

W A T E R,
AS A PRESERVATIVE OF HEALTH, AND A REMEDY IN DISEASE.

A TREATISE ON BATHS;

INCLUDING

COLD, SEA, WARM, HOT, VAPOR, GAS, AND MUD BATHS;

ALSO, ON

HYDROPATHY,

AND

PULMONARY INHALATION;

WITH

A DESCRIPTION OF BATHING IN ANCIENT AND MODERN TIMES,

BY

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TO
RENÉ LA ROCHE, M. D.,
IN TESTIMONY, NOT MORE
OF
HIS PROFESSIONAL AND LITERARY MERITS,
THAN OF
THE CHERISHED INTIMACY OF A LIFE-TIME,
THE FOLLOWING PAGES
Are Affectionately Inscribed
BY HIS ATTACHED FRIEND
THE AUTHOR.

(iii)

PREFACE.

IN the present Treatise, the author has enlarged on the main subject of a former work,* viz., in all that relates to Bathing; and he has substituted for the chapters on Mineral Springs, still fuller ones on the internal uses and virtues of common water. This fluid is known to be an indispensable part of man's daily aliment and the largest constituent of his blood, while its curative properties, as a bath and as a drink, stand on perhaps higher grounds than any one article of the *Materia Medica*.

It must be deemed somewhat strange, in medical literature, that, although there were essays on the Cold Bath, on Sea Bathing, on the Warm Bath, and on the Vapour Bath, and sometimes on two of these in the same volume, yet, until the appearance of the treatise just referred to, there was no one, in the English language, in which they were all severally considered, and their resemblances and contrasts, and their successive and alternate uses, pointed out. In this want of a connected and comprehensive view of the whole subject, may be found one cause, at least, of the empirical use of baths of different temperatures, and of the uncertainty of opinion respecting their true character. Each kind of bath was considered too much in itself, and as a consequence, without its due relation to the others. If the cold had been compared with the warm bath, and both of them contrasted with the hot bath, in place of seeking for analogies to their operation in the effects of medicinal

* On Baths and Mineral Waters—1831.

agents, a more satisfactory and harmonious doctrine of balneatory hygiene and therapeutics would have resulted.

In thus uniting into a compact body, with something like form and features, the hitherto scattered parts of dietetical and medical hydrology, no attempt has been made to establish, at the same time, a dogmatic system of hydrotherapia, nor to persuade readers that they will find in water a universal remedy, acting in some mysterious, if not occult manner. So far from assenting to any doubtful creed of this kind, we have only to recur to the elementary teachings of physiology for a knowledge of the means and manner by which water finds entrance into the living organism. In the form of a bath, it permeates the skin, and of drink, it passes through an analogous membrane lining the digestive passages, and, in both ways, enters the blood-vessels. By its varying temperature, it acts on the nervous system, in virtue of its primary impression on the two great surfaces, the external and the internal, just mentioned; operating as a sedative and tranquilizer, or as a stimulant and tonic. For the better understanding, on the part of the general reader, of the primary, as well as the secondary and sympathetic effects of water in its hygienic and medicinal relations, brief outlines of the structure and functions of the skin and of the internal or mucous membranes are given.

The author has found no cause to change the explanations which he has heretofore given, of the mode of action of the cold and warm baths on the living system. He believes them to be more in harmony with physiological phenomena, and with the curative effects of the different kinds of baths; and to furnish a safer guide for the use of these agents, in the preservation of health and the cure of disease, than the hypotheses generally

current on this subject. Of the practical tendency and application of the explanations offered by the author, an example may be instanced in the little volume of Dr. M. L. North, on the Saratoga and other mineral waters, in which, in reference to the selection of a warm or a hot bath under particular circumstances, he says: "In a treatise on Baths and Mineral Waters, by Dr. Bell of Philadelphia, I found a criterion which I looked for in vain in Currie, Jackson, Scudamore and other distinguished writers on this subject—a criterion which has in very few instances, to my knowledge, during eight seasons, led me astray in its application to the diversified phases of disease—and one which I can most honestly, perhaps too credulously, recommend to the adoption of my fellow practitioners here and throughout the country, as a safe and intelligible guide."

On the subject of Sea Bathing, M. Gaudet's interesting treatise has supplied a large amount of definite knowledge, which was so much needed. The work of M. Rapou on Vapour Baths, has been, in like manner, turned to useful account, by the introduction, in these pages, of the results of his extensive observations. American readers are thus put in possession of a body of instructive matter not hitherto accessible in an English dress.

The somewhat detailed descriptions of the several processes and appliances for bathing among the ancient Romans, and the people of Northern Europe and of the East at the present time, will, it is hoped, be acceptable, even as a part of the history of manners and customs. But there was a still higher design than that of gratifying curiosity, in these descriptions, as well as in other passages which might seem to be of a purely literary nature. They will be found to exert a direct bearing

on the practical question of the alternate use of cold and warm bathing, and of the propriety of the additional processes of friction, shampooing, &c., which are too much overlooked, even if their utility be not contested, in modern bathing throughout the greater part of the civilized world.

In the details on the "Watery Regimen," it is the aim of the author to familiarize his readers with the importance of dietetics, in the large sense, and to exhibit this branch in its true relation to medicine. If required to define their relative position to each other, there can hardly be a doubt that medicine ought to be regarded as an appendage to dietetics, and not dietetics an appendage to medicine.

The author is not insensible to the ambition of giving greater vogue to the practice of bathing, under a belief that, if it were once to become general, it would contribute powerfully towards an increase of the public health, and of individual comfort and pleasure. It would be a step in the advance from physical to moral amelioration and progress. With this view he would earnestly entreat the co-operation of the medical and other directors of hospitals, and asylums of all kinds, by the construction of baths of every needful variety, for the use of the inmates.

Much might be done to the same end by the heads of manufacturing establishments in which steam-power is employed. It has been computed that the waste water of a 500 horse-power steam-engine would suffice to furnish baths for 26,000 persons daily, at an average temperature of 70° to 75° of Fahrenheit. The water, if taken from the hot well of the engine, ranges from 92° to 110° F.

PHILADELPHIA, March 2, 1850.

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CHAPTER I.

BATHING AN INSTINCTIVE WANT—IS TOO MUCH NEGLECTED IN ENGLAND AND THE UNITED STATES.—THE SKIN—ITS STRUCTURE.

It is the design of the author, in this volume, while he gives the greatest prominence and largest space to the subject of Bathing in all its varieties, to dwell, also, with due emphasis, on the internal use of water, both in its hygienic and therapeutical applications, as one of the chief means of preserving health and of alleviating and curing many diseases. The watery regimen, in its most comprehensive meaning, as adapted to cleansing, purifying, and invigorating the human frame, will thus receive greater developments than it has hitherto obtained in any connected system of instruction. While friendly to the body, it will be shown to be, at the same time, a soother and comforter to the mind, and, next to fresh and pure air, the best dispeller of the vapours and spasms of fitful hysteria and of gloomy hypochondriasis—the best cosmetic for beauty, the best cordial for care.

Bathing, after some fashion or another, may be considered as the gratification of an instinct common to all living nature; for, it is no fanciful idea to regard the aspersions of the vegetable kingdom, including all its tribes and varieties, from the cedar and the oak down to the humble and parasitical moss, by rain, atmospheric vapours and dew, as a modification of the bath; by which dust is removed, insects are destroyed, and fluid is furnished for the nutrition of the plant. Large classes are so distinctly aquatic as to be habitually immersed in water, leaving only their flowers and some of their leaves to float on the surface.

The practice of bathing, either by immersion and swimming in rivers, lakes and the sea, or, in a more restricted manner, in water collected for the purpose in domestic and public baths, would be, one might naturally suppose, of universal adoption, unless in some region of sandy

deserts or otherwise arid soil in which water is not procurable. It has been declared to be a law imposed by nature upon all perspirable creatures. We have, in fact, ample historic precedent and contemporaneous usage in its favour; but yet, it is far from being so general as is necessary for the requirements of health, not to say of personal cleanliness and comfort. In this respect, modern civilization is behind the ancient, and the people among whom science and the arts most flourish, and among whom the theory and practice of medicine and its collateral branches have made the greatest progress, will poorly compare with those whom we are too ready to call semi-barbarous. The singular discrepancy between admitted theoretical knowledge and its practical application for the wants of the many is met with, to a painful extent, in the Anglo-Saxon branch of the great human family, the people comprising which turn water to wonderfully diversified uses, for ocean and river navigation, and manufactories, canals, and steam-engines. They employ it in its solid state, as ice, in its aeriform state as vapour, they use it for bleaching linen, for cleansing wool, and for every assignable purpose except those to which the cravings of instinct sanctioned by sound physiology and hygiene more directly point, viz.; for drinking and for bathing. It is here that a hydrophobic tendency is manifested by nearly all classes. They are more just to their domestic animals. Their horses, in a more especial manner, receive from their hands the advantages of ablution, often even to excess, with the aid of a thorough currying, brushing and rubbing—healthy observances of which the gentlemen who own, and the coachmen, ploughmen and wagoners who drive, these animals voluntarily and in a spirit of uncalled-for penance deprive themselves.

We read in a small work,* not remarkable for its literary execution, of an assertion, which, bold as it may seem, is not wide of the mark. The writer says: "There is no people in the world who evince so great a disregard of personal cleanliness as the English, and at the same time, no nation that piques itself so much upon the possession of that quality." He asserts it, as a fact that will hardly admit of contradiction, "that a large proportion of the

* The Bath, &c., by Horatio Mahomed

population of this country [England] never submitted themselves to an entire personal ablution in their lives, and many an octogenarian has sunk into his grave with the accumulated dirt of eighty years upon his skin ; and yet were he charged with uncleanness would indignantly repel the assertion, and would endeavour to prove the purity of his person, by instancing the cleansing of his face and hands several times daily." The daughter follows the example of the mother, and Columbia is as far from seeking the aids to health and beauty furnished by frequent ablution and bathing, as Britannia was ever wont to be. Of late years, however, the English who have travelled on the continent, and in Turkey and Egypt, have returned home with higher notions of the utility of bathing ; and some of them have adopted, in consequence, a tone of rebuke of the neglect of ablutionary proprieties in the United States, which is notoriously common at home. But, what we are bound to regard is the pertinency of the advice or the rebuke, rather than the qualifications of the adviser. Mr. Stuart, whom we cannot accuse of a censorious disposition, remarks on this topic in his "Three Years in America": "In fact I have found it more difficult in travelling in the United States, to procure a liberal supply of water at all times of the day and night, in my bed-chamber, than to obtain any other necessary. A supply for washing the face and hands once a-day, is all that is thought requisite." Mr. Stuart was not aware of the severe strictures of an English writer, who, in his advocacy of cleanliness, thus speaks of the prevalent practice of his own countrymen : "Some disgusting economists of both time and water, reduced ablution to a habit of washing the face and hands, leaving the clothing to hide whatever dirt might accumulate in the rest of the body, and, as though enamoured of its ingenuity, their descendants have never abandoned the same filthy and unwholesome practice." This writer's observations on the frequenters of the sea-shore during the heats of summer are so entirely applicable to the same class on this side of the Atlantic, that, at the risk of offending some of them, I shall repeat his language on the occasion : "The yearly custom of visiting the watering-places has very little to do with the use of the bath ; this custom, confined as it is to a circle

of society which does not compose a hundredth part of the population, is not for a moment to be placed on a footing with that constant and habitual exercise of bathing which distinguishes other countries. The hydromaniac fever, which comes on about the month of August, arises from a love of change—change of scene and amusement—an ennui of town; it is a fit of fashion, it is any thing but a parallel to the habit it feebly caricatures.” These annual visits to the sea-shore are not meant to be disparaged. The argument to be conveyed is, that bathing ought to be a daily, instead of a yearly practice, and that simple water of a tepid or a warm temperature may well replace the sea water, the virtues of which are erroneously supposed to depend upon the saline substances which it holds in solution.

In this, however, as in other matters of public hygiene, there is an evident improvement,—which has reached the masses, and of which the poor, and even the tenants of the prisons, are now beginning to enjoy the benefits. Baths and washing houses for the poor have been tried with entire success in some of the chief towns of Great Britain; and in Philadelphia, in the new house of Industry in Moyamensing, similar arrangements have been made for this class of persons. Wherever steam is used in manufactories, warm water for bathing can be readily procured, with slight additional cost to the owners, and with so much increase of comfort and better health and alacrity of movement and feeling on the part of the operatives, and other persons employed in them, that there would be a real gain, in consequence, to all parties even in a pecuniary point of view. Where a building is warmed by steam, all its inmates might easily enjoy the comforts of the warm bath. Taking into account the increased supply of water in our chief cities and towns, and the facilities of the kind just now alluded to, the remark of Dr. Combe, in reference to the state of things in Great Britain, that “baths are now to be found in fifty places for one in which they could be obtained twenty years ago”^{*} ought soon to be equally applicable to this country. The comparison which immediately follows, must, also, we are afraid, be received to our disadvantage, as well as that of the English. “Even yet, however,” continues Dr. C.,

* The Principles of Physiology, &c.

"we are far behind our continental neighbours in this respect. They justly consider the bath as a necessary of life, while we still regard it as a luxury. I believe that I am within the truth when I say that in one hospital in Paris, a greater number of baths have been administered to the poor during the last year, than to the whole working population of Great Britain, during the last ten years." Since this was written, measures have been taken in Liverpool, London and other cities, which will neutralise in a great degree the force of the stricture implied in the last sentence.

Why, it may well be asked, should the people of the United States deprive themselves of the admirable appliances, on the score both of health and enjoyment, to which all classes in many other countries and opposite climates have ready recourse. In Russia, the use of the vapour bath, in the manner to be hereafter described, is general, from the Emperor to the poorest serf; and, as Dr. Clarke, in his northern travels, truly remarks, through all Finland, Lapland, Sweden, Norway and the vast northern empire there is no hut so destitute as not to possess its family vapour bath, whither all the members of the household resort every Saturday at least, and every day in case of illness. Equally general is the use of the bath in Turkey, Egypt, and Persia among all classes, from the Pasha down to the poor camel driver and porter, or the Arab boatman; in short every one who can raise a few paras. Even the red men of our forests, the aborigines of this continent, have more fully appreciated the advantages of the bath than their civilized successors and supplanters of the white race.

Details of the various modes of bathing by the people now enumerated, will be found in a subsequent chapter,—following a description of the public and private baths of the Greeks and Romans. The question of the utility of bathing, as a matter of hygiene, might be supposed to be placed beyond all controversy by the example of so many people in all ages of the world, and in the greatest variety and contrast of climates. But science, in the shape of physiology, gives, also, its confirmation of the practice of bathing; and to it I shall appeal, by introducing a brief sketch of the structure and functions of the skin, and of its intimate relations with the chief organs of the human

frame. It will then be seen, how necessary ablution and the various auxiliary processes of the bath are, for maintaining a healthy state of this tegument and of the internal organs with which it is in close functional connection, as well as for preventing a host of diseases to which mankind is liable by a neglect in this particular.

Offices performed by the Skin.—The skin, the external tegument or envelope of the animal frame, serves to establish our relations with the external world, by receiving impressions, through its sense of touch, of the physical properties of substances with which we are brought in contact. Through its other modifications of sensibility it apprizes us of the temperature of these substances, and of that of the atmospheric or watery medium in which we may happen to be placed. In this way, the brain is actively and continually impressed through the skin by connecting nerves, and the frame of mind is, of course, not a little dependent on the force and extent of these impressions.

There is yet another series of functions performed by the skin, by which it aids in the nutrition of the body. It absorbs fluids and gases, and exhales the like; and it is auxiliary to respiration and to the regulation of animal heat.

Anatomical Divisions of the Skin.—The apparatus by which all these various functions are performed will now be briefly described. It consists of two main layers: the external, called epidermis, cuticle or scarf skin; and the internal, called *cutis vera*, *dermis*, *corium*, or true skin, with the perspiratory and the sebaceous or oil-secreting glands.

The True Skin.—The dermis or true skin consists of a dense elastic tissue, with numerous areolæ or openings, for the transmission of bloodvessels and nerves from its under surface, and of an intricate web-work of minute bloodvessels, sensory nerves, and lymphatic or absorbent vessels distributed over its upper surface. This web-work is sometimes called the papillary layer. The dermis also contains in its substance the sebaceous follicles, and transmits the ducts of the sudoriparous or sweat glands that lie beneath it. The papillary layer of the dermis consists of conical minute prominences, very irregular in their distribution. The papillæ are sometimes collected into masses

and are arranged in parallel rows, giving rise to the ridges and furrows seen upon the palm of the hand and sole of the foot. The dermis or true skin varies in thickness in different parts of the cutaneous surface, being most dense on the back, outer sides of the limbs, palms of the hands and soles of the feet; and contrasting, in this particular, with the inner side of the limbs, the breast and the back of the hands and the eyelids. The thickness in these cases is sometimes of the dense sub-stratum or corium proper of the true skin, and sometimes, as where great delicacy of touch and sensation is required, it is by increase of the substance of the papillæ themselves. Of the profuse supply of blood to the true skin, by the interweaving of innumerable fine bloodvessels or capillaries, and of nervous tissue on which last sensitive impressions are made, we may form an idea from the fact, that, in no part of the surface can the point of the finest needle penetrate without blood being drawn and pain felt.

The Epidermis or Cuticle.—The external layer of the skin, called epidermis or cuticle, is formed by an exudation of cells from the papillary layer, which is at first soft, but afterwards becomes hard and horny in its texture, and of a scaly or imbricated arrangement. It consists of several laminæ, the outer of which exhibit the commonly described characteristic features of the epidermis, in their being hard and unorganized, while the inner, or those in contact with the papillary layer, are soft and cellular. The latter was for a long time described as a separate layer, and was called the mucous or *rete mucosum*, in which the seat of the colour of the skin was believed to reside. It is now ascertained, however, that the pigment cells are scattered through the ordinary epidermic cells in the under laminæ of the epidermis, and contiguous to the papillary layer of the dermis. On the presence of this pigment, in the cells of the epidermis, depend the different tints of colour of the skin, observable in different races and nations. Owing to the laminated texture of the epidermis, its superficial laminæ are continually removed by attrition, and new ones are as continually formed on its internal surface. This outer layer of the skin is accurately modelled on the papillary layer, and each papilla has its appropriate sheath in the newly formed epidermis.

The epidermis is pierced by the excretory ducts of the sweat glands, and of the sebaceous follicles, which, as already remarked, lie in the true skin and immediately beneath it, and also by the shafts of the hair. Its laminæ become more numerous, or in other words it becomes thicker, in proportion as the surface is rubbed and exposed to pressure, by which the true skin is excited to increased secretion, in order to protect the parts most subjected to attrition and pressure, as the soles of the feet and palms of the hands. It is thinnest on the tips of the fingers, and on the lips, parts in which sensibility is required for important purposes. The obvious use of the epidermis is to obtund what would otherwise be acutely painful sensations, from the impression of foreign bodies or extremes of temperature on the denuded dermis, as we all know in cases where the epidermis has been accidentally peeled off, or removed by disease or by a blister. Under the present arrangement, it allows of a more extended contact with the substances to be examined, by a greater pressure and firmer grasp and diversified handling, so that a more definite and at the same time pleasurable perception of their properties is obtained.

The Sudoriparous or Sweat Glands.—The sudoriparous, or perspiratory, or sweat glands are small, oblong, rounded bodies, in some cases sacs situated on the tissue beneath the skin. Under the microscope these bodies present the appearance of a solitary tube intricately ravelled, one end of which is closed, and usually buried within the gland, the other emerges from the gland, and opens on the skin. The external end passes through the dermis and opens obliquely by a pore upon the surface of the epidermis or scarf skin, so that the orifice is covered by a minute valve of this outer layer of the skin. The convoluted tube, making a kind of knot of which the gland consists, is copiously supplied with bloodvessels, and lined by a prolongation of the epidermis. The pores are visible to the naked eye upon the palm of the hand, the sole of the foot, and the extremities of the fingers: they are ranged along the little ridges of sensory papillæ, and give to the latter the appearance of being crossed by transverse lines.

Perspiration, and Extent of the Perspiratory Tubes.—From these glands there is constantly secreted the watery and saline fluid of perspiration. The following minute esti-

mates by Mr. Wilson, in his *Practical Treatise on Healthy Skin*, are curious and interesting.

“Taken separately, the little perspiratory tube, with its appended gland, is calculated to awaken in the mind very little idea of the importance of the system to which it belongs; but when the vast numbers of similar organs composing this system are considered, we are led to form some notion, however imperfect, of their probable influence on the health and comfort of the individual. I use the words ‘imperfect notion’ advisedly; for the reality surpasses imagination, and almost belief. To arrive at something like an estimate of the value of the perspiratory system, in relation to the rest of the organism, I counted the perspiratory pores on the palm of the hand, and found 3528 in a square inch. Now, each of these pores being the aperture of a little tube of about a quarter of an inch long, it follows that in a square inch of skin on the palm of the hand, there exists a length of tube equal to 882 inches, or $73\frac{1}{2}$ feet. Surely such an amount of drainage as 73 feet in every square inch of skin, assuming this to be the average for the whole body, is something wonderful; and the thought naturally intrudes itself, What if this drainage were obstructed? Could we need a stronger argument for enforcing the necessity of attention to the skin? On the pulps of the fingers, where the ridges of the sensitive layer of the true skin are somewhat finer than in the palm of the hand, the number of pores on a square inch a little exceeded that of the palm; and on the heel, where the ridges are coarser, the number of pores on the square inch was 2268, and the length of tube 567 inches, or 47 feet. To obtain an estimate of the length of tube of the perspiratory system of the whole surface of the body, I think that 2800 might be taken as a fair average of the number of pores in the square inch; and 700, consequently, of the number of inches in length. Now, *the number of square inches of surface in a man of ordinary height and bulk is 2500; the number of pores, therefore, 7,000,000, and the number of inches of perspiratory tube 1,750,000, that is, 145,833 feet, or 48,600 yards, or nearly 28 miles.*”

Sebaceous or Oil-Forming Glands.—The sebaceous or oil-forming glands which are included in the above calculation of Mr. Wilson, are small, oblong bodies closely

resembling the perspiratory glands, and sometimes they are short straight follicles or pouches, seated in the substance of the dermis. Their excretory or terminal ducts open, in the largest numbers, in a hair follicle. In the hairy parts of the skin, we usually find a pair of sebaceous follicles opening into the passage through which every hair ascends. In general, the sebaceous tubes are straighter and wider than the perspiratory ones. They are absent in the palm and sole, but abound in the face and nose, the head, the ears, the borders of the eyelids, arm-pits, and the natural outlets of the body, &c. The purpose of the sebaceous secretion is to keep the skin soft and pliable, and to prevent its being dried and cracked by the influence of the sun and air, and, also, to protect parts much exposed to friction. This oily fluid is much more abundantly formed in the races of mankind which live in warm climates than in those that inhabit cold countries. Its presence on the skin of a person in a bath causes the water to form itself into separate drops or globules on this surface; and it imparts, also, a certain degree of greasiness to a garment that has been worn for a length of time next the skin.

The sebaceous tubes are frequently the seat of a curious parasite, or animalcule (*Demodex folliculorum*), which Mr. Wilson represents to be present in great numbers on the inhabitants of cities and large towns, whose skin is more or less torpid in its functions. He has found it in all ages, from youth to old age; more numerous, it is true, in the latter than in the former period, and in great and remarkable numbers during sickness. He is disposed to regard it as answering a salutary purpose, by helping to keep open the over-distended cells and tubes, which, in the persons referred to, become impacted with hardened sebaceous matter, and which are in this way irritated and sometimes inflamed.*

* The *British and Foreign Medical Review*, after demurring to this hypothesis of Mr. Wilson, makes the following pertinent remarks: "Doubtless it will be highly gratifying and instructive to the public mind, to be made acquainted with the fact, that the habits of 'refined society' tend just as strongly to the production of this tribe of parasites, as the habits of the 'great unwashed' favour the development of certain others, which are not in themselves one whit more disgusting. Here, as else-

The Hair.—The hair is an important appendage to the skin: it derives its origin from follicles situated under this membrane, still more deeply than the sweat-glands. The hair-follicle is formed by the inversion of the skin. From the bottom of the follicle, a kind of papilla of a cellular structure rises; the exterior and densest part of which is called bulb, the inner and softer is known by the name of pulp. The shaft or body of the hair begins at the external surface of the skin: it is of a darker colour, harder, and flatter than the bulb, and is somewhat curved, particularly at its termination. It consists of two elementary parts: a cortical or investing substance of a fibrous or horny texture; and a medullary or pith-like substance occupying the interior. The latter is, sometimes, almost entirely wanting. A section of hair is represented by Mr. Wilson to consist of three different textures, a loose cellular texture in the centre, a strong texture of parallel fibres becoming more and more dense towards the circumference externally to this; and a thin, varnished layer of flattened cells, constituting the polished surface of the hair. By Krause the hair is regarded as a tissue analogous to the epidermis; the cortical portion resembling the outer layer, and the me-

where, we see how nature manages to compensate one class for the exemption they may enjoy from the evils incident to another. The delicate town-bred lady of fashion, in descending from her carriage, shrinks instinctively from the mass of rags, filth, and vermin, which is brought into contiguity with her precious person by some pertinacious beggar; ignorant all the while that her sebaceous follicles give board and lodging to a host of parasites, whose number may equal that of the various kinds of 'small deer' that nestle in the matted hair and tattered garments of the fellow-being whom she regards with such loathing. 'Where ignorance is bliss, 'tis folly to be wise;' and some, perhaps, of Mr. Wilson's fair readers may not thank him for enlightening them on the subject. But we consider that such knowledge ought not to be withheld from deference to fastidious delicacy; and that, besides the immediate inducement it affords to the adoption of such habits as may free the sebaceous system of those unwelcome inhabitants, it may also have the beneficial *moral* use, of aiding in the demolition of those barriers between the classes of society on which we are thankful that every day is now making some fresh inroads."—Vol. 21, pp. 201-2.

dullary portion the inner layers of the epidermis. But, whatever differences of opinion may prevail respecting the intimate structure and composition of the hair, its scaly character externally is generally conceded. The scales resemble those of the epidermis, but they are much smaller; they are arranged in rows like tiles upon a roof, and their edges form delicate lines upon the surface of the hair, which are sometimes transverse, sometimes oblique, sometimes apparently spiral. This imbricated arrangement of the cells, composing the outside of the hair, gives rise to the sensation of smoothness, which we feel on drawing a hair between a finger and thumb in one direction, and of roughness when this process is performed in another direction.

The hair grows by the addition of new matter at the base of its shaft. That it is organized, and that in its changes—in growth, colour, abundance, sparseness, and falling off—it is influenced by the causes which act on the nutrition of other parts is evident under various circumstances. Among these may be mentioned its coming away in febrile and other violent diseases; its change of colour in old age, or in states of the economy which bring on premature senility, and also of strong mental emotion, as of anxiety and fright. The changes in certain diseases of the hair itself, are demonstrative of the same fact, as in the *Plica Polonica*, in which the hair is matted together by a glutinous secretion, and bleeds when cut off close to the stumps. Mr. Paget relates the history of a case of a lady, who was subject to very violent attacks of nervous headache, which generally came on towards evening. She was able to predict that on the following morning there would be a total loss of colour of a tuft of hair, which was, however, generally restored after a few days. In appearance and in texture, the hair differs, as is generally known, in the different races of mankind, and, also, in different individuals.

The Nails.—The nails are another appendage to the skin, and so closely do they resemble the epidermis that they are little else than an altered form of this latter. They consist of cells which gradually dry into scales and become coherent, one to another.

CHAPTER II.

FUNCTIONS OF THE SKIN—ITS CONNECTION WITH THE INTERNAL ORGANS OR THOSE OF NUTRITION—THE SKIN IS THE ORGAN OF GENERAL SENSATION AND TOUCH—IS ALSO AN ORGAN OF ABSORPTION AND SECRETION—REGULATES ANIMAL HEAT—THE CAUSES MODIFYING ANIMAL HEAT—SYMPATHIES OF THE SKIN WITH OTHER ORGANS.

Continuity of the Skin with the Mucous Membranes.—In order to be able to appreciate fully the nature and importance of the functions of the skin, we ought to be aware that it is continuous with the membranes which line the internal cavities of the body, on and through which the functions of digestion, respiration, and nutritive absorption are performed. These membranes are called mucous, on account of the secretion of the mucous fluid by which they are lubricated. One division, after lining the mouth, passes down and lines the stomach and the whole tract of the intestinal canal, giving out prolongations, in its course, to the excretory ducts of the liver and pancreas, as, in the mouth, it had done to the excretory ducts of the glands which furnish saliva. Another division passes from the nose and back part of the throat into the wind-pipe, and thence into the cavities of the lungs, to which it gives a lining as far as their minutest divisions. The system of mucous membranes, or the *mucous system*, as it is generally called, is not only directly continuous with the skin, at the various orifices, mouth, nose, &c.; but it also resembles the latter closely in structure, in its consisting of an investing membrane, *epithelium*, analogous to the epidermis externally, and of a reticulated tissue of blood-vessels, nerves and follicles bound up in areolar tissue, and resting on denser tissue of the same nature as the areolar, which takes the place of the corion of the skin. Another, but smaller division of mucous membranes lines the urinary and genital organs, and is, like the other divisions of the mucous system, continuous with the skin, which it, also,

resembles in structure, and with which it has a close sympathy, both in health and disease.

Skin, the Organ of Touch.—It has been stated in a former part of this chapter, that the skin is the organ of general sensation, and of touch. It is so in virtue of its nervous ramifications and expansions, which are connected, by nervous cords, with the spinal marrow and the brain.

Absorption by the Skin.—The skin is, moreover, an apparatus for the performance of the functions of absorption, by which various substances, gaseous, fluid and solid, are introduced into the body, and of secretion and exhalation, by which various matters are eliminated, either for special uses, or the retention of which would be hurtful to health. In virtue of its first or absorbent function, it becomes an organ of supply for the wants of the animal economy: and in this way it allows of the entrance of oxygen gas, and of water and of numerous saline substances, when they are held in solution by water. Nitrogen gas and carbonic acid are also absorbed by the skin. Most of the articles, indeed, of the *Materia Medica* may be introduced in this way into the blood, and produce their distinctive effects on the different organs in the same manner, although with not so much certainty of operation, as if they had been taken into the stomach. In certain cases, as of sailors in open boats, and in which water could not be procured for drink, the pangs of thirst have been assuaged by keeping the skin wet with sea water. In other cases, in which, owing to obstruction by disease, the patient, as in the instance related by Dr. Currie, was unable to swallow, the emaciation has been arrested, and the thirst removed by the use of nutritive clysters, and prolonged immersion in a tepid bath of milk and water.* Immersion in the warm bath causes both cutaneous absorption as well as exhalation from the skin and the lungs; but, as, notwithstanding the loss by the double exhalation, the weight of the body is increased by the bath, there must be a real gain by absorption. The hard and scaly epidermis or cuticle retards the introduction of fluid into the general system; but, after a while, it is permeated by this latter, as in the instance of the feet being soaked in warm water, when the thick cuticle of the sole

* Medical Reports on the Effects of Water, &c.

becomes whitened and opaque, and allows a quantity of fluid to exude, if pressure be then made upon it. A farther example of nutritive absorption by the skin is furnished by an experiment which consisted in tying a bandage round the hind leg of a puppy, and then keeping the limb for twenty four hours in tepid milk. At the expiration of this time, the lymphatic vessels were found full of milk. I do not deem it necessary, in this place, to inquire into the relative part performed by the veins and the lymphatics, respectively, in the function of cutaneous absorption. Frogs, which have a thin skin, and lizards, which have a cuticle thicker than in man, after having lost weight by being kept for some time in a dry atmosphere, were found to recover both their weight and plumpness very rapidly, when immersed in water. Immersion of even a part of the body will be followed by the absorption of the water and its distribution throughout the entire system.

Epidermic Medication.—When the epidermis is raised by a blister or by hot water, and the true skin or dermis is exposed, substances applied to the surface of the latter are readily absorbed. Advantage has been taken of the fact, by the introduction of various medicines, in this way, into the general system, constituting what is called endermic medication. This method is especially useful when, owing to mechanical obstruction, the article cannot be swallowed, or in the case of an inflamed and irritable stomach which prevents its being retained.

Secretion and Exhalation by the Skin.—Equally conspicuous with the function of absorption or supply is that of secretion and of exhalation, depuration or waste, as performed by the skin. Its appropriate secretions have been already mentioned. Some of these are for the formation of parts or appendages of the skin, such as the epidermis, or cuticle, and the nails; one is indirect, as the hair; another, sebaceous, is directly contributive to the healthy state of the skin, while the secretions of perspiration and of carbonic acid serve both to purify the blood by the elimination of effete matters, and to exert an influence on the equalization of animal heat.

We may infer that the oleaginous matter secreted by the sebaceous glands and hair follicles, besides its immediate purpose of lubricating the skin and protecting the

borders of the eyelids and the ear-passages, at which parts it is thick and abundant, is also an excretion, the removal of which from the blood is necessary to health. But the chief depurating processes are, the elimination of the perspirable fluid or sweat, and of carbonic acid. Mention has been already made of the immense extent of the tubes of the sudoriparous or sweat-glands—nearly twenty-eight miles in length, from which a secretion is constantly going on. Commonly the fluid is formed so gradually that the watery portion escapes by evaporation as fast as it reaches the surface, in the form of vapour. It is then called *insensible* perspiration. But during strong exercise, exposure to great external warmth, in some diseases, and when the air is already so loaded with moisture as to be incapable of receiving more, or when evaporation is prevented by the application of oiled silk or plaster, the secretion becomes *sensible* perspiration, and collects on the skin in the form of drops of fluid. Insensible perspiration consists, in addition to watery vapour, of carbonic acid and acetate of ammonia. The fluid of sensible perspiration or sweat holds in solution various saline substances, viz., phosphates of soda and lime, carbonate of lime, chloride of sodium (common salt), sulphate of soda, muriate of ammonia and some potash, and lactic and acetic acids. Traces of iron and an animal matter have, also, been met with. Not all of these, however, have been detected by any one experimenter. The acid reaction and sour smell of sweat are due, it is alleged, to lactic acid. These estimates include the secretion from the sebaceous glands, which is necessarily mixed with the sweat—at any rate is imbibed by clothing, in common with this latter fluid. One of the experiments made by M. Thenard, was on the perspiration collected in a flannel shirt which had been washed in distilled water.

Perspirable Matter given out by the Skin.—It is not necessary that I should repeat here the details of the experiments of Seguin, Lavoisier, and others, nor those of Sanctorinus at an earlier date, in order to determine the quantity of perspiration, and mainly that in the state of watery vapour, in a given period. The two great surfaces for the exhalation of watery vapour from the body, are those of the skin and of the mucous or lining membrane

of the lungs,—the pulmonary mucous membrane, as it is generally called. The entire loss by exhalation from the lungs and skin, during the twenty-four hours, seems to average about three and a half pounds; and as the pulmonary exhalation is usually somewhat less than a third, and the cutaneous somewhat more than two-thirds, the average loss from the skin may be estimated at two and a half pounds in the period specified. Of this quantity not more than a sixth, however, is furnished by the vital process of secretion from the perspiratory glands: the greater part is the product of the simple evaporation of moisture which transudes through the skin, unaccompanied by the saline and animal matters and acids of the glandular secretion.

The discharge from the skin, or cutaneous exhalation, is less active when the digestion is impaired. It is most abundant during the period of digestion, and least so immediately after food is taken. This exhalation is influenced both by the state of the atmosphere and by that of the body itself; in its being increased in a dry atmosphere and by active muscular exertion, and diminished in a moist atmosphere and by repose and indolence. The organs, the function of which most influences the skin, are the kidneys. The cutaneous and urinary excretions are reciprocally vicarious; the deficiency of one being compensated by increased action of the other, and this not merely in regard to the amount of fluid which they carry away from the blood; but also, in respect to the solid matter which they eliminate from it. It appears that, at least, one hundred grains of effete azotized matter are daily thrown off from the skin; and any cause which checks this excretion, must increase the labour of the kidneys, or produce an accumulation of noxious matter in the blood. Hence attention to the functions of the skin, at all times a matter of great importance, is peculiarly required in the treatment of urinary diseases; and it will be often found, that no means is so useful in removing the lithic acid deposit as copious ablution and friction of the skin, combined with exercise. The like observation might be made regarding Bright's disease, or albuminuria, to the production of which suppressed perspiration and intemperance so powerfully contribute.*

* Bell and Stokes's Lectures on the Theory and Practice of Physic. Fourth Edition, Vol. ii. p. 578.

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The Skin, a Respiratory Organ.—The skin, by its absorbing oxygen from the atmosphere, and by its secreting carbonic acid, is, in fact, a respiratory organ, and, as such, it aids the lungs in producing that change in the blood on which the arterial colour and other characters of this vital fluid and the evolution of animal heat mainly depend. In some of the inferior animals respiration is performed by the skin alone, and in others, as in frogs, excision of the lungs is better borne than removal of the skin, although the quantity of carbonic acid exhaled by the cutaneous is just equal to that exhaled by the pulmonary mucous membrane. The importance of the respiratory function of the skin, even in the higher animals, is farther manifested by the fact, that if its surface be covered with an impermeable varnish, or if the body be inclosed, all but the head, in a caoutchouc dress, they soon die as if asphyxiated; their heart and lungs being gorged with blood, and their temperature during life gradually falling many degrees, and sometimes as much as 30° F. below the ordinary standard. Another remarkable result of this obstruction of the respiratory and exhaling functions of the skin is the production of Bright's disease, and the secretion of albuminous urine.

If the knowledge of these facts could reach the crowd of the unwashed, certainly of the unbathed, both rich and poor, they would surely feel some alarm at their danger. They would reflect that their own skins must be pretty thoroughly coated, and its pores obstructed by a thick investing layer, the residue of perspirable and sebaceous secretions mixed with detached scales of the cuticle, dust and other matters floating in the atmosphere, all of which have been allowed to accumulate for a term of years.

Diseases from Interrupted Functions of the Skin.—Every organ of the body is liable to be inflamed or to take on some other form of disease, in consequence of disturbance or suspension of the cutaneous functions. This latter is usually caused by the sudden or the prolonged impression of cold and moisture, and especially by their partial application, as in a current of air. To this agency we may refer anginose or throat affections, catarrh running into acute bronchitis, pulmonary consumption, pericarditis, inflammation of the stomach and bowels, uterus, &c., rheu-

matism and gout, and very often fevers. Dyspepsia with all its painful concomitants is often kept up by these same means. The operation of cold and moisture on the skin is rendered much more noxious when the impression suddenly alternates with either high solar or artificial heat, and when the skin is bathed in sweat after labour or other exhausting exercise.

The Skin a Regulator of Animal Heat.—As the skin by its respiratory function contributes to the evolution of animal heat, so by its exhalation and the exudation of fluid and its forming a large surface for evaporation, does it prevent the excessive accumulation of this heat and preserve a medium temperature of the whole body. In health the internal organs, and the blood and fluids circulating through them, have a temperature of about 98° F. Except under the armpit or axilla, that of the skin falls below this standard. A thermometer placed on the sole of the foot, having a comfortable situation of warmth, indicates 90° F. The greater the external heat to which the body is exposed, the greater would be the internal or animal heat generated, were it not that this effect is prevented by the increased perspiration and consequent evaporation which take place under this exposure. Franklin, in pointing out this interesting fact, compared the transpiration from the skin to the oozing of the water through the sides of the unglazed earthen vessels called *alcarazas*, and its appearance on the outer surface. Evaporation in both cases is followed by a diminished temperature. The secretion of the fluid from the sudoriparous glands has also a share, and that a no small one, in preserving this equilibrium by furnishing a supply for evaporation.

The extent to which the process of evaporation from the skin and lungs cools the body may be inferred from the estimate that there is a loss of heat, per minute, by this means, enough to raise 4000 grs., or more than half a pint of water, from the freezing to the boiling point, 32° to 212° F. In a dry warm air the evaporation is rapid; but in cold weather or when the air is charged with moisture, even though it be warm, the loss in this way is inconsiderable. The loss of heat by radiation is, on the other hand, greater in cold weather, and it is still more increased when the air is in motion than when it is still.

Man's power of adaptation to a great range of atmospherical temperature is very great. He will live amidst the polar ices when the thermometer is from 80° to 100° F. below freezing point; and in tropical regions in which it rises every day through a large portion of the year to upwards of 100° F., constituting a range of 200° F. I have seen sailors, slung on the side of our vessel between the tropics, engaged for hours in painting her, exposed to a direct solar heat of 130° F. This was during a voyage to China.

The modifications of animal heat, both in respect to its absolute degree and its evolution, so far as dependent on age and season, are worthy of our consideration. It would seem, from the numerous experiments of Dr. W. F. Edwards, that the heat of the body is less in tender or infantile than in adult age. The medium heat of twenty adult persons was 97° F.; that of ten healthy infants was 95° F. In an infant born at seven months, the temperature of the body was $89\frac{1}{2}^{\circ}$ F. This difference would hardly justify any general inference, were it not in entire accordance with the results of his experiments on the young of other animals. Dr. Edwards found that, when these creatures, such as kittens, puppies and rabbits, were separated from their parents, their bodies, which at first were of nearly the same heat as the latter, soon underwent a notable decrease in this respect, so as to be within a few degrees of the surrounding atmosphere. The same result followed the removal of the young of birds from the nest of their mother: and to show that the want of plumage or cutaneous covering had no share in this phenomenon, he took an adult sparrow and cut its feathers close to its body, and then exposed it, at the same time with young ones partially feathered, to air of the temperature of $64\frac{1}{2}^{\circ}$ F. The grown bird preserved its customary heat of $100\frac{1}{2}^{\circ}$ F., or 36° above the atmospherical medium; the young ones lost their heat rapidly, so as to be at last only 2 or 3° above the same medium. We arrive, therefore, at the same conclusion with the author, that the faculty in warm-blooded animals, of producing heat, is at its minimum at the epoch of their birth, and that it increases successively on to adult age. In old age, it is less active, resembling in this respect what occurs in the infantile period.

In regard to the influence of the seasons on animal heat, we learn that, with the *gradual* diminution of the external or atmospherical temperature, man and most of the warm-blooded animals acquire an increased energy of respiration, and power of evolving caloric in their bodies. This power attains its maximum in winter, and declines in summer. A gradual succession of seasons seems necessary to enable the animal economy to accommodate itself to the external temperature. If, for example, a degree of cold come on suddenly in summer we are taken, as it were, unawares, since our power of evolving caloric is then at its minimum. In this respect our summer differs from our winter constitution, in the same manner, though in less degree, that the young of warm-blooded animals differ from the adult ones.

While admitting these facts, we must be very careful not to confound the gradual with the sudden application of cold ; or frequent alternations, with a regulated transition from heat to cold. The slow and moderate diminution of nervous excitement by a gradual diminution of temperature accumulates the energies of the system : sudden and extreme cold, on the contrary, in the usual state of the system, not only exhausts the free caloric, but enfeebles the nervous energies, so as to prevent the secretion of this fluid. Dr. Edwards assures us, that animals chilled and warmed at different times, though they recover their first temperature, are longer in doing so : in other words, their faculty of evolving caloric, of course the power of resisting fresh cold, is diminished after each chilling or sudden exposure to cold.

The following is a fact in illustration of the subject. A young man who, during a severe winter when the river Seine was frozen, wished to cross, broke through the ice and fell into the water. He extricated himself from his dangerous situation, and escaped without his health suffering ; but for three days afterwards he was tormented with an unremitting sensation of cold.

The temporary application of a high degree of heat, on the other hand, favours its subsequent evolution in the body thus exposed. Hence the best means of supporting great cold is to be previously subjected to high heat ; a theory this, the practice of which is exemplified in the people of

the north of Europe rushing out from their hot and vapour baths, and rolling themselves in the snow, or plunging into a cold stream.

Compatibly with this view, we should expect to find the animal heat of the people of tropical climates, even after making all allowances for the means of refrigeration recently noticed, to be higher than those of cold latitudes. Such is, in fact, the case, as we learn from the experiments of Dr. John Davy, who found the temperature of the interior of the body to be from $2\frac{1}{2}^{\circ}$ to $3\frac{1}{2}^{\circ}$ F. higher in the former than in the latter. To the same purport are the observations of the French naturalists, in the voyage of the Bonite, who relate that, in passing from hot to cold climates, the temperature of the body falls slowly, and that it rises, but more rapidly, in returning towards the torrid zone. The change was not, however, very great, being somewhat under 2° F., in the same men when at Cape Horn in lat. 59° S., the temperature of the air being at 32° F. or freezing point, and when on the Ganges, near Calcutta, in an atmospherical temperature of 104° F.

Effects of Extreme Heat and Cold, in Developing Animal Heat.—The morbid increase of animal temperature by great external heat is manifested in the phenomena of sun stroke caused by exposure to the sun's rays.

One characteristic effect of this excitement is the evolution of animal heat or caloric, which is often so great and excessive, as to render it impossible for us to restrain it by cold affusions externally, and by cold drinks and cold injections internally. Cloths dipped in ice water, applied over the stomach and to the head, are soon made warm, as if wrung out of hot water. This morbid state persisting, the sudden and fatal effects, not only from indirect debility but from disorganization of parts, ensue, and death closes the scene.

Here we have a notable example of heat so stimulating the skin, and through it the nervous and bloodvessel systems, as to give rise to an excessive evolution of caloric; in other words, of heat creating heat, and rendering the body almost insensible to the operation of cold freely applied in the manner already mentioned. The main peculiarity to be remembered, in the application of the heat in this case, is its suddenness and intensity. Should the indi-

vidual, however, who has suffered from a sun stroke, recover from the accident, his nervous and vascular systems, over-excited at the time, and evolving an inordinate amount of caloric, will subsequently fall into a state of indirect debility and of comparative exhaustion, accompanied with a minor evolution of caloric ; and so far is he, in the second stage, from being insensible to extreme cold, as he was in the first, that he cannot tolerate the common atmospherical vicissitudes from warm to cool, without shivering and complaint.

Extreme cold, on the other hand, suddenly applied or, even in less degree, long continued, diminishes and finally prevents the evolution of animal heat, by enfeebling and paralysing the body.

The skin, when thus exposed to intense cold, becomes pale and shrunk, the senses and the mental faculties are dull and obscure, respiration, at first irregular, is eventually slower, the tongue is pale, and thirst, if it prevailed before, is entirely gone ; the disinclination to motion is extreme, and a drowsiness, gradually increasing, ends in torpor and stupor. It is the winter sleep of a class of animals, such as reptiles and some of the mammalia and birds ; but if indulged in by man, and most of the warm-blooded animals, it is in them the sleep of death. The human body then becomes obedient to the general laws of the equalization of temperature, and it is an inert frozen mass, like the objects around it. Nearly every severe winter, in middle and northern latitudes, gives examples of unfortunate human beings thus perishing from cold, the morbid effects of which are greatly augmented and accelerated by primary feebleness of constitution, long fasting, fear and despair, and drunkenness. But the most numerous and melancholy records of this nature are to be found in the history of a winter campaign, or the forced retreat of an army in an enemy's country, as in that of Sir John Moore in Spain, and of the grand army under Napoleon in Russia. In these cases of congelation, the cold of the atmosphere acts both on the lining or mucous membrane of the lungs, and on the skin. But the same effects will result if excessive cold, by immersion in cold water, be applied to the skin alone, just as in the instance of sun stroke, the morbid

operation of heat on the animal economy takes place through this part.

Sleep Modifying Animal Heat.—Sleep modifies the development of animal heat; and hence the temperature of the body is $1\frac{1}{2}^{\circ}$ F. lower at this time than in the waking state. According to Dr. Davy, it is highest in the morning after rising from sleep, continues high but fluctuating till evening, and is lowest about midnight. Continued bodily exercise, sustained mental exertion and gastric excitement following the ingestion of food, increase the animal heat. Most evident is the influence of active bodily exercise in producing this effect.

Individual Peculiarities modifying Animal Heat.—Individual differences in the development of animal heat, and in the large power of self-accommodation to the various changes from without, must be taken into account. These grow, in part, out of original differences of constitution, and, in part, of habit. In many persons this tegumentary covering is so habitually sensitive, that the slightest mutations of temperature of the external air are productive of disturbance in the nervous system and other painful effects. In them the vernal sun irritates and blisters, and the autumnal coolness chills and renders pale. The activity of their functions is not great, and the power of evolving caloric is correspondingly feeble. Of course, they feel very sensibly the smallest expenditure of this kind of heat by exposure to diminished atmospherical temperature; they are said, in common language, not to be able to bear cold; they demand and require much clothing, and a regulated artificial heat. On the other hand, provided their skins be protected from direct exposure to the sun's rays, they revel in the heat of summer, under which those of a vigorous and athletic frame and sanguine temperament feel as if they were being consumed with heat. Persons of this last class, with ample chests and full and active respiration, whose muscles are largely developed and nerves and bloodvessels liberally distributed and in strong functional exercise, have their organs of calorification correspondingly strong and active. In them the habitual evolution of caloric is great, and they can illy tolerate increase of the process by external heat. On the contrary, they bear with pleasure an expenditure of

their own internal heat by means of atmospheric coolness, and in lieu of this, by means of a cold bath : they can bear even such a degree of cold as shall not only exhaust the free caloric as rapidly as it is evolved, but which shall also temporarily diminish the activity of the organs themselves from which it is given out.

Such is the difference in respect to toleration of atmospheric extremes and vicissitudes, that the cold which, to the robust and sanguine, is grateful, would be to the sensitive and feeble a depressing agent, to resist which would require a continued struggle by the functions of the animal economy, ending too often in distress and disease. These two classes of persons differ as much in what we may call appetency for cold and ability to endure its effects, as two individuals, the one just in that state of chill preceding a shake of intermittent fever, and the other in the hot stage of the disease. Immerse the first in a cold bath and he may not come out alive. Plunge the second in one, and his mind, in place of being delirious, is calm and rational ; the burning heat of his skin, panting respiration and hurried pulse, are succeeded by natural coolness and regular breathing and circulation, and an absence of the inextinguishable thirst with which he had been tormented. This person, as far as regards morbid heat, resembles the man who had received a sun stroke, and he is relieved by similar means.

Toleration of Extremes of Temperature.—The toleration of extremes of temperature by those persons who are gradually accustomed to them is exhibited in various manufactories. The instances in which high heat is borne occur especially in iron foundries, glass-houses, bakeries, &c. The workmen of the late Sir F. Chantrey, the celebrated English sculptor, had been accustomed, as we learn from Dr. Carpenter (*Principles of Human Physiology*), to enter a furnace in which his moulds were dried, whilst the floor was red-hot, and a thermometer in the air stood at 350°. Chabert the “Fire-king” was in the habit of entering an oven, the temperature of which was from 400° to 600° F. Exposures of this kind have the effect, however, of increasing the animal heat. Experiments instituted with a view of determining the amount of increase, show it to be from 6° to 13° F., but before it reaches this latter or even

as high as 11° or 10° F., beyond the common standard, the animal perishes. Farther examples of the force of habit in enabling persons to tolerate and apparently enjoy high heat, even with accompanying moisture—a combination generally the most oppressive to the animal economy—is manifested in the practice of the Russians, and still more of the Finnish peasantry, when making use of their vapour-baths. But on this point I shall have more to say in a subsequent chapter, when describing the different modes of bathing.

Instances are numerous of habitual exposure to cold, and to cold and moisture, without detriment to the health, if the rules of hygiene be attended to in other respects. In proof of this, we may cite those who are engaged in the whale fishery in high latitudes, in the north and the south; also in the cod fishery on the banks of Newfoundland. Many persons stand in cold water, or have other parts of their body wet with this fluid, for hours, in certain manufactories. The men occupied in the several processes of cutting, stowing away, and subsequent distribution of ice to private families, are further proofs of the comparative impunity of exposure, even though it be partial, to a great degree of cold. But in enumerating instances of this nature, we ought to regard them as exceptional rather than as a rule or example, for general imitation. They show what can be tolerated rather than what is advantageously borne by the human body. They are introduced here to illustrate the power possessed by the animal economy to maintain an average temperature of the body, under circumstances so well calculated to destroy the equilibrium, but not as favourable examples to enforce precepts of hygiene.

Improper Treatment of Children.—Physical education, when it has been attempted with a show of method, is in no case more defective than in its subjecting young children and constitutionally delicate and feeble persons to what is called the hardening process; viz., exposure to extreme cold and great atmospherical vicissitudes, without the ready resource of suitable clothing during the exposure, and of artificial warmth immediately afterwards. Physicians, were they, in larger numbers than they are, physiologists and imbued with the principles of hygiene,

would themselves set a better example, and inculcate with more earnestness the proper treatment of the classes of persons just enumerated. Parents, and especially mothers, might then, more generally, be induced to adopt a more rational, one might say a more humane fashion of clothing their children.

The Young less enduring of Cold than Adults.—The general proposition, that the young of all animals are less able to adapt themselves to the extremes of either cold or heat, or to bear sudden vicissitudes, than those of adult age, ought to be made familiar to every capacity, and be continually impressed on all, as a rule of conduct whenever circumstances require its application. The younger and the more tender the little being, the more is it dependent on external warmth. More especially does this remark apply to children born prematurely: for years after their birth, they require peculiar watchfulness in protecting them from even the common vicissitudes of weather. Concurrent testimony on this head is borne by Drs. W. F. and Milne Edwards, Villermé, Quetelet, Flourens, Fontanelle and others. Infant baptism in the churches in Italy, and the registration of children at the mayoralty in France, within a short period of birth, have been productive of considerable mortality among the young subjects thus exposed. M. Quetelet, of Brussels, tells us, that the average mortality of children within the year, during the three summer months was 80, while that of January was nearly 140, and the average of February and March 125. Precisely identical results were obtained by MM. Villermé and Milne Edwards, in their researches into the mortality of the children in the Foundling hospitals of France. They discovered that, not only was the mortality greatest during the first three months of the year, but that it varied in different parts of the country according to the severity of the winter in those parts respectively. Of the same character are the observations made by Mr. Farr, deduced from the Reports of the Registrar General in England.*

The morbid effects of cold and of cold and moisture on the young and delicate, are not restricted to acute diseases,

* Human Health, or Elements of Hygiene. By Robley Dunglison, M.D., &c. &c., 1844.

which at once kill. Where the skin has not been adequately protected by clothing and where, also, its functions have otherwise suffered by a neglect of bathing, the constitution is enfeebled, and the individual thus neglected undergoes a gradual decay, manifested by scrofulous and other analogous glandular obstructions and defective nutrition, with, often, a slow fever which ends in pulmonary consumption.

Injury from high Atmospheric Heat.—Equally destructive to infantile life is extreme atmospheric heat, as is evinced by the great mortality in our chief cities, along the sea-board, during the summer months.* To the cutaneous membrane, or the skin and the mucous membrane of the lungs and digestive apparatus, must our attention be directed, both to enable us to appreciate the action of the morbid causes—a hot and impure air and irritating and badly chosen food,—and to suggest the appropriate measures for relief.

The Aged Unable to bear Great Cold.—The same precautions are demanded for the protection of the aged, as for that of the young, in relation to external temperature; and more especially to cold, in the case of the latter class. Mr. Farr says, pointedly, that the temperature of the atmosphere in which the aged sleep can never safely descend lower than 40° F., for if the cold that freezes water in their chamber do not freeze their blood, it impedes respiration, and life ceases when the blood-heat has sunk a few degrees below this standard.

In the climate, or we might say rather, climates of the United States, every possible means ought to be enlisted for enabling the inhabitants to bear up under the two extremes, constituting two contrasted climates, of great summer heat and great winter cold. The influence of one is so powerful and sufficiently prolonged as to render us susceptible invariably to the other; and we, in the Middle States, are nearly in the situation of those who should spend their summers in Egypt and their winters in Russia.

Influence of the Nervous System on the Functions of the Skin.—The state of the nervous system modifies very

* Bell and Stokes's Lectures on the Practice of Physic, vol. i., p. 433-6. Bell's Edition of Combe on Infancy.

greatly both the development of animal heat and the functions of the skin generally, whether we have regard to its heat or coldness, dryness or softness, and moisture,—in fine its general and tactile sensibility, and its exhalent and absorbent offices. A knowledge of the fluctuations of the cutaneous functions, from this cause, explains the difference in the impressions produced in the same individual by air or a bath of the same temperature but at different times, according to the changes in feelings and general health, age, and season,—intervening sickness or exhausting labour.

The sensibility of the skin and its sympathies with other organs vary with the region of the skin. When we speak of our sensations in passing from one medium to another of a different temperature, we ought to be aware of the actual differences in the heat of the different parts of our body, and the consequent shades of feeling of either heat or cold in them, until there is a perfect equilibrium established. It is only then that we can judge with any degree of accuracy of the full and uniform effect of the medium, whether aerial or aqueous, in which we may happen to be at the time. Thus, for instance, water of any given temperature applied to the feet or hands, which are of an animal heat of about 90° F., conveys a different sensation to what it would do when applied over the abdomen and about the groins, where the heat is 96° , or to the armpit, where it is 98° F. We experience, also, different feelings according as we expose to air or water a part of the skin immediately over a particular organ, as of that over the stomach, or the heart, or the kidneys, each of which is impressible in different degrees, independently of the precise temperature of the outer surface or skin. We may immerse our hands in water which we should, while doing so, call milk warm; but which, after we had plunged the entire body in, we should declare to be cool if not cold: so, for the same reason, we hardly know how to define our sensations on entering a bath of 92° or 93° : it at first feels to our extremities warm and pleasant, but hardly produces this effect on the central parts of the body: and we are, finally, constrained to acknowledge, after a short stay in it, that we sometimes feel a slight creeping, an approach to coolness; at least this is my own experience. Others may select a lower temperature to illustrate the same idea.

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During this time, an equilibrium is being established between the water and the body immersed; the extremities lose little or no caloric, but the trunk, being warmer, parts with this fluid: hence the difference in our sensations experienced during the immersion. It would follow, as a necessary inference, that, when a pediluvium or foot bath is directed to be used, its temperature may and on occasions ought to be more elevated than would be proper in the case of a general bath.

Sympathy between the Skin and the Internal Organs.—The sympathy between certain portions of the skin and the internal organs is worthy of attention. When these latter are diseased, the skin of the extremities is sometimes morbidly cold, at other times burning hot, without the rest of the cutaneous surface being always different from its common temperature. In certain fevers, the skin of the epigastric region, or that over the stomach, conveys to the hand of another person a sensation of the most acrid heat, while that covering the limbs is little changed in this respect. The skin lining the inside of the upper and lower limbs, and covering the sides of the chest and abdomen, and along the spine, is warmer, and has greater delicacy of touch than in other parts. But there is no invariable connection between temperature and tactile power or touch, since we find that the skin of the extremities is generally a few degrees cooler than that covering the trunk, though the delicacy of touch is incomparably superior in the former to what we find it to be in the latter. As a mere sense, and, of course, as connected with general sensation and volition, the skin is most powerfully affected in the portions covering the extremities: hence the benefits derived from stimulating and irritating applications to these parts, when we desire to rouse the nervous system and restore it to its accustomed train of action, as in cases of fainting or insensibility, stupor and the like.

The connection between the organs in the cavity of the chest and the skin is such, that impressions made on the portion of the latter lining the arm and covering the side below the armpit, have a strong influence on the lungs and heart. Exposure of this portion of the cutaneous surface, common in children and females, from the absurd style of dressing, is a frequent cause of catarrh, croup and pleuritic

stitches. Between the skin lining the inside of the thighs and covering the inguinal regions, and the lower bowels and uterus, there is also a very intimate sympathy. Where there is much susceptibility of these organs to disease, the skin should be well protected, in both sexes, by warm drawers. Every intelligent physician is aware of the influence exerted over the genital and digestive apparatus by the application of blisters and other counter-irritants to the inside of the thighs.

We meet with numerous examples of active sympathies between the skin and the mucous membranes, including the organs lined by these latter,—lungs, digestive apparatus, comprising its glandular appendages, the salivary glands, and the liver and pancreas, as also the urinary organs,—and consequently of the influence which it exerts over them, both in health and disease. An example of this sympathy was adduced in a preceding paragraph, when speaking of the sensation of acrid heat conveyed to the hand placed over the skin corresponding with the irritated and inflamed mucous membrane of the stomach beneath. So, conversely, will excessive thirst and a sensation of burning heat of the stomach be allayed by cloths wet with cold water or in which ice is wrapped, and applied to the skin. How often do we not meet with cutaneous eruptions, both of an acute and chronic character, caused and kept up by irritation of the mucous membrane of the stomach and intestines. Different articles, such as certain kinds of fish and crude fruits, will, often, soon after their being eaten, show their effects in disordering the skin. This surface reflects but too plainly the errors of regimen by which the mucous membrane of the stomach is morbidly affected—whether it be by cakes and confections and coffee, in the case of the fair sex, or of highly seasoned dishes, and wines, and more potential liquors still, on the part of the men. In justice to some sufferers it should be known, however, that the claret-nose is not always indicative of devotion to the bottle; but may afflict persons of either sex whose habits of temperance are unquestioned. In exanthematous diseases (scarlet fever and measles, &c.), in which a morbid matter is secreted by the skin, the danger of the supervention of internal inflammation becomes more imminent, not merely in proportion to the suppression

of the process by which the morbid matter is eliminated from the blood, but also in proportion to the violence of the inflammation by which the function of the skin is arrested (*Bell's Edition of Müller's Physiology*, p. 459). In all of the eruptive fevers, the mere interruption to the respiratory and exhalent functions of the skin must prove of itself a cause of great disorder of the internal organs, and give rise to well-grounded anxiety for the patient. Extensive burns of the skin have been followed by inflammation of the respiratory and digestive mucous membrane, and in a more especial manner by that of the duodenum. But not merely is there a transfer of irritation from the external to the internal tegument, and *vice versâ*—skin to mucous membrane, and mucous membrane to skin,—but these two are often the seat of disease at the same time. The mucous membranes of the air passages and of the digestive tube are inflamed in a similar manner as the skin is, in these diseases. I have frequently traced numerous ulcerated spots of the mucous membrane lining the windpipe and larger ramifications of the bronchiæ, closely resembling the pustules on the skin, in those who have died of small-pox. M. Rayer but repeats the observations of other physicians, when he says, "The running of the eyes, the nasal, laryngeal and tracheal catarrhal affection of measles correspond to the exanthema of the skin, which characterizes the disease on the general surface, and the matter secreted by the bronchi presents a peculiar character, in relation with the species of inflammation which is going on. In scarlatina, the mucous membrane of the mouth and pharynx almost always, and that of the stomach and intestines occasionally, presents a dotted redness altogether analogous to that which is observed upon the surface of the skin. The eruption in this disease is followed by desquamation of the cuticle, and the mucous membranes furnished with an epithelium, cast this pellicle off in a precisely similar manner."*

Pleasanter illustrations of the sympathy between the skin and mucous membranes than those hitherto adduced, are presented in the effect of external applications to the

* A Theoretical and Practical Treatise on Diseases of the Skin—With Notes and other Additions. By John Bell, M.D., 4to. Illustrated by forty beautifully coloured plates.

former for the purpose of soothing febrile heat, or pain and other irritation of the latter. The sedative operation of the cold bath, for example, on the skin is immediately responded to in the same sense on the internal membranes. The breath, before hot, in consequence of the highly excited state of the pulmonary mucous membrane, is now of the common warmth, if it be not actually cool; the internal heat, especially felt in the regions of the chest and stomach, and the urgent thirst are gone; and the tongue and mouth and throat, before red and parched, become of a paler colour and moist. All the mucous membranes have lost their former dryness, heat, and morbid vascularity, so soon as these states of the skin were removed by the application of cold water. Equally prompt, decided and beneficial results are obtained in cases of internal hemorrhage, which is almost always from mucous membranes, by the application of cold, either in the form of a cold bath, or more locally, of ice on particular regions of the skin. I merely mention these facts now, proposing to make a fuller application of them hereafter, when the subject of the cold bath comes regularly before us.

CHAPTER III.

CONDITIONS FOR PRESERVING THE FUNCTIONS OF THE SKIN
—PROTECTION OF THE SKIN BY CLOTHING—EXERCISE—
BATHS—PROPERTIES OF CLOTHING—ITS FORM OR FASHION
—USE OF FLANNEL.

A KNOWLEDGE of the various and important offices performed by the skin, in the animal economy, must quicken our attention to the means by which they can be best preserved, without disturbance or interruption. The primary organic conditions for this purpose are, a certain degree of activity of circulation of the blood in the extended network of vessels, and of fulness of the nervous tissue and especially of the papillæ of the *cutis vera* or true skin. Unless the first of these be complied with, the requisite secretions of sweat and sebaceous matter, and of carbonic

acid, cannot take place: the blood will fail to be purified by the removal of effete matter, and the whole system will, in consequence, suffer from disorder of all the functions, respiration, digestion, innervation, calorification, muscular action, &c. The failure of the second condition, or fulness of the papillæ, will be followed by imperfect general sensibility and a deficiency in the sense of touch.

With comparatively few exceptions, man lives in an atmospheric medium of a temperature lower than that of his body, which, as the reader has already learned, is about 98° F. Consequently his efforts must be directed to counteract the continual abstraction of his animal heat; for this, if not interrupted, would cause feebleness, succeeded by torpor and finally death. However vigorous may be the exercise of the functions of digestion, respiration, innervation and nutrition, by which animal heat is generated, the waste will still exceed the supply, unless the skin be protected in such a manner as to husband the latter and prevent the former. Nearly all animals except man have a covering, as an appendage to their skin, which serves to keep up a medium temperature, so that the ready radiation of heat from their bodies to the surrounding atmosphere, and from the atmosphere to their bodies, is prevented. This covering consists, in the case of mammal quadrupeds, of hair, in that of birds, of feathers and down. In the reptiles, some have an additional external protection in a thick shell, others in scales. Man alone is without any natural covering of this nature, and hence he is compelled to have recourse to artificial aid.

Happily for our health and well-being, the means best adapted to aid the skin in the performance of its functions are, also, the most useful for enabling it to bear with relative impunity the alternations of temperature, and especially the colder medium in which it is for the most part placed. For this purpose, and in compliance with the conditions just now stated, recourse must be had to clothing, exercise in the open air, and baths. By the first a due amount of blood is invited, and by the second it is driven into the reticulated system of vessels or capillaries of the skin, and these together with the nervous tissue are excited to that degree as to fit them for their offices of secretion and absorption. By bathing all its adherent impurities are removed

and the skin is rendered soft and readily adapted to preserve the proper adjustment between its secretion or exhalation and its absorption; and more especially, in as far as this is necessary for its respiratory function, by the absorption of oxygen gas and the secretion or exhalation of carbonic acid.

Clothing acts in virtue of its being a bad conductor of heat, and of its stimulating more or less the cutaneous surface to which it is applied. It is serviceable, also, by confining a body of air between it and the skin, and in the areolæ or spaces between the intersecting threads of which the web of nearly all kinds of clothing is made. The air thus confined is a bad conductor and prevents the skin from losing, as rapidly as it would otherwise do, its heat; just as, on the same principle, double windows having a body of air between them, contribute to the warmth of a room. In the proportion in which they are slow conductors of heat or caloric, is the efficacy of the several kinds of stuff used for clothing. Hence those made of wool come first, then those of silk, and of cotton; while those of linen are last in the order of enumeration. Ranking with the first class, as bad conductors and consequently well adapted to preserve the warmth of the living body, are the furs of certain animals and the feathers and down of birds.

These articles just mentioned, together with silk and wool, have the additional property of being idio-electric, that is, of developing and retaining the electric fluid; effects which they produce by their gentle friction of the skin when they are applied to this surface, provided it be not moist. The electricity thus developed, though it is not productive of positive sensations, cannot be without its influence in exciting the capillary system and nervous tissue of the skin; and it deserves to be taken into account, among the advantages or the inconveniences of woollen and silk garments worn next the cutaneous surface.

The hygrometric properties of the different kinds of clothing merit some notice, in making our selection of those to be worn. Linen, owing to its porosity, readily imbibes moisture, and by its condensing the products of cutaneous exhalation and allowing of their evaporation, cools the skin and in greater degree causes chilliness, and the diseases resulting from the application of cold and moisture. In

cases, on the other hand, of undue cutaneous excitement, marked by heat, itching and eruptions, vestments of linen are soothing by the coolness which they produce. Cotton stuffs less readily imbibe moisture, and those of wool and silk are still less hygrometric by their defective porosity. On this account, and owing to the areolæ between their woof and warp, through which vapours escape, they are slow to receive or to retain the perspiration, although, by accumulating the heat of the skin, they tend to keep up a certain degree of moisture resulting from increased excitement of the perspiratory vessels. But, as linen is of thin texture, it is soon saturated with moisture, and becomes in this state a still more ready conductor of caloric, and allows of a quick interchange between the temperature of the human body and that of the atmosphere and substances with which it is brought in contact. There is this disadvantage, however, attending the slow conducting of heat and moisture by woollen and silk stuffs, viz., that they allow of a longer and more complete deposit of vapour, and simultaneous precipitation of animal or other deleterious substances that had been diffused through the atmosphere. So, also, by condensing on their inner surface the product of cutaneous transpiration, and, in cases of disease, of morbid secretion, they become the recipients of poisonous matters, such as small-pox, &c.

The texture of different stuffs modifies not a little their effects as clothing. In all, whether of wool, silk or linen, the thread cannot be woven into cloth without leaving regular interstices or areolæ, which are occupied by air. Of two pieces of an equal amount of material, the one of a looser texture, that is containing more air in its interstices, will be the warmer than that made of more twisted and finer thread, and the interspaces of which being smaller, contains less air. Wool or cotton carded, and spread out in the shape of wadding and inclosed in an envelope of silk, will be a warmer garment than one made of the same quantity of material spun and wove, and similarly covered. In addition to its other properties, we must, also, take into account the coarseness or fineness of texture, and the softness or roughness of surface, by which the garment will prove either grateful or irritating to the nervous papillæ of the skin, and modify the capillary circulation at the same

time. A woollen garment, flannel for instance, by its innumerable points or capillary projections keeps up a continual excitement of the skin, which in those in whom this organ is sensitive, amounts to irritation, and the supervention of various eruptions. Cotton in this respect, and still more silk stuffs, of looser texture especially, come midway between woollen and linen clothing, in their being less irritating than the woollen, and securing more warmth than the linen.

Colour is not without its influence in modifying the warmth procured by clothing. It acts both by the radiation and absorption of caloric. Dark-coloured textures are represented commonly both to radiate and absorb more readily than those of a light hue. Mr. A. D. Bache, now the Superintendent of Coast Survey, has, however, rendered it probable, as the result of a series of experiments instituted by him for the purpose,* that the radiation is but little affected by the colour of the clothing, and hence that it matters little what we shall select, under this head, for winter wear. He infers that the chief difference consists in the greater or less readiness to absorb the sun's heat, and that, therefore, in summer, a black dress, as having this property in the greatest degree, will be warmer than a white dress, which will reflect the luminous rays. If we deny the radiating power of black to be greater than that of white or intermediate lighter colours, we are deprived of the explanation commonly given for the negro preserving his skin and body of the common standard of animal heat. The skin absorbs caloric freely, but we have been told, that it also radiates it with equal freedom, and in this way the equilibrium is kept up. This is the view which would result from the experiments of Dr. Stark of Edinburgh, on the calorifying properties of cloth of different colours.† The hygrometric property of various coloured articles of clothing corresponds with their conduction of heat; black wool receiving moisture more rapidly from the air, when a little below freezing point, than scarlet, and this more than white.

In another and far from unimportant particular, viz. : in the absorption and retention of odours, colour exerts a

* Journ. Frank. Institute, 1835. † Edinb. Phil. Journ. 1834.

marked modifying influence. Dr. Stark, by a number of ingeniously conducted experiments, has shown that odorous emanations have not only a particular affinity for different substances, but that the colour of these substances materially affects their absorbing, or radiating quality. We learn from this writer that black absorbs most, then comes blue, and afterwards, in the descending scale, red, green, yellow, and white scarcely at all. It would, also, appear that animal substances have a much greater attraction for odours, than vegetable substances: that silk attracts more than wool, and this latter more than cotton. The readiness with which coloured surfaces gave out odours, was ascertained by Dr. S. to be in direct relation with their radiation of caloric, under similar circumstances. The deductions from these facts are worthy of serious consideration. One of them is the impropriety of physicians wearing black, which, as the most ready absorbent of animal odours, may be, also, that of pestilential effluvia at the same time. General usage in the fitting up of hospitals, and in the costume of the attendants, is conformable with science in this particular. White walls, white curtains, when these are used, and white aprons and outer dress of the nurses, are most commonly met with. Dr. Stark recommends, also, that the bedsteads, tables, seats, &c. should be painted white.

The form or fashion of clothing, a subject of great moment, is, unfortunately, in the greater part of the civilized world, regulated more by the caprices of the tailor and the mantua-maker than by the principles of hygiene, in adaptation to the climate, season and requirements of health of the individual. The Orientals have, on this point, greatly the advantage over us, in their loose, flowing drapery, in which the air is readily renewed, and the undulations of which in harmony with the movements of the body cause a moderate and refreshing ventilation. The ligatures and compressions of hats, cravats, corsets, garters, and shoes, are or until late years were entirely unknown to the followers of Mohammed, in Turkey, Asia and Africa. What an amount of useless punishment might the Franks—the people of Europe generally, and their descendants in this continent—have been saved. Pressure on the skin, produced by these or any similar fashion of ligature, is not only in-

jurious to this organ, by interfering with the free circulation of blood through it, but also exerts a deleterious effect on the internal organs, causing serious functional disturbances in the brain, lungs, heart, digestive and uterine apparatus—in the proportion which may be readily understood, according to the compression exerted by one or other, or by several conjointly, of the above-mentioned articles of clothing.

Clothes fitting very tightly, in addition to their impeding free movements of the limbs and body, generally, have the farther inconvenience of being better conductors of heat, owing to the small portion of air interposed between them and the skin. Thus they transmit readily the heat of the body, and in cold weather, furnish less warmth, while they also receive and give passage with equal readiness to atmospheric and solar heat, and hence they increase the oppression from this cause in summer. In order to derive evident benefits from the habitual use of the bath or from a regular course of summer bathing at the sea-shore or elsewhere, an easy-fitting costume ought to be worn, which, without being an entire sacrifice of fashion, should be at least exempt from its impertinent interference with health and comfort. The term bathing dress might have a much more comprehensive meaning than is now attached to it. Not only for the mere art of bathing, but, also, for walking, riding, dancing, in fine all the exercises and amusements of the day and evening, ought the parties who frequent the sea-shore, and the different Springs, wear a dress in character with their supposed search and wants. An innovation of this kind on established follies would be worthy the ambition of leaders of ton, and of the genius of some of our dress-makers, of both sexes. The extensive requirements of the ladies for novelty of material, variety of colours, and garnishing with trimmings of lace, ribbons, &c., would continue, even if the proposed change were adopted, to furnish ample employment to the persons now engaged in the task of decorations. Nor would the vanity of the rougher sex be at fault, in keeping messieurs of the shears and thimble, as busy as heretofore. Our young men might advantageously extend their imitation of Turkish costume, beyond letting their beard grow on lip and chin. They ought to be thankful, also, for the resource which

a Turkish bath would furnish them, in disposing of a part of the wearisome days with which the idlers among them are afflicted.

Apropos of Turks and costume. I cannot refrain from introducing a passage on shoes, from a work which manifests a deeper insight into Turkish character than most of the volumes penned by tourists in the East,—whether they be in quest of new sensations, or on a pilgrimage to Jerusalem and the Pyramids.

“There are members of the community who, enslaved, degraded, and debased amongst western nations, enjoy, throughout the whole of the East, a degree of comfort and independence, which is a satire upon our so-called free institutions. How far those members of the community whose interests I advocate are deserving of attention, may be inferred from this, that the numbers thus afflicted amount to very nearly the double of the other members of the community, reckoned per head. I refer to the Feet. On the severity of the measures imposed upon our Feet it is needless to dilate, because every one feels where the shoe pinches. Stuffed into black moulds, they are deprived of the common benefits of air, and too often of water, and never permitted to raise themselves from the lowest grade of existence. But, while practically conversant with this state of degradation and suffering, we, having no knowledge of another state of things, fancy that degradation necessary, and that suffering unavoidable. How different, however, is the state of Feet in the East. Admitted to perfect equality of rights with their brother hands, they there, also, take upon themselves an equal share of duty. No sense is offended at their presence, no aversion excited by their aspect; placed, with respect, on the great man’s sofa, or handling with dexterity the tools in the workman’s stall, in the full enjoyment of light, air, and water, and making use of boots and shoes, instead of being used by them; thus preserving the original object of these institutions, which, like so many others, begotten by necessity, have become the parents of despotism. When we hear of kissing the Foot of an Eastern Monarch, what false ideas do we not present to ourselves, not only of human nature, but also of Foot-kind. We imagine the saluter to be the abject thing that could kiss the abject and offensive slave

we carry in a boot, and call a Foot. But *the Foot* (as existing in the East) is a member of no less quality than usefulness; elevated in position, educated with care and maintained in elegant ease—*simplex munditiis*.

"There the Foot rejoices in a buskin, which, in common with the covering of the head, and as in the days of Roman grandeur, denotes the quality of the man! When the festal henna imparts its dyes to the rosy fingers, it disdains not to bestow its purple on the toe; and the artful coquette, conscious of the power of a pretty Foot, calls attention thereto by dyeing the nail of the third toe, when she tinges that of the third finger.

"No wonder that the distorted and indecent foot of the West anticipates the aversion which its presence would call forth, and shrinks from a display of its ungainly forms. 'Cabined, cribbed, confined,' its nature becomes debased, like its fortunes; and, shorn of its natural right, as robbed of its fair proportion, invokes the protecting covering of calf-skin for its hunchback toes, while external grace and lustre compensate, to the helpless inmates, for the torture of corns, and the terrors of gout."*

One, and indeed the primary object of wearing shoes or boots, for protection of the feet against wet and dampness, is apparently lost sight of by the makers of these articles. Unless express directions be given to insert between the soles a slip of bladder or of gum elastic, the leather is permeable to the slightest exposure, as in walking out even after a summer shower. Mere thickness of sole will not give the desired protection. Cork will also fail.

The use of the hat is of modern date. The French refer it to the time of their Charles VIII. The ancient Greeks and Romans, and the Asiatics in all times, knew it not. The former only wore a covering on their heads, when sick or on a journey. The people of the East generally wear a turban or a light cap. Children and young persons ought not to be subjected to the punishment of a hat, which is, when fitting tight, a cause of headaches and nervous irritation.

If we were to carry into practice the idea of the savage,

* The Spirit of the East, &c. By D. Urquhart, Esq.

who, in reply to a European expressing surprise at his state of semi-nudity in cold weather, said that his skin was all face, it would be in the case of the neck. They who, like the Orientals and certain working classes, leave this part habitually exposed, are comparatively exempt from inflammations and other diseases of the throat. It is, at the best, very difficult to envelop it after any fashion, without subjecting it to inconvenient warmth, by which more blood than necessary is invited to the throat and head, and to pressure by which this fluid is accumulated in the head and face, and various disorders are produced, such as deep suffusion of the face, headache, fullness of the cerebral vessels, and even apoplexy itself. I have seen, quite recently, temporary insensibility, with a deeply flushed face and slowness of pulse, brought on, as it seemed to me, by an extremely tightly-buttoned shirt collar, in a workingman who was required to stoop a good deal in the performance of his labour. The least exposure, also, of a part so sensitive as the skin of the neck, is attended with danger of violent sore throats, and severe colds. Females in this respect have an advantage over the other sex, the members of which must seek mitigation of the evil, in wearing a loose shirt collar, and a narrow cravat or stock, of as light material as possible and fitting loosely on the neck. One great means of prevention against diseases of the throat, from vicissitudes of weather, and unlooked for exposures, will consist in ablution of the neck every morning, in addition to that of the face, with cold water.

Happily, just now the fashion of wearing corsets is partially suspended, at least as regards the abominable appendage of busks of metal and wood, and we believe, also, of whalebone. The absurdity and cruelty of so girthing and enveloping the trunk of the body as to convert the thorax from a conical into a cylindrical shape, or even to invert its figure so entirely as to make what was the narrow part above broader than the lower, is only comparable to, we cannot say equalled, by the Chinese fashion of cramping the growth of the feet of their females. It would not be easy to devise any practise so destructive to true beauty of form, grace of movement, and smoothness and freshness of complexion, and of the skin generally, as that of tight lacing.

It gives the blood wrong directions, sending it upwards in undue quantity to the head, and downwards to the pelvis, and its contained organs. It causes pressure of the ribs on the lungs, which last are protruded upwards and downwards; it also displaces the liver and stomach, and interferes with the entire economy of respiration, circulation, and digestion, as well as of those functions which depend on the peculiar organization of females. Diseases of the breasts date every now and then from the continued chafing and pressure of the bones of corsets, as well as of the tight upper border of these latter themselves. Deformity of the figure by spinal curvature, is another result of the practice of tight lacing, particularly in the case of the young and the delicate. Women who are fat and with very protuberant mammæ, or who have frequently borne children, may derive comfort and a feeling of support from a jacket of elastic tissue, adapted to their form, and drawn with a moderate degree of tightness. But the nubile, the young, those of thin habit, invalids generally, and all when engaged in active exercise, ought to shun corsets of every description. More especially is this rule obligatory, during the period of pregnancy. Its neglect has been a frequent cause of abortion.

Men are not exempt from sufferings by undue compression from tight waistcoats and pantaloons, and even from coats, by all which the skin suffers and various disorders ensue.

The fashion of exposing the arms and shoulders and other parts of the busts of females, when in ball dress, and of children of both sexes, is, in our climate, productive of the most disastrous consequences, not only in the acute and often fatal diseases, but also in those of a chronic nature to which it gives rise. The young of our own species, like those of all animals, require the aid of external warmth to keep up the requisite amount of animal heat. This important principle in physiology and its hygienic deductions are not appreciated, certainly not enforced as they ought to be by physicians generally. To a certain extent the like additional protection of clothing is demanded for females, whose frequent delicacy of constitution interferes with a full development of animal heat, and can illy afford its expenditure from naked arms, and shoulders, and a portion of the breast itself.

A fruitful source of disease in persons of both sexes and all ages, and especially in children, is a neglect of proper covering of the feet. That next the skin is by stockings, which need not be of very thick or of coarse texture : even in winter cotton or lamb's wool will suffice, if the right kind of shoe or boot be worn. In the case of children and delicate adults, it is necessary to take off the shoes or boots after a long walk or other exercise and dry the stockings, which are often wet with perspiration. Catarrhal and other attacks from this cause are prevented by sponging the feet every morning, at first with tepid, and, after a while, with cold salt and water, and then rubbing them for some time with a coarse towel.

Of the under garments, drawers, of stuff and texture varying with the exposure of the wearers and their sensibility to cold, is useful in both sexes. To the wardrobe of the female it is a valuable accession.

The reasons to govern us in the selection of the kind of stuff to be worn next the skin, have been already placed before the reader, when their different properties were described. On the subject of the use of flannel as the inner garment, I may be allowed to repeat the opinions and suggestions offered on a former occasion.

The use of a flannel shirt next the skin throughout the year—winter and summer—night and day, has been declared to be inimical to health, and certainly, as a general practice, to this extent, even among invalids, is not to be recommended. The body, thus constantly stimulated by a woollen garment, no longer derives that protection in extreme and sudden states of cold and moisture which was promised for it. In summer, flannel increases unduly the discharge of sweat, already too great by the mere heat of the season, and thus contributes to throw the skin into a state of languor and debility, which illy prepares it for the wintry cold. There are, moreover, persons whose skin is so habitually hot and sensitive, as not to tolerate the application of flannel to this surface. Sometimes, cutaneous eruptions forbid its use, as they are either kept from being cured or are aggravated in consequence. At other times, the sensations of inward heat and thirst are augmented by the irritation of the skin maintained by this cause ; hence,

in febrile diseases, the physician most generally allows the patient to discontinue the use of flannel.

The manner in which a woollen garment produces its effect is two-fold,—1. By numerous points it acts, as it were, the part of a flesh-brush, and keeps up a mild irritation of the cutaneous surface. 2. By its being a bad conductor of caloric, it preserves the temperature of the body at nearly a uniform degree: it thus prevents, in cold weather, the escape of the animal heat into the surrounding air, and in summer, or when the body is exposed to the sun's rays, it prevents the transmission of the external heat of the air to the skin. Woollen cloth is, moreover, a bad absorbent, and its interstices not being close, its pores give a passage to the various exhalations from the skin, so that evaporation from this surface is not arrested, and it remains relatively cool. This last property is of course only to be expected in flannel which is not very fine, and in that which has not been fullered as it were, or made thick and hard by repeated washings.

According to these views, a person may be allowed to dispense with wearing flannel, whose circulation and vital functions, generally, are vigorous, and whose skin is habitually warm, that is, develops animal heat largely. This state of things does not necessarily imply, though it is often accompanied with robustness of frame. Where, on the other hand, the circulation is languid, the skin, and especially that of the extremities, frequently cold, and digestion slow, flannel is of the first necessity during nearly eight months of the year in our climate. Independently of these considerations, if the employment of a person be such as to expose him to sudden transition of temperature, as in rushing from a hot workshop or foundry into the open air, or if the labour or exercise out of doors be otherwise so excessive as to cause sweating and fatigue, without the possibility of change of linen, dry rubbing, and passing into a warmer medium, then had flannel better be worn. But in none of these cases is it necessary to wear it during the night in bed, provided a person be furnished with sufficient covering, and be not frequently required to go out into another apartment, or hurriedly into the open air, without due time being allowed for putting on suitable outer garments.

In disordered states of the body, as in catarrh, asthma, rheumatism and bowel disease, it is necessary that flannel should be worn next the skin ; at least the omission would be attended with risk. It is almost impossible to procure permanent relief from these and various other maladies without the functions of the skin, and of course its equable temperature, being properly sustained. For this purpose flannel, as the inner garment, seems well adapted ; but to be completely so its use must be accompanied with the following conditions: 1. That it be regularly and at short intervals changed, and its use during the night, with the exceptions already indicated, be dispensed with. 2. That it be not tight fitting to the body, nor of a texture made firm and thick by much washing. 3. That friction of the skin with a coarse towel or flesh-brush be practised night and morning ; and sponging this surface with cold or tepid water according to the season and the temperature of the skin, be had recourse to, before friction, every morning, or at least on alternate days. In cases where the skin is not of uniform warmth and is readily chilled, it will be sufficient to use the sponge well squeezed, and just moist, or perhaps damp ; renewing, of course, its immersion in water, and subsequent squeezing several times during the operation of sponging the skin with it. This last condition can be carried into effect by most persons, but there are some who invariably suffer during the colder months, from even sponging their surface with water of the temperature of the air, or under the degree of decided warmth. To such persons, a warm bath twice a-week will be advantageous. But we are anticipating in this last particular, and shall conclude the subject of flannel clothing by noticing some of the objections brought against its use.

It is alleged that the wearing of flannel is apt to cause excessive and exhausting perspiration ; but this objection can only apply to the practice being continued during the summer season or in hot climates. Flannel is also said to render the skin too delicate and susceptible to changes of weather. Now this argument is founded upon a false theory, which supposes that an uniformly sustained temperature enervates, and that to bear cold, we must be much exposed to it, than which, as has been already shown, nothing is more fallacious. If the stimulus of the flannel

be called for by any of the circumstances already mentioned, excess of stimulation or of heat of the skin, in consequence, is readily prevented by discontinuance of this kind of garment at night, when the person is in bed, and by the practice of sponging, as just directed. In this way, also, is the body safely inured to changes of temperature, to which it must, of necessity, be exposed in the various concerns of life. Excessive irritation of the skin, or even cutaneous eruptions in persons in whom this part is very sensitive, may be obviated by lining the flannel with fine muslin. This is a preferable plan to wearing the flannel over the shirt, and may be had recourse to in all cases where, at the same time that we want to guard against sudden transitions of temperature, we would avoid the inconveniences attributed to flannel next the skin. The objection made to flannel on account of its being long worn without change, applies, not to the article, but to neglect of personal cleanliness: and it is also urged under the supposition of its use being unremitted during summer, and at night when in bed. If, from particular causes, a flannel garment be worn at night time, it ought to be replaced invariably by another in the morning, and the first hung up to air during the day. When I recommend that it should be dispensed with by a person in bed, I ought to add that it is often proper to wear at this time a jacket with sleeves, made of coarse muslin, under the common shirt and next the skin, in place of the flannel. This substitute is the more necessary to invalids who are liable to be alternately chilled and sweated in the night, and on whom the flannel would be more apt to produce this last effect. I may add, that, even the robust, who disdain to wear flannel at all, would find their account in wearing the muslin jacket with sleeves, under their linen shirts, if they are much given to athletic exercises, or readily excited to sweat. In the summer season this will be found a good substitute for the flannel which had been worn next the skin during the winter.

In regions and during seasons in which periodical fevers prevail, the wearing of flannel next the skin is of paramount importance, both for prevention and cure.

CHAPTER IV.

SUMMARY ON THE USE OF A FLANNEL GARMENT—ADVANTAGES OF NIGHTLY CHANGE—BEDDING—EXERCISE—HOW PROCURED—DANCING—FRICTIONS OF THE SKIN—SWIMMING—THE BATH—CLEANLINESS.

IN suggesting the omission of flannel for an inner garment during our summer months or in hot climates, I have supposed that the requisite substitutes were always at hand, and that the changes of these could be made when necessary, as after severe exercise or labour, causing profuse perspiration. But, if the occupation and exposure are of such a nature as to prevent the requisite changes, by substituting a dry inner jacket and drawers for others either wet with rain or saturated with sweat, and at morning and evening, and if the individual is compelled to wear the same garment both during the severe exercise and profuse perspiration, and in the period of languor and coldness afterwards; or, if he is exposed to great alternations of hot days and cool nights, at sea and in sickly regions on shore, he can have no security against violent diseases—inflammations and fevers—unless by the habitual wearing of flannel day and night, both winter and summer. Generally it will be in his power to procure that of a thinner body and finer texture for the latter season, and to allow himself a change morning and evening in the manner explained in my preceding remarks. The refreshment obtained by sleep during the night is much more complete when a loose night dress is worn, owing, mainly, to the comparative freedom with which cutaneous exhalation goes on in bed when the day clothes are removed.

Bedding.—The materials of which the bedding consists is a matter of considerable moment, both as regards a sound and a healthy sleep, and immunity from various exhalations from retained animal excretions, and particularly of sweat. The chief part is, or ought to be, a mattress consisting of hair or moss, or, wanting these, of straw, chaff, or

corn-husks. A feather bed, by allowing the body to sink in it, causes an inconvenient warmth and perspiration, at the same time that it fails to allow of the escape of the cutaneous exhalations, which are necessary to health. Nor does it give the same extended support to the body as a mattress, and hence the greater tendency to sores in those who are long bed-ridden, if they lie on a feather bed. Feathers imbibe and retain, also, perspirable matter and the poison of contagion which may have escaped from those who had lain on them during their sickness. All the objections now made apply in degree, also, to feather pillows and bolsters. The coldness felt on first lying down on a mattress should be obviated during the winter, and at all seasons in the case of delicate persons and invalids, by covering it with a blanket, which ought, however, to be removed every morning, and receive a good airing with the rest of the bed-clothes. These will consist of linen or cotton sheets, with blankets and quilts or coverlids. Except in summer, and for the use of persons in good health even at this season, cotton (muslin) sheets are preferable for causes already assigned when treating of the different kinds of material and texture used for clothing. It ought to be needless for me to say that the bedding of all kinds should be well aired in the morning, by the removal and hanging up of each separate article of covering, and its exposure in a room well ventilated, for as many hours as usually there are minutes given to this purpose, unless sickness prevent the transfer of the patient from one room to another, and otherwise interferes with these domestic arrangements.

Unless due care be taken to provide the requisite kinds of garments and to change them at proper intervals, as well as to use suitable bedding, we cannot expect to derive the benefits from bathing which would otherwise ensue from the practice. Hence it is, that I introduce the subject here, as one closely akin to our main theme, independently of the interest necessarily attached to it as part of private hygiene.

Exercise—Conditions for its Use.—The next means, after clothing, adapted to keep up the vitality of the skin and to aid it to discharge its functions, is exercise. By this term we are to understand such a degree of locomotion

and successive and alternate movements of the trunk of the body and the limbs as shall quicken the circulation of the blood and the respiration, that is, the action both of the heart and lungs. There are various mechanical employments which call into play only one part of the body, while the other is entirely at rest, and which barely increase the number of contractions of the heart. To restricted and partial movements of this kind the term exercise can hardly be applied. There is yet, also, one other condition for its being hygienic and meeting the requirements of our nature. It is that it be taken in the open air.

Effects of Exercise on the Lungs and the Skin.—Under the circumstances now laid down, the blood courses more freely and rapidly through the system, from the arteries into the veins and from the veins back to the heart, from the right side of which it is distributed to the lungs, where it is exposed in large quantity to the pure and vitalizing air. While these organs absorb oxygen they give out carbonic acid; receiving a vital stimulant, the pabulum of the different tissues in the former, and giving out a deleterious principle in the latter. Thus renovated and purified, the blood, under the name of arterial, is returned to the left side of the heart, whence it is distributed to all the organs through the arteries, and fits them for the discharge of their several functions. The more freely the chest expands, and the more its movements of inspiration and expiration are accelerated, within certain limits, in pure air, the more perfect are the changes of blood in the lungs and the quicker is its transmission to the different organs, among which we must of course include the skin. Not only is the skin benefited by the healthy action of the lungs during and after bodily exercise, but it is also the better enabled to perform its own respiratory function, owing to the increased amount of blood sent to it from the heart through the arteries, and the access to it of pure air. Perspiration, at first insensible and after a while sensible, or sweat, comes on and increases; and there is farther depuration of the blood by the elimination of carbonic acid. Precursory to and accompanying these secretions, are the additional evidences of genial excitement of the skin in its increased warmth and coloration, especially a heightened glow of the cheeks and face generally, with

additional brilliancy of the eyes and expansion of all the features. Vain will be all the arts of the toilet, all the applications of cosmetics, the most tasteful arrangements of hair and coiffure, the most artistical distribution of light in the reception room, unless the fair one admit out-door exercise among the arcana for procuring a beautiful complexion and a smooth and soft skin.

Varieties of Exercise.—I shall not enumerate in this place the different kinds of exercise, coming under the several heads of active, passive, and mixed; my purpose being only to make such reference and explanations of a physiological and hygienic nature as are connected with the main subject of this work, or which serve to explain the utility of certain processes auxiliary to bathing. On a former occasion I entered more into detail on the topic of exercise, and dwelt somewhat on its modifications and the circumstances under which it was most advantageous to health, particularly in the female sex.* I wish it were in my power to be able to point out well-regulated institutions and practices for securing to the youth of both sexes a due and pleasing variety of bodily exercise, consistent with the acquisition both of an easy and graceful carriage and of muscular development and strength. Even these, however well conducted, ought only to be regarded as aids, succedaneums to the large charter by which the fields and the woods are to be traversed and the mountains climbed, in quest of fruits and flowers, or for the sake of joyous company, or in a spirit of youthful adventure and the gratification of youthful curiosity. Then will the measured walk be occasionally succeeded by running, and when obstructions present, diversified by jumping and occasional suspension of the body by grasping with firm hands the elevated and projecting branch of an overshadowing tree. Extemporaneous gymnastics, these, of the best kind.

Want of Exercise in Towns—Dancing.—In towns and densely populated districts, the inhabitants of which are unable thus to commune with nature, and who are continually subjected by their civic life, with its cares, perplexities and restrictions, to deterioration of all their func-

* Health and Beauty, &c. Philadelphia, 1839.

64 SINGING COMBINED WITH DANCING.

tions, among which those of the skin suffer grievously, artificial aids for the incitement to and procuring of bodily exercises are required. What shall be thought of the one in common use, that of dancing? Can we say more of its history and present degradation than is summed up in the following terse sentences of a French writer, from whose judicious compend* I have already derived pertinent suggestions and useful facts. "Dancing," writes M. Levy, "blended with the rites of primitive religions, the exercises of the military gymnastics of the ancients (pyrrhic danse), the pleasures of the most polished courts and the frightful feasts of the anthrophagi, is, now-a-days, nothing but a mere saloon parade, or an indecent mimicry in public balls. The exercise which Socrates praised for its utility in developing the strength and grace of the body, which the royal psalmist himself indulged in before the sacred ark, which constituted a part of the solemnities of the primitive Church, which Henry IV. and Louis XIV. were so partial to; this exercise is now an accompaniment of orgies, or is practised in the mephitic air of crowded rooms and in dresses which, while they almost suffocate by their tightness, are too scant to protect the wearers from atmospherical vicissitudes during those hours of the night in which the exhausted frame requires the blessing of sleep."

Singing combined with Dancing.—The hygienist, if requested to give an opinion on dancing, as an amusement to be reconciled with health and morals, would probably answer in this wise. If day were substituted for night, easy fitting and plain costumes for the tightly laced and rich ones, more varied, more graceful and more chaste movements to take the place of those of an opposite character, and temperance in its large sense to preside over the table of refreshments, when these are deemed necessary, then might dancing be taught to all and practised by all who are in the enjoyment of common health, without anxiety on the part of thoughtful and scrupulous parents, and without danger on that of their ingenuous and pleasure-seeking children. Music and dancing are in constant alliance with each other; and this might be rendered still

* *Traité d'Hygiene, Publique et Privée, Par Michel Levy.*—2 Vol.

more intimate, without the suspicions that arise on hearing certain pieces which are more than Lydian in their strain and measure. My recommendation is, that the persons who are engaged in the dance, should chaunt in rhythm at the same time. The sentiments uttered in this way might be as various in their metre and musical accompaniments as the movements and measures of the dance. A vocal accompaniment of this nature, while it increased the gymnastic character of the dance, by calling additional organs into exercise, would insure attention and interest on the part of the performers, and, at the same time, prevent those tasteless gyrations and rapid movements which are the only breaks now attempted on the general listlessness and stiffness of the customary dances.

If I have given somewhat into the language of reproof on a favourite amusement, and on favourite styles of dress, it is because I am desirous that they who are in quest of health, by visiting watering places and mineral springs, with a view to bathe and drink the waters, should not be disappointed in their expectations, and at the same time bring deservedly favourite remedies into disrepute by unseasonable indulgences.

Frictions, an Exercise of the Skin.—In addition to the exercises, such as we generally understand them, there is a modification which acts directly on the skin, and through this organ, of course, on the entire economy. It consists in friction, by rubbing with the hand or with a towel or still rougher material, as a horse-hair brush or bag, or in actual scraping, as in the strigillation so common in the ancient Roman baths. In addition to a thorough rubbing by one or other of these contrivances, the skin is, also, subjected in Eastern bathing, to a process called shampooing, by which it, in common with the muscles and other tissues beneath, is kneaded as it were, and often the process is concluded by stretching the different joints of the body to that degree as to make them fairly crack. All these are very important accessories to the bath, and add not a little to its refreshing and sanatory operation. They will engage our attention again, when the different kinds of baths are described, either historically, or when designating their appropriate use under the different circumstances of health and disease, and of individual predisposition and

habits. But even now, before passing to other topics, I shall not I am sure displease my readers by introducing the strong enforcement of the exercise of the skin, in the somewhat quaint language of the original Dr. Geo. Cheyne.

"The flesh-brush is an exercise most useful for promoting a full and free perspiration and circulation; almost every body knows, what well currying will do to horses, in making them sleek and gay, lively and active; even so much as to be worth half the feeding. This it can no otherwise effectuate, than by assisting nature to throw off, by perspiration, the grosser parts of the juices which stop the full and free circulation, and by constant friction, irritation, and stimulation, to allicite blood and spirits to the parts most distant from the seat of heat and motion, and so to plump up the superficial muscles. The same effect it would produce in other animals, even human creatures themselves, if they were managed in the same manner, with the same care and regularity. I should think it, therefore, well worth the pains of persons of weak nerves and sedentary lives, especially those threatened with paralytic disorders, to supply the want of exercise of other kinds, with spending half an hour, morning and night, in currying and rubbing their whole body, more especially their limbs, with a flesh-brush."

The recommendation which follows may excite a smile, but it is not without its use. "And it is a wonder to me," continues Dr. Cheyne, "that luxury has not brought cold-bathing and currying in use, upon the animals (especially those of them upon whom they can be so readily made use of, such as oxen, pigs, veal, lamb, and all poultry, which naturally delight in cold-bathing) which are brought to the table. For certain it is, that cleanness and due exercise (of which currying is one part) would much contribute to make all animals whatsoever, without exception, healthier in themselves, fuller of juice and spirits, and, consequently, better food for human creatures."

Swimming.—Swimming comes necessarily under the head of exercises, and at the same time of bathing, conferring to a considerable extent, on those who practice it, the benefits of both. Swimming is locomotion and progression in the water, in which the muscles of the limbs, together with many of those of the trunk, are brought into vigorous

and successive contractions. But although the limbs, and especially the upper, are more tasked in swimming than in walking and even running, yet the interval between the muscular movements in the former is one of comparative repose, as the body is supported with very slight effort by the water in which it rests. The breathing is not as equal in swimming as in walking, owing to the greater and more prolonged expansion of the chest, by long inspiration of air without corresponding expiration. This proceeds from two causes: first, in order to make the chest a fixed point for the contraction of the various muscles common to it, and the arms and neck, but which are now wanted exclusively for the movements of the former in striking out, and of the latter in keeping the head above water; second, in order to diminish the specific gravity of the body by filling the lungs with air. So long as the lungs are thus distended, a practised swimmer or even a person who is self-possessed, will float on the surface of the water if he be extended on his back. He must, however, in popular language, have taken in a long breath, and must hold his breath afterwards. So soon as he lets the air escape from his lungs, by expiration, he will begin to sink below the surface, unless he call his arms into play. A very slight effort of these limbs, as in paddling in the manner in which a dog uses his fore-legs, will enable a person to remain in the water with his head above the surface for a length of time.

The hygienic effects of swimming will be dependent not only on the force used and its duration, but, also, on the temperature of the water in which the swimmer is immersed. In tropical climates, and during the oppressive heats of summer in more northern ones, swimming in rivers, lakes, or in the sea, combines the advantages of a cool bath with its soothing influences, and of exercise with its muscular and nervous revulsion. The excess of animal heat which similar muscular exertions, as in fast walking or running, evolve, is carried off immediately by the surrounding cooler medium of the water, and exhausting sweat is at the same time prevented.

There is this additional peculiarity in the fashion of bathing by swimming; that it is not merely a healthful exercise and recreation, but it is, also, an accomplishment by which

life is often saved, and moments of extreme anxiety and agonizing fear are converted by the bold swimmer into a season of rejoicing and thankfulness, at the escape, through his exertions, of many a helpless fellow mortal from a watery grave.

It should be rather a matter of surprise that the moderns pay so little attention to the art of swimming as a part of education, than that it was held in such high estimation by the ancient Greeks and Romans. The latter, when they wished to convey an idea of the complete ignorance of an individual, would say of him, that he *neither knew how to read nor swim*—a phrase corresponding with our familiar one, that such a person, poor fellow, knows not how to read or write. Attached to, and forming a part of, the gymnasia and palestræ were schools for swimming; and according to Pliny, the Romans had basins (*piscinæ*) in their private houses, for the enjoyment of this exercise. At the present time, there are several swimming schools in Paris, Berlin, Vienna, and Copenhagen.* In one at Paris, on the left bank of the Seine, the temperature of the water is maintained at a suitable elevation to allow of its being regularly resorted to during the coldest season. It exhibits a basin ninety-six feet long by thirty wide; its greatest depth is eight, and the least five feet. There was an establishment for learners to swim, on a large scale, in Boston harbour, which, for some years, was under the direction of Dr. Lieber. We have such on the Delaware opposite to this city and in the city itself, but without the benefit of that regular and systematic superintendence essentially required for the younger class of the population, who usually

* By the new system of Captain Clias, swimming is taught with much greater facility and in briefer time than formerly. In the year 1818 there was formed, in the central school of Denmark, one hundred and five masters, destined to teach, in the different cities of that kingdom. All of them having been instructed after the same method learnt in less than four months to swim a distance of nine miles, to dive twenty feet deep, and even to swim a considerable distance in full dress and arms, carrying a man on their back. In the different swimming schools of that country, 2707 individuals have learnt to swim perfectly in the same year, and almost every one of those Institutions, on the continent of Europe, offers the same satisfactory result.—*Clias on Gymnastic Exercises.*

resort to these places. We are also deficient in means and arrangements for keeping open a swimming school during the winter—or even during that portion of it when the river is not closed by ice. The advantages from a swimming school ought not, however, any more than those from a gymnasium to be restricted to the young alone, nor to one sex. Adults, including even invalids with proper precautions, might resort to them, and either learn to swim or to keep up a knowledge already acquired. Females would, of course, have separate establishments, under discreet guidance, for their own use.

Surely, says a popular writer on gymnastics, it may be called a duty of parents to attend to this part of the physical education of their children. Is it not truly pitiable to see the smallest animal find its safety in crossing rivers, and in sustaining itself on the water for hours, whilst man, the king of animals, so proud of his knowledge, may be drowned in a brook, if he has not learned to swim? Societies and institutions for the recovery and resuscitation of drowned persons are very praiseworthy; but would not humanity be the gainer, if adjoining, to each of the establishments of this nature, a swimming school were to be opened, in which persons of all classes and ages might learn to save themselves from drowning.

Were children accustomed from their infancy to the water, they would probably learn to swim earlier than to stand upright. A tub of adequate and it might still be moderate dimensions ought to be part of the furniture of every nursery, for the purpose of allowing the children the facilities of daily or twice daily immersion in water—cool, tepid, or warm, according to the season and their constitution;—and, also, of accustoming them to amuse themselves and make the preparatory movements for swimming. In the accounts by voyagers of the inhabitants of the Sandwich and other islands of the Pacific, we are told, that when one of their canoes happens to be upset, the children seem to rejoice at their change of element, and swim about without any symptoms of alarm. The Caribs were also dexterous swimmers. Mothers, in case of a boat being overset, were able to support themselves on the water with their infants at the breast, whilst the men were employed in putting the boat to rights and emptying out the water.

Swimming is too severe an exercise, and it may be a dangerous one too, for the asthmatic, and those suffering from organic disease of the heart, or from spitting of blood, and who are predisposed to apoplexy, or are troubled with hernia.

Bathing for Purification of the Skin.—It may be readily inferred from the description of the functions of the skin, that a large amount of excreted matter will adhere to its surface in a short period, and give rise to effluvia at once offensive to the sense of smell, and deleterious to the health of those coming within the range of its emanations, unless regular and thorough ablution be practised. To what extent the air is thus contaminated in crowded assemblages, one is painfully sensible who mixes among them, whether in theatres, courts of law, public meetings, halls of legislation and full churches during evening service—to say nothing of the fashionable party and ball. Hospitals, with all their real and imputed disagreeableness, rarely have, as now arranged and managed, so impure and deleterious an air as any of the places of resort just mentioned, when these latter are crowded in the evenings. Fevers of the most malignant type have originated from the animal matters thus discharged from the skin and lungs of a number of persons, confined for any length of time in circumscribed space in which there was deficient ventilation. From the bodies of these persons a peculiarly offensive effluvia radiates for a length of time even after bathing has been had recourse to. Individuals also, who, without being thus confined, have long neglected personal ablution and change of garments, and have been addicted to the use of ardent spirits, are often so many walking sepulchres, whose emanations are far less tolerable than those of the dissecting room itself. Some persons who would resent the imputation of uncleanness, deceive themselves into a belief that, if they overcome one odour by another, the animal by vegetable essences and sweet waters, they comply with the requirements of the toilet. They have yet to learn the important lesson, that no distillation, though each drop should be as costly as grains of a diamond, can avail either to cleanse or to beautify, without the use of water, the universal fluid, the true panacea for all bodily impurities.

This leads to a consideration of the bath, as the third

means, which I enumerated to be necessary to a healthful discharge of the cutaneous functions. My remarks on this point just now, will be brief, and serve merely as an introduction to a more systematic division and minute details, which will form the subject of the succeeding chapters of this work.

Cleanliness—Preservation of Beauty.—To wash one's self ought to have a much more extended meaning than people generally attach to the words. It should not consist merely in washing the hands and rubbing a wet towel over the face, and sometimes the neck: the ablution ought to extend over the entire surface, and it is particularly necessary where often least thought of, as at the bends of the limbs, &c. In a tepid bath, with the aid of a little soap and a sponge or brush, the process may be completely performed—with a feeling of comfort at the moment, and of much pleasure afterwards. Cleanliness of body is in closer connection with purity of mind than is generally imagined; and both must be associated with our ideas of personal beauty and loveliness. The Grecian fiction, of Venus being of "ocean born," is typical of the aid which beauty is expected to derive from frequent ablution and bathing.

Females are not, we fear, adequately impressed with the full importance of the practice here recommended. They often spend much time at the toilet—great pains and expense are incurred to obtain, select, and arrange the finest materials for dress, and to display colours in the most tasteful contrast—but is that which ought to precede all these arrangements, the tepid or warm bath, regularly used? Is it had recourse to in the morning, after the fatigues and exertions in a ball room, or an excursion of pleasure in a carriage or on horseback? Some ladies will say, ay—but I greatly fear they are in so small a number as to be entitled to be considered exclusives of the first water, even though they may not show off in silks and brocades. In the interests of vanity alone—a desire to appear to the greatest advantage in the eyes of the other sex—a female should rigidly and regularly follow the practice of daily ablution. This is a point properly urged on their attention by writers of their own sex. Among these, Mary Wollstoncraft, in her "Vindication of the Rights of Woman,"

says, "Were I to name the graces that ought to adorn beauty, I should instantly exclaim, cleanliness, neatness, and personal reserve. So necessary indeed is that reserve and cleanliness which indolent women too often neglect, that I will venture to affirm that when two or three women live in the same house, the one will be most respected by the male part of the family who reside with them, leaving love entirely out of the question, who pays this kind of habitual attention to her person."—Elsewhere she says, "In order to preserve health and beauty, I should earnestly recommend frequent ablutions, to dignify my advice that it may not offend the fastidious ear; and by example, girls ought to be taught to wash and dress alone, without any distinction of rank."*

The means for the preservation of beauty are enumerated by a lady of fashion, as follows: 1. *Temperance*, in a well-timed use of the table, and so moderate a pursuit of pleasure, that joining the crowd in evening amusements shall not frequently recur. 2. *Exercise*, gentle and daily, in the open air. She goes on to speak of the third and last means in the following strain.

"*Cleanliness*, my last recipe (and which is, like the others, applicable to all ages), is of most powerful efficacy. It maintains the limbs in their pliancy, the skin in its softness, the complexion in its lustre, the eyes in their brightness, the teeth in their purity, and the constitution in its fairest vigour. To promote cleanliness, I can recommend nothing preferable to bathing.

"The frequent use of tepid baths is not more grateful to the sense, than it is salutary to the health, and to beauty. By such ablution, all accidental corporeal impurities are thrown off; cutaneous obstructions removed; and while the surface of the body is preserved in its original brightness, many threatening disorders are removed or prevented. * * * *

By such means the women of the East render their skin softer than that of the tenderest babes in this climate, and preserve that health which sedentary confinement would otherwise destroy.

* Journal of Health, Article "Personal Cleanliness," Vol. I. pp. 323-4.

"This delightful and delicate Oriental fashion is now, I am happy to say, prevalent almost all over the continent. From the Villas of Italy to the Chateaux of France; from the Castles of Germany, to the Palaces of Muscovy; we may everywhere find the marble bath under the vaulted portico or the sheltering shade. Every house of every nobleman or gentleman, in every nation under the sun, excepting Britain, possesses one of those genial friends to cleanliness and comfort. The generality of English ladies seem to be ignorant of the use of any bath larger than a wash-hand basin. This is the more extraordinary to me, when I contemplate the changeable temperature of the climate, and consider the corresponding alterations in the bodily feelings of the people. By abruptly checking the secretions, it produces those chronic and cutaneous diseases so peculiar to our nation, and so heavy a cause of complaint.

"This very circumstance renders baths more necessary in England than anywhere else; for as this is the climate most subject to sudden heats and colds, rains and fogs, tepid immersion is the only sovereign remedy against their usual morbid effects.

"Indeed, so impressed am I with the consequence of their regimen, that I strongly recommend to every lady to make a bath as indispensable an article in her house as a looking-glass."

In these remarks on the necessity of preserving cleanliness by frequent and regular ablution, it is not intended that tepid bathing should be regarded as the only means of accomplishing this desirable end, to the exclusion of cold and warm baths; but simply, that in public and domestic hygiene, it is the variety which can be most advantageously used by mankind at large, without detriment or danger.

Let me notice, in conclusion, another important condition for preserving a healthy skin, and in doing so, I shall make use now, as I made use on a former occasion,* of the words of an intelligent lady (Mrs. Farrar), addressed to her own sex in a useful work, called *The Young Lady's Friend*.

"I cannot dismiss this part of my subject," says Mrs.

* *Health and Beauty*, pp. 110-11.

Farrar, "without a few observations on the importance of a daily evacuation from the bowels. The practice of taking medicine to effect this should be avoided; but no pains should be spared in regulating the diet and exercise so as to obtain it. If all mothers made a point of establishing regular habits in childhood, it would not be necessary to notice the subject here; but knowing how carelessly most young persons treat the subject and that some even consider it a piece of refinement and a privilege not to pay daily attention to this function of the body, I feel it incumbent upon me to point out the evil consequences of such a course.

"It may startle some, who thus neglect themselves, to know that they carry in their face the proof of their bad habits; and that a medical man has said, he could distinguish, in a large company, all those girls who were inattentive to their health in this particular. He says, he knows them by the state of their complexions; and he longs to remonstrate with them on the impolicy if not the sin, of so maltreating their systems and spoiling their good looks. To those who have right views of the subject, there is something the very reverse of refinement in such conduct; and young ladies would certainly avoid it, if they were aware of all the consequences. Besides the indirect injury to the health, and consequently to the beauty, of all, it has a direct effect unfavourable to the complexion; it, also, makes the breath offensive, and sometimes affects the whole atmosphere of a person; it is, moreover, a frequent cause of eruptions of the skin. If this be not already your mortifying experience, let me persuade you to comply with the laws of your being, before you have felt the chastening which will sooner or later follow their infringement."

CHAPTER V.

BATHING—ITS ANTIQUITY—A RELIGIOUS ORDINANCE—BATHING IN THE EAST—AMONG THE GREEKS—AMONG THE ROMANS.

IN the historical sketch of the different modes of bathing and its auxiliary processes in ancient and modern times, which I am about to place before my readers, I look beyond the mere desire to gratify their literary curiosity. The information communicated will, I hope, be of an available kind, by suggesting the means of supplying omissions and of making improvements in our own balneatory arrangements.

Bathing may with great propriety be regarded as a practice not less congenial with our feelings of bodily comfort than conducive to vigorous health. We cannot doubt its antiquity, when we see it resorted to in every stage of society, from the wandering savage of the woods to the polished inhabitant of the city. The same instinctive impulse by which, during the oppressive heats of summer, man and animals are led to seek the shade, and inhale with eagerness cool air, would prompt them to plunge into the nearest stream, as an additional means of refreshment and invigoration.

Antiquity of Bathing.—In the best descriptions of ancient manners we meet with accounts of bathing in rivers ; as when the daughter of Pharaoh and her attendant maidens went down to the Nile ; and Nausicaa and her companions indulged in similar enjoyment in the stream near her royal father's residence. Domestic baths, suggested by the wants and conveniences of life, were also of remote antiquity ; as we learn from Homer who represented Diomed and Ulysses to have made use of such, after washing in the sea. So, also, the poet tells of Andromache preparing warm water for Hector on his return from battle ; and of Penelope calling in the aid of unctions and baths, to mitigate her melancholy at the prolonged absence of her husband. It

is from the hands of Helen herself that the disguised Odysseus receives these services. Minerva is feigned to have imparted renewed vigour to the wearied limbs of Hercules at the warm springs of Thermopylæ; and Vulcan, in place of other gifts, offered him warm baths.

Numerous are the passages in Homer which describe the custom of females attending male guests, and assisting them in their ablutions. On this point, the following observations of Athenæus are worthy of remembrance. "Homer, also, makes virgins and women wash strangers, which they did without exciting desire, or being exposed to intemperate passion, being well regulated themselves, and touching those who were virtuous also: such was the custom of antiquity, according to which the daughters of Cocalus washed Minos, who had passed over into Sicily."

The importance attached to bathing, as a means of cure of loathsome diseases is well illustrated in the directions given to Naaman the leper, by the prophet Elisha, to wash seven times in the river Jordan; and still more, in the command of our Saviour, for the blind man to wash in the pool of Siloam. The pool of Bethesda was, also, resorted to by the sick and infirm. It seems to have been a uniform part of Eastern hospitality to furnish water to the wearied traveller, for bathing his feet, as we find Laban to have done for the messenger of Abraham and his attendants, and as Abraham did for the three angels in disguise who tarried with him during the night.

Bathing a Religious Ordinance.—As typical of moral purity, bathing, by frequent ablutions and immersions, was made to form part of the religious rites of the inhabitants of central Asia and the East. We find that, even prior to the time of Moses, and during the patriarchal age, these observances were strictly attended to; as when Jacob commanded his family to purify themselves and to change their garments, before they went to Bethel to sacrifice. Job speaks of a like purification by snow water. It would seem, indeed, that the great Jewish legislator and prophet was not merely influenced in his enactments, in this respect, by the necessity of preserving the health of the twelve tribes, during their long journeying through the wilderness and their subsequent residence in the land of Canaan; but he was, also, swayed by the remote example

of the patriarchs, and the more recent one of the Egyptians, whose priests washed their bodies three times a-day, on the occasion of extraordinary sacrifices. So intimate was the connection between bodily purity and moral truth deemed by the Jews, that not only the priests, as was first enjoined on Aaron and his sons, washed their whole bodies before they undertook to officiate in the temple, but the proselytes, born of heathenish parents, in addition to their being circumcised, were immersed up to their necks in a river, during which time they listened to an exposition of some of the precepts of the law. This custom was continued by John the Baptist. Christian baptism by immersion, in the early ages of the church, succeeded the Gentile purification. Mohammed engrafted on his code the lustrations of the Jews; and his followers conceive themselves bound to wash the face, neck, hands and arms before each of the five prayers which they repeat daily. Besides these ordinary lavations, there are others peculiar to each sex.

The Greeks, though doubtless familiar with the practice, for the purposes of health and recreation, were indebted to the Egyptians for giving system to bathing as part of the medical art, and as connected with religious observances. The latter people, in common with the Jews, acknowledged three kinds of purification by bathing, viz. immersion or dipping, washing of the hands and feet, and aspersion or sprinkling. The priests washed themselves in cold water, twice in the course of the day and as often in the night.

Baths were sometimes called sacred by the ancients, and the reason of this designation is one of the problems proposed for solution by Aristotle. Whether it originated in a belief in the divine origin of baths, particularly those of natural hot springs, or from the circumstance of their being dedicated to particular deities, it is not very clear, nor is the question one of any moment to us on the present occasion. We read, however, that sea-baths were dedicated or held sacred to Neptune, fountains and springs to the Naiads and other Nymphs, &c. At Syracuse, in Sicily, Apollo Thermites was worshipped; and in Thessaly, the hot springs of Thermopylæ were dedicated to Hercules. In Italy medicinal springs were sacred to, respectively, Juno,

Esculapius, &c. ; as lake Avernus was to Pluto, and that of Cuma to the Sybil who was designated by it.

Following these almost venial superstitions, the Christians, in Italy, gave names to various springs after those of the apostles and saints, as St. Christopher, because the water imparted divine relief, St. George because it healed wounds, St. Luke because it was good for diseased eyes, St. Bartholomew because it purified the skin, St. Nicholas on account of the generous hospitality of this saint, and of his giving baths to the poor. Baccius,* from whom I derive these details, concludes with a pious reflection, that, both patients and physicians should remember, that, whatever relief of a wonderful and unexpected kind is procured from bathing, is due not so much to the bath and the doctor, as to the divine goodness. This may sound like ethical casuistry, but in these days of materialism, it is worth being repeated.

Bathing in the East.—As might be anticipated from the importance attached to it in a religious point of view, and the necessity, in warm climates, of frequent ablutions of the skin, methodical bathing first began to be practised in the East with all the artificial aids which refined sensuality could devise, for procuring the enjoyment of varied sensations, as precursors to languid repose.

The Egyptians used warm as well as cold baths, though for ordinary ablution cold ones were preferred. In a tomb at Thebes, there is a painting in which a lady is represented as about to take a bath. She is surrounded by four female attendants, who are engaged in the various duties of unrobing her, &c. That bathing was regarded as a luxury as well as an observance of hygiene in ancient Egypt, seems to be proved by the circumstance of its being prohibited during times of general mourning.

How the Persians prized the bath we are allowed to infer, from the astonishment which Plutarch represents Alexander the Great to have felt at sight of those of Darius. The numerous hot springs in Cilicia, Troas, Phrygia, &c., mentioned by Athenæus, would naturally suggest the application of their waters to the purposes of bathing.

Bathing among the Greeks.—The Greeks, as we have seen, readily adopted the usages of bathing so congenial

* *De Thermis, &c.*

with their national love of pleasure and novelty ; but, more sociable than their Oriental neighbours, and at the same time ever intent on mixing up the common affairs of life with Epicurean philosophy and patriotic pride, they joined their public baths to the gymnasia, so that athletic sports should be succeeded by bathing, and this again alternate with conversation on literature and morals, while the people were sitting, or slowly walking under their long and finely sculptured porticos.

The obligations of Rome and the western provinces of the Empire to Greece, for a knowledge of bathing on a large, and it may be said complicated scale, are evinced in the fact that the names of the several divisions of the *Thermae* are all Greek. Socrates, Plato, and Aristotle talk of baths as in common use ; and Hippocrates, about the time of the Peloponnesian war, recommends them in a variety of circumstances, both for the purposes of hygiene, and the cure of diseases. Plato, in describing his Atlantis, the lost island of the west, supposes that not only were there baths open as well as covered for each sex, but also for domestic animals.

In the private houses of the Greeks, the guests' bath-room is described as being included in the division of the first court. The bath-room appropriated to the women and children must, however, be sought for in the interior of the house, as appears from the hymn to Demeter, where the child is immediately put into the warm bath in the *thalamus* itself. In the *Iliad*, too, Hector appears to take a bath in the interior of the house. Bathing and anointing formed a part of the recreations of the retired and quiet apartments of the women ; as they still do in the regions where Homer's song first resounded. The strengthening bath, as it was generally deemed, in the sea, or in rivers, was followed by a bath for cleanliness in a tub ; and the only superior privilege enjoyed by the immortal gods, seems to have been the ambrosial oil with which the goddesses heightened their charms after the bath, and which was thence itself called *kallos* or beauty ointment. In all other respects they shared this refreshment with mortals. Noble women, thus bathed and perfumed, were also accustomed to put on fragrant garments.*

* H. Hase. The Public and Private Life of the Ancient Greeks.

Historically considered, bathing assumed the most importance, when it became a part of hygiene, or that art by which all the agents of life and well-being are systematized, and their separate and conjoined effects distinctly described. Popular prejudices, it must indeed be acknowledged, at times usurped the place of sober experience, and led to a fatal abuse of cold bathing; as in the case of the Spartans, who were in the practice of plunging their newborn infants into cold springs. While pointing out the florid health and robust frames of those who grew up to adult age, these people forgot, that it was owing to their very robustness that this severe treatment was tolerated, and that the tender and delicate sank under it. In more northern and inclement climates, a greater, though we must consider it questionable, necessity was thought to exist for cold immersion. The ancient Germans, as described by Tacitus, were expert swimmers, and of course addicted to bathing. But he adds, that, "as soon as they rise the first thing they do is to bathe, and generally, on account of the intense severity of the climate, in warm water." Cambden tells us that the Gauls, the progenitors of the Britons, had their sacred fountains which they called *diona*, and which were doubtless employed both for lustrations and the cure of diseases. In England there were many cold springs, early celebrated for their curative powers, which were supposed to be of a miraculous nature, as that at Rye in Kent, into which a wonderful virtue was infused by the prayers of a certain Norman monk.

Bathing among the Romans.—The Romans, at first imitators of the Greeks, eventually surpassed them and all other nations in the magnificence and extent of their baths. The primitive practice in the earlier period of washing the arms and legs, as a matter of cleanliness, before they sat down to supper, was such as might be expected among a people so agricultural as the Romans. Their bare arms and legs would be exposed to, and retain, dust and dirt; and at all times the use of sandals, even by persons of quality, would require more frequent ablutions of the feet than are absolutely necessary with our modern European chaussure. Every ninth day, when the rural population repaired to the city either on the *nundinæ* or to attend at the assemblies of the people, they bathed in the Tiber, or

some other river which happened to be nearest to them. The youth, also, after their games and military exercises in the Campus Martius, would plunge into the Tiber, both to clear themselves of sweat and dirt, and to indulge in swimming. The chief obstacles, for a long time, to the general use of baths, and particularly warm baths, were, probably, the fear on the part of the authorities, that indulgences of this kind were opposed to the simplicity of republican usages, and, also, the difficulty of procuring an abundant supply of pure water. More extended intercourse with the Greeks and the nations of the East effaced, in a great measure, the inherited prejudices on the score of effeminacy; and the construction of the aqueducts by which water was brought from the country into Rome, obviated the second difficulty. A public Piscina or large swimming bath, between the Capitoline hill and the Tiber, was constructed soon after the introduction of water from Tusculum by the Appian aqueduct. It was not, however, until a still later date, or about the time of Pompey, that the custom of bathing every day seems to have been introduced. The erection of the first warm and hot baths or Thermæ, a term expressive of their Greek origin, dates from Augustus, to whose favourite and minister, Mæcenas, the Romans were more immediately indebted for this source of luxurious enjoyment. The great extension of the buildings for the bath grew out of their connection with the Palestræ; for until this time the gymnastic and martial exercises were performed in some open space, such as the Campus Martius.

The thermæ were placed under the direction of the ediles, who regulated their temperature, and enforced cleanliness in the establishments themselves, and order and decorum on the part of the visitors. Agrippa, during the time he was edile, increased the number of thermæ to one hundred and seventy, and in the course of two centuries there were upwards of eight hundred in imperial Rome.

Water of every grade of temperature abounded; and even that of the sea and of the sulphurous fountain of Albula, near Tibur, was introduced. Within the vast precincts of the thermæ were found temples, palestræ for the sports of running, wrestling, boxing, pitching the quoit and

throwing the javelin ; and extensive libraries. Architecture, sculpture, and painting exhausted their refinements on these establishments, which for their extent were compared to cities : incrustations, metals, and marble were all employed in adorning them. Those of which the most numerous remains are still visible are the baths of Titus, Antoninus Caracalla, and Diocletian. In the order of time, these were of subsequent erection to the thermæ of Agrippa and of Nero. Of the magnificence of the baths of Agrippa, the relation, friend, and counsellor of Augustus—an idea may be formed, from the circumstance of the Pantheon serving as a vestibule to them. By his will he bequeathed his gardens and the baths which went by his name to the Roman people, and he appropriated particular estates to their support, in order that bathing might be attended with no expense to the public. Still more rich and costly were the baths of Nero, erected in the spot now occupied, in part, by the Justiniani palace, near the church of St. Eustatius. Martial, in one of his epigrams, asks—was there ever a more execrable man than Nero, and yet is there any building which equals his Thermæ in magnificence ? The baths of Etruscus, made free by the emperor Claudius, also enjoyed considerable repute.

The baths of Caracalla were ornamented with two hundred pillars, and furnished with sixteen hundred seats of marble : three thousand persons could be seated on them at one time. Those of Diocletian surpassed all the others in size and sumptuousness of decoration ; and were, besides, enriched with the precious collection of the Ulpian library. We can entertain some idea of the extent of this edifice, when we are told that one of its halls forms at present the church of the Carthusians, which is among the largest, and at the same time most magnificent of modern Rome. Here we are furnished with one of the many monuments of the triumph of Christianity, in despite of the most persevering and cruel persecutions of the then sovereigns of the world. On this very spot, where the organ and the choral strain of devotion are now daily heard, Diocletian is said to have employed in the construction of his baths forty thousand Christian soldiers, whom, after degrading with all the insignia of ignominy, he caused to be massacred when the edifice was completed.

CHAPTER VI.

BATHS OF THE GREEKS AND ROMANS—DIVISIONS OF THE GREEK BATHS—DIVISIONS OF THE ROMAN BATHS.

Baths of the Greeks and Romans.—As there was a considerable resemblance between the divisions of the baths in Greece and those in Rome, it may be well, in this place, to designate the chief apartments of which they were composed, and the auxiliary apparatus employed to give greater effect, either for luxury or health, to the use of the baths proper. There was this difference, however, in the appreciation of bathing by the Greeks and the Romans, that, whereas among the latter the gymnasium constituted a part of the bath, by the former the bath was looked upon as a part of the gymnasium. Hence, the gymnasia of the Greeks were chiefly frequented with a view to exercise, but those of the Romans for warm bathing.

The apartments constituting the series through which bathers passed were the following: *Apodyterium*, or *apodytorium*—undressing room; *Tepidarium*, or warm room, with a tepid bath; *Frigidarium* which contained a cold bath; *Luconicum* or hot-air room for sweating, or in its stead *Caldarium* or hot and sometimes vapour bath,—*vaporarium*. There were, also, an *Unctuarium*, or *Elaothesium*, for holding the ointments and oils with which the bathers were rubbed; a *Sphæristerium* or large room for exercises; the *Ephæbeum* of the Greeks. Below these rooms was the *Hypocaustum* or furnace for heating the rooms and the water in the boilers, before it was distributed to the baths. This also received the names of *præfurnium*, *propnigeum*, *ostium furni*, *fornax*. The *Piscina* was a cistern called also *natatio* or *natatorium*, holding cold water, large enough to allow of the exercise of swimming. *Solium* had also occasionally a similar meaning, with the prefix *frigidum* or *calidum*, according as its contents were cold or warm. “*Solium* is defined to be either a vessel to wash in, or a hollow into which those

who washed descended." *Labrum*, indicated a vessel or a basin of various sizes, from that large enough to allow of immersion of the entire body to one calculated merely for ablution of the face or feet, &c. *Lavacrum* was generally restricted to the latter meaning. The Greeks called the cold bath *Loutron*. Pliny designated it by the title of *Baptisterium*, a name retained by the early Christians for the vessel in which the infant, or the adult convert, was immersed in baptism.

Frigidarium, tepidarium, &c., served to designate both the temperature of the air of rooms through which the bathers passed, as well as that of the water in the reservoirs, and in the *labra* or baths proper, in the sense in which they are generally understood in Western Europe and by ourselves in this country. Cameron truly remarks, that it does not appear that the frequenters of the baths made use of the water either of the Tepidarium or Frigidarium, but only passed through these rooms, which, he adds, confirms our supposition that it was the temperature of the air and not of the water which made them so generally frequented in the return from the hot bath. In this sense these rooms were sometimes called *Cella Frigidaria*, *Cella Tepidaria*, &c.

In the smaller baths of the provincial towns, or in those belonging to individuals, all these several compartments were not met with. Thus, for example, the apodyterium or unrobing room was not unfrequently wanting; and its place was supplied by the frigidarium, or even by the tepidarium.

Baths of the Greeks.—Before speaking more in detail of Roman baths, we may give a few words to those of the Greeks, taking the description of these latter, as we find them included in that of the Gymnasia, by Vitruvius. He tells us that "it was their method to surround a square or oblong area, with a portico one thousand two hundred and fifty-seven feet in circumference, and to support that portico on three sides with a single row of columns; on the fourth side, with a double row, to prevent the dust blowing in during stormy weather. Round the three sides of this area were constructed spacious Exedrae, with seats for the use of philosophers, and men of letters. In the centre of the double row of columns was a most elegant and spacious room; this, also, was furnished with seats,

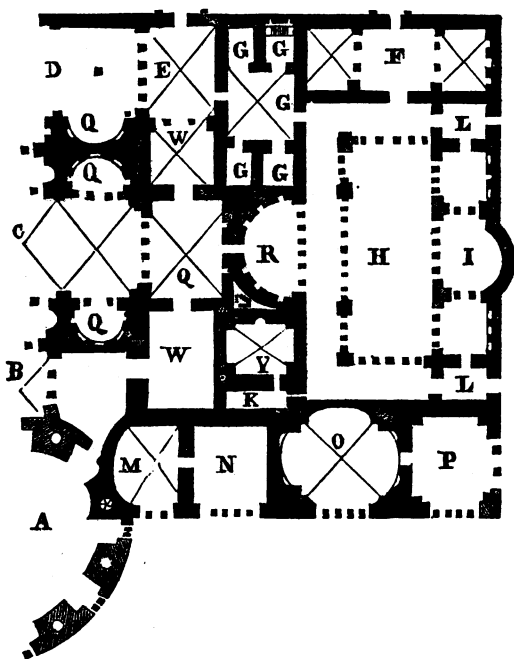
and was one-third longer than it was broad, and went by the name of Ephæbeum. To the right, or upon the east side, was the *Corycæum*, or room for shaving, dressing, &c. Next followed the *Conisterium*, where the sand for the use of the wrestlers was kept. In the corner of the peristyle was a cold bath which went by the name of *Loutron*. The apartments to the left of the Ephebeum, were, first the *Elaeotherium*, or room for holding the ointment; contiguous to it was the *Frigidarium*; out of which a passage led to the *Propnigeum* near the furnace, in the corner of the portico. Further on, but adjoining to the *Frigidarium*, was placed the *Concamerata Sudatio*, a vaulted room, twice as long as broad; in one angle a *Laconicum*, and on the opposite side a warm bath.

"There were likewise three other porticos, one at the going out of the *Gymnasium*, the other two for the use of the wrestlers, one on the right hand, the other on the left; that towards the north is to be made double and spacious; the other single: in the middle of this portico was a descent of a foot and a half by two steps, to a lower ground, which must not be less than twelve feet broad, and is to be surrounded by a margin not ten feet in breadth. By this means the spectators will not be incommoded by those who are taking their exercises. This portico is called by the Greeks *Xistos*, because here the wrestlers exercised under cover in the winter.

"In the area between the two porticos were rows of plane trees, with walks, and, at proper intervals, Mosaic pavements. Between the *Xysti* and the double portico are walks exposed to the air, called by the Greeks *Peridromidas*, by us *Xysti*; in which, even in winter time, when the weather was fine, the wrestlers exercised, leaving the covered *Xystus*. Behind this *Xystus* was a *Stadium*, so constructed that a great number of spectators might commodiously see the exercises performed."

The Thermæ or Public Baths of Rome.—Taking the baths of Antoninus Caracalla as an example, on a large and complete scale, of those of Rome under the emperors, we meet with the following divisions and arrangements, which represent one-half of the edifice.*

* Cameron (*The Baths of the Romans*, London, 1775) ac-



Half of the plan of the baths of Antoninus Caracalla. \

A. A circular room called the Solar Cell, used to contain the numerous labra of the baths, 111 feet in diameter. Spartianus describes it thus:—"Caracalla left magnificent Termæ, which went by his own name; the solar cell of which could not be equalled by the best architects of that age. The window lattices are said to have been overlaid with brass or copper, of which materials the whole vault was made; and so vast was its extent that learned mechanics declare it impossible to make one like it."

B. The Apodyterium.

C. Xystos, or portico, for the athletæ to exercise under in bad weather.

companies the description with an engraved plan, which, on a reduced scale, we introduce here, as we find it in the volume of the *Library of Entertaining Knowledge*, entitled *Pompeii*.

- D. Piscina, or large reservoir for swimming.
- E. Vestibule for spectators, and the clothes of those who were bathing.
- F. Vestibules on entering the thermæ: on each side were libraries.
- G G. Rooms where the athletæ prepared for their exercises.
- H. Peristyle, having in the middle a Piscina for bathing.
- I. Ephebiûm, or place for exercise.
- K. Elæothesiûm, or room for oils.
- L L. Vestibules.
- M. Laconicum.
- N. Caldarium.
- O. Tepidarium.
- P. Frigidarium.
- Q Q Q Q. Various halls or recesses, for the use of those who frequented the baths.
- R. Exedræ, or large recesses, for the use of the philosophers.
- W. Rooms for conversation.
- Y. The Conisterium.

The other half of the building is exactly similar to this. An extensive inclosure surrounds the whole, in which are temples, a vast theatre, academies, numerous covered baths, for those who wished to bathe more privately; and a variety of accommodations which we cannot particularize. In this inclosure, and at some distance from the main building, was the castellum, or furnace for heating the water, of which I shall speak hereafter.

Cameron enumerates the following parts auxiliary to the Thermæ, in addition to those already placed before the reader: These were, S. Stadium, cells for bathing, in one of which there is yet, says Cameron, the bath remaining with the water in it. Z. Recesses for ornament, and which served for the spectators to sit in: 1. Theatre for the spectators to see the exercises in the open air; 2. Apartments of two stories for those who had the care of the baths; 3. Exedræ where the gymnastic exercises were taught; 4. Rooms for those who exercised in the stadium; 5. Atrias to the academies; 6. Temples; 7. Academies; 8. Piazzas for the masters to walk in, detached from the noise of the Palestra; 9. Covered baths for those who did not choose to exercise in the Xystus; 10. Stairs which led to the top; 11. Stairs by which you ascended to the palestra; 12. Stairs which went down to

the subterranean cells for bathing; 13. Receptacles for water.

Order in which the Divisions of the Bath were Used.
 —We have now to notice the order in which the several apartments were made use of by those who frequented the public baths. On entering the *Therma*, where there was always a great concourse of people, the bathers first proceeded to undress, when it was necessary to hire persons to guard their clothes: these the Romans called *Capsarii*. They next went to the *unctuarium*, where they anointed all over with a coarse cheap oil before they began their exercise. Here the finer odoriferous ointments, which were used in coming out of the bath, were also kept, and the room was so situated as to receive a considerable degree of heat. This chamber of perfumes was quite full of pots like an apothecary's shop: and those who wished to anoint and perfume the body received perfumes and unguents. In a representation of a Roman bath, copied from a painting on a wall forming part of the baths of Titus, the *elæothesium* appears filled with a vast number of vases. These vases contained perfumes and balsams, very different in their composition, according to the different tastes of the persons who perfumed themselves. The *rhodium*, one of those liquid perfumes, was composed of roses; the *lirinum* of lily; *cyprinum* of the flower of a tree called *cypria*, which is believed to be the same as the privet; *baccarinum*, from the foxglove; *myrrhinum* was composed of myrrh. Perfumes were also made of the oil of sweet marjoram, called *amaracinum*; of lavender, called *nardinum*; of the wild vine, called *ænanthinum*. There was also the *cinamominum*, made of cinnamon, the composition of which was very costly; oil made from the iris, called *irinum*; the *balaninum*, or oil of ben; the *serpyllinum*, wild thyme, with which they rubbed their eyebrows, hair, neck, and head; they rubbed their arms with the oil of *sisymbrium* or watermint, and their muscles with the oil of *anarcum*, or others which have been mentioned. An amusing story relative to this practice of anointing is related by Spartianus: "The Emperor Hadrian, who went to the public baths and bathed with the common people, seeing one day a veteran whom he had formerly known among the Roman

troops, rubbing his back and other parts of his body against the marble, asked him why he did so. The veteran answered that he had no slave to rub him, whereupon the Emperor gave him two slaves and wherewithal to maintain them. Another day several old men, enticed by the good fortune of the veteran, rubbed themselves also against the marble before the Emperor, believing by this means to excite the liberality of Hadrian, who perceiving their drift caused them to be told to rub each other."

The ancients, as Sir William Gell remarks, had an astonishing number of oils, soaps, and perfumes; and their wash-balls seem to have had the general name of *smegmata*, a word derived from the Greek. Persons of lower condition sometimes used, instead of soap, meal of lupins, called *lomentum*, which, with common meal, is yet used in the north of England, while the rich carried their own most precious unguents to the *thermæ* in vials of alabaster, gold and glass. These were of such common use, both in ordinary life and at funerals, that they have very frequently been found in modern times, when they acquired the name of *lachrymatories*, from a mistaken notion concerning their original destination.

When anointed, the bathers immediately passed into the *sphæristerium*, a very light and extensive apartment, in which were performed the many kinds of exercises to which this third part of the baths was appropriated; of these, the most favourite was the ball. When its situation permitted, this apartment was exposed to the afternoon sun, otherwise it was supplied with heat from the furnace. Both Pliny and Lucian speak of this part of the baths as considerably warm at this time of day. After the bathers had taken what degree of exercise they thought necessary, they went immediately to the adjoining warm bath, wherein they sat and washed themselves. The seat was below the surface of the water, and upon it they used to scrape themselves with instruments called *strigils*, or concave and sickle-shaped scrapers. They were most usually of bronze, but sometimes of iron, and also of bone and silver; or this operation was performed by an attendant slave, much in the way that ostlers treat horses when they come in hot. It was not a very agreeable operation; and Suetonius men-

tions that the Emperor Augustus was a sufferer by having been too roughly used in this way.*

The bathers used the strigils themselves, after which they rubbed themselves with their hands, and then they were washed from head to foot, by pails or vases of water being poured over them. They were then carefully dried with cotton and linen cloths, and covered with a light shaggy mantle, called *gausape*. Effeminate persons had the hairs of their bodies pulled out with tweezers, when they were thoroughly dried, and their nails cut: young slaves then came out of the *elæothesium* carrying with them little vases of alabaster, bronze, and terra-cotta, full of perfumed oils, with which they had their bodies anointed, by causing the oil to be slightly rubbed over every part, even to the soles of their feet. After this, they resumed their clothes. On quitting the warm bath they went into the *tepidarium*, and either passed very slowly through, or staid some time in it, that they might not too suddenly expose their bodies to the atmosphere in the *frigidarium*; for these last rooms appear to have been used chiefly to soften the transition from the intense heat of the *caldarium* to the open air. It has been alleged that the water of either the *tepidarium* or *frigidarium* was not used for bathing in these larger baths, although it probably was so used where the accommodation, as at Pompeii, was on a more contracted scale; but merely as an easy means of keeping the rooms at the required temperature.

Contrary to this view, we cannot doubt that in many of the large public baths of Rome, the *frigidarium* held a true *piscina* or *natatorium*, not only large enough to allow of the immersion of the whole body but also of the exercise of swimming. The *natatorium* of the baths of Diocletian was two hundred feet long by half that width, the *Aqua Martia* supplying copious streams of water, which spouted forth in grottoes artificially contrived.

It is to be supposed that many preferred this species of bath to undergoing the perspiration of the thermal chamber; and, as the *frigidarium* alone could have produced

* The Turks use a sort of bag or glove of camel's hair, which without pain peels off the perspiration in large flakes, and leaves the skin in a most luxurious state of softness and polish.—*Sir W. Gell*.

no effect, so it must be understood that the *natatio* was intended, when it is asserted that, at one period, the cold bath was in the greatest request. “Adeoq̄ue pr̄evalint semper frigidarium usus ut vix quidam aliis balneis uterentur.”*

The lower end of the frigidarium was left vacant; the upper end, in which the bath was placed, was semicircular, and in the centre of the semicircular part was placed the basin or piscina. This portion of the wall was decorated with pilasters and niches, in which were placed statues (as represented in the painted walls of the baths of Titus), and two raised steps called *scholæ*, or places of waiting, ran round it for the use of spectators, or persons waiting for their turn. From *scholæ* comes the term school, because the philosophers frequented those places where they were sure of an audience.

Time of Bathing.—It is probable that the Romans resorted to the thermæ for the purpose of bathing, at the same time of the day that others were accustomed to make use of their private baths. This was generally from two o'clock in the afternoon till the dusk of the evening, at which time the baths were shut till two the next day. This practice, however, varied at different times. Notice was given when the baths were ready by the ringing of a bell; the people then left the exercise of the sphæristerium and hastened to the caldarium, lest the water should cool. But when bathing became more universal among the Romans, this part of the day was insufficient, and they gradually exceeded the hours that had been allotted for this purpose. Between two and three in the afternoon was, however, the most eligible time for the exercises of the palæstra and the use of the baths. It must be understood that we are now speaking of the days about the equinoxes; for as the Romans divided their day, from sunrise to sunset, into twelve hours, at all seasons of the year, the hours of a summer's day were longer, and those of a winter's day shorter, than the mean length,—continually varying, as the sun approached or receded from the solstice. Hadrian forbade any but those who were sick to enter the public baths be-

* Gell, *op. cit.*

fore two o'clock. The thermæ were by a few emperors allowed to be continued open so late as five in the evening. Martial says, that after four o'clock they demanded a hundred quadrantes of those who bathed. This, though a hundred times the usual price, only amounted to about nineteen pence English, or about thirty cents. We learn from the same author, that the baths were opened sometimes earlier than two o'clock. He says, that Nero's baths were exceedingly hot at twelve o'clock, and the steam of the water immoderate. Alexander Severus, to gratify the people in their passion for bathing, not only suffered the thermæ to be opened before break of day, which had never been permitted before, but also furnished the lamps with oil for the convenience of the people. We are told of many citizens of distinction who were in the habit of bathing four, five, and even eight times a-day.

Bathing constituted part of the demonstrations of public rejoicing, equally with the other spectacles, and like them was prohibited when the country suffered under any calamity. They who had been convicted of crime before the tribunals were, also, deprived of the use of the bath. All classes resorted to the baths, and the emperors themselves, such as Titus, Hadrian, and Alexander Severus were occasionally seen among the bathers. The price of admission was very small, amounting to not more than half a cent. In fact, it may be said to have been gratuitous, and hence the Thermæ were sometimes, as by Cicero (*pro Cælio*), called *Xenixæ* or gift-offerings—to the people.

There was a double suite of apartments in the public baths, one for each sex. In this respect the Romans preserved, at least for some time, more decency than the Lacedæmonians, among whom the individuals of the two sexes bathed together promiscuously. Cicero tells us, that fathers could not bathe with their sons, after the latter had attained the age of manhood, nor a man with his son-in-law; and to such an extent was this reserve carried, at the first institution of public baths, that some of these were set apart for the exclusive use of the females. Among the latter, those of Agrippina, the mother of Nero, were in such a style of splendour as to surpass all the rest. In the general increasing corruption of manners, under the emperors, bathing ceased to be used with the reserve im-

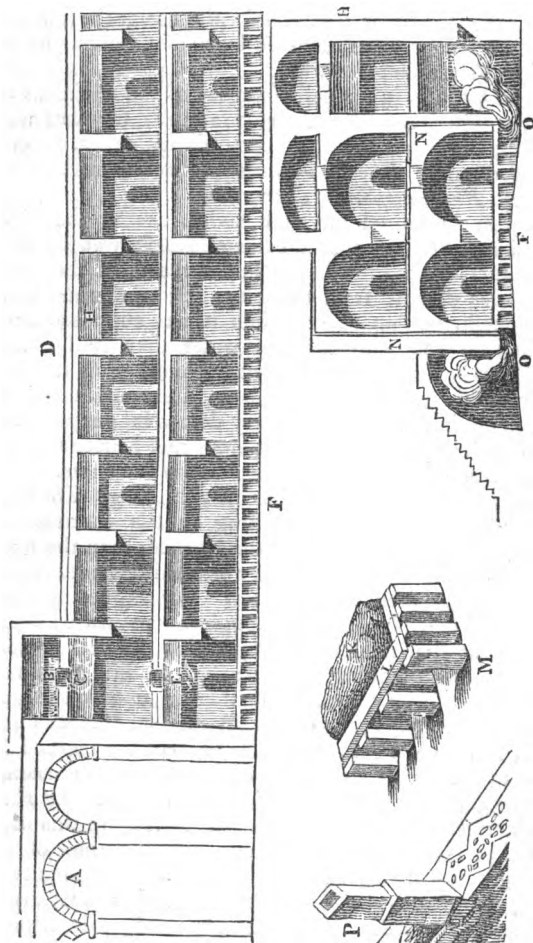
posed by modesty ; and to such a height had the evil reached, that Hadrian found it necessary to forbid the women, under penalty of repudiation, and the loss of their dowers, from bathing with the men ; and to condemn to the punishment of death those of the latter who should dare to enter the baths reserved for the use of the females. These restrictions were removed by Heliogabalus, and renewed by Alexander Severus.

A good picture, in a small compass, of the divisions of a Roman *Therma* and their several uses, together with that of the various itinerant venders of toys, cakes, comfits, &c., and retailers of news, is presented in the work of M. Dozobrey, *Rome au Siècle d'Auguste*.

The water required for such lavish use in the eight hundred and fifty-six public baths of Rome, was brought by aqueducts from the springs and streams of the hills, many miles distant from the city. So numerous were these aqueducts, that at one time it was supposed they furnished no less a quantity of water than half a million of hogsheads in the twenty-four hours. At the present day, although many have been destroyed, there remains enough, not only for every domestic purpose, but also for the supply of those numerous and beautiful fountains in which modern Rome excels all other cities.

Mode of Heating the Water in the Large Thermæ.—Nothing, says Cameron, relating to the thermæ has more exercised the attention of the learned, than the manner of supplying the great number of bathing vessels made use of in them with warm water. For supposing each cell of Diocletian's baths large enough to contain six people, yet, even at that moderate computation, 18,000 persons might have been bathing at the same time ; and as no vestiges remain of any vessels in the thermæ, to give the least foundation for conjecturing in what manner this was performed, it has been generally believed that the method described by Vitruvius was that in use. By the assistance of two sections of the castella of Antoninus given by Piranesi, Cameron thinks that he is able to clear up this mystery and to show that the Romans, from the time of the invention there described, could be under no difficulty in heating the greatest bodies of water that their most extensive thermæ required. The following abridged description

will, in connection with the engraving which follows, it is to be hoped, convey a general idea of the contrivances resorted to in the great public baths of Rome for heating water on a large scale.



Sections of the Castellum of Antoninus Caracalla.

Flues in the Floors and Walls.

The water from the aqueduct (A) was received first in a cistern (B), whence it flowed into a spacious reservoir (D) not very deep but extending the whole length of the castellum, in which it was exposed to the sun and lost a portion of its coldness. In this reservoir there was an aperture (C) through which the water passed into a series of vaulted rooms, twenty-eight in number: they were arranged in two rows, fourteen on a side, and all communicated with each other. Under these were other twenty-eight rooms, placed immediately over the hypocaustum or furnace; having likewise communication with each other, but only one of them communicated with the chambers above through an aperture (E).

By the reservoir receiving its water from the cistern, rather than from the aqueduct direct, a more gentle flow into the reservoir was effected, so that the surface of the water was not ruffled nor the power of the sun to heat its contents diminished. When there was no efflux from the inferior chambers to supply the baths, there could be no demands for water from the reservoir, which would have been liable to overflow but for an aperture in the side of the cistern through which the waste water ran off in a different direction from that in which the baths were situated.

The economy of fuel by which all the heat, including even that of the smoke from the furnace, was expended in warming these vast collections of water is worthy of particular notice, and we must hope, that it will be, some of these times, thought worthy of imitation. The water in the chambers placed immediately over the furnace or hypocaustum, would, of course, soon begin to be heated. But in addition to this source of supply of heat, there were flues (N N) which ran up through the side and party-walls of these chambers to increase the facility of heating so vast a body of water. The upper series of rooms were, also, supplied with flues from the hypocaustum, and their contents were thus rendered tepid and furnished a ready supply to those below, for being promptly heated.

When the time for bathing was come, the cocks were turned to admit the hot water from the lower chamber into the labra of the baths, to which it would run with great velocity, and ascend a perpendicular height in the thermæ, to a level with the surface of the receptacle in the castellum.

The current would be accelerated by the expansive force of the steam confined in the castellum. To prevent the water cooling as it passed through the tubes under ground, they were all carefully surrounded with flues from the præfurnium; and always considerably heated before the water entered them. Each of these chambers was, within the walls, forty-nine feet six inches long, by twenty-seven feet six inches wide, and about thirty high, the number of superficial feet in the whole floor of twenty-eight rooms being 38,115. If we allow thirty feet for the mean height, the whole quantity of water in these lower rooms will amount to 1,143,450 cubic feet. And the like quantity must be allowed for the upper rooms, making the whole quantity heated by fire 2,286,900 cubic feet, sufficient, allowing eight cubic feet of *hot* water to each man, for the accommodation of 285,862 persons. We have no intimation from the ancients when they first fell upon this expedient for heating such large bodies of water; whether it was an invention of the Romans or brought from the East. We may reasonably suppose, that, as it was not necessary before the public warm baths were built in Rome, it was not more ancient than the time of Augustus, in whose reign, we are told by Dion Cassius, that Mæcenas first instituted a swimming bath of warm water, or a *calida piscina*.

The hypocaustum, so often mentioned in preceding descriptions, was a furnace under ground (F), the bottom of which formed an inclined plane; the internal side sloping gradually to the mouth of the furnace, where the fuel was put in. The reason which Vitruvius gives for this method of construction is, that the heat might be more equally conveyed to the vessels above. Mouths of the furnace (O O). There were communications from the back of these furnaces to the several rooms of the baths, by means of flues fixed in the walls (P), which were more or less numerous as the purposes to which the rooms were appropriated required. These flues all proceeded from the back, or roof of the furnace, which was supported by pillars of brick (M) two feet high. Arrangements similar to these have been discovered at Pompeii, and at Wroxter in Shropshire. (K) a double floor of strong mortar, resting on the pillars. (L) a square tile on the head of every pillar.

CHAPTER VII.

BATHS IN THE ROMAN PROVINCES—BATHS AT POMPEII—THEIR DIVISIONS AND ARRANGEMENTS—PRIVATE BATHS OF THE ROMANS—THEIR DECORATIONS—HANGING BATHS—DIRECTIONS FOR THE USE OF THE BATH BY CELSUS AND GALEN.

Baths in the Roman Provinces.—Our acquaintance with the construction and divisions of the Roman baths has been rendered more definite by the excavations at Pompeii, which resulted in the bringing to light, in 1824, the public baths of that city. I shall make use of the descriptions by Sir William Gell in his beautiful work "*Pompeiana*," and the summary in the volume *Pompeii*.* It should be borne in mind that Pompeii was but a provincial town, although one to which, and its immediate neighbourhood, strangers resorted in large numbers, in pursuit of pleasure or of health.

The Baths at Pompeii.—The baths at Pompeii occupy a space of about a hundred square feet, and are divided into three separate and distinct compartments. One of these was appropriated to the fireplaces and to the servants of the establishment; the other two were occupied each by a set of baths, contiguous to each other, similar and adapted to the same purposes, and supplied with heat and water from the same furnace and from the same reservoir. The apartments and passages are paved with white marble in mosaic. It is conjectured that the most spacious of them was for the use of the men, the lesser for that of the women. It appears, from Varro and Vitruvius, that baths for men and women were originally united, as well for convenience as economy of fuel, but were separated afterwards for the preservation of morals, and had no communication except that from the furnaces.

The Piscina, or reservoir, is separated from the baths themselves by the street, which opens into the Forum.

* Library of Entertaining Knowledge.

The pipes which communicated between the reservoir and the baths passed over an arch thrown across the street. This arch was perfect when the excavation was made; now only the shoulders remain, in which the pipes above-mentioned are still visible. There were three entrances to the furnaces which heated the warm and vapour baths. The chief one opened upon a court, of an irregular figure, fit for containing wood and other necessities for the use of the establishment, covered in part by a roof, the rafters of which rested at one end on the lateral walls, and at the other on two columns, constructed with small pieces of stone. From this a very small staircase led to the furnaces and to the upper part of the baths. Another entrance led to a small room (*præfurnium*), into which projects the mouth of a furnace. In this room were the attendants on the furnace, or stokers (*fornacarii* or *fornacatores*), whose duty it was to keep up the fires. Here was found a quantity of pitch, used by the furnace-men to enliven the fires. The stairs in the room led up to the coppers. The third entrance led from the apodyterium of the men's baths by means of a corridor. It is to be remarked that there is no communication between these furnaces and the bath of the women, which was heated from them. The furnace was round, and had in the lower part of it two pipes, which transmitted hot air under the pavements and between the walls of the vapour baths, which were built hollow for that purpose. Close to the furnace, at the distance of four inches, a round vacant space still remains, in which was placed the copper (*caldarium*) for boiling water; near which, with the same interval between them, was situated the copper for warm water (*tepidarium*); and at the distance of two feet from this was the receptacle for cold water (*frigidarium*), which was square, and plastered round the interior like the piscina or reservoir before mentioned. A constant communication was maintained between these vessels, so that as fast as hot water was drawn off from the caldarium, the void was supplied from the tepidarium, which being already considerably heated, did but slightly reduce the temperature of the hotter boiler. The tepidarium, in its turn, was supplied from the piscina, and that from the aqueduct; so that the heat which was not taken up by the first boiler passed on to the second,

and instead of being wasted, did its office in preparing the contents of the second for the higher temperature which it was to obtain in the first. It is but lately that this principle has been introduced into modern furnaces, but its use in reducing the consumption of fuel is well known. The reader has been already apprised that the terms *frigidarium*, *tepidarium*, and *caldarium*, are applied to the apartments in which the cold, tepid, and hot baths are placed, as well as to those vessels in which the operation of heating the water is carried on. The furnace and the coppers were placed between the men's baths and the women's baths, as near as possible to both, to avoid the waste of heat consequent on transmitting the heated fluids through a length of pipe. The coppers and reservoir were elevated considerably above the baths, to cause the water to flow more rapidly into them.

The men's baths had three public entrances. Entering at the principal one which opens to the street leading to the Forum, we descend three steps into the vestibule, cortile, or portico of the baths, along three sides of which runs a portico (*ambulacrum*). The seats which are to be seen arranged round the walls were for the slaves who accompanied their masters to the baths, and for the servants of the baths themselves, to whom also the apartment appears to have been appropriated, which opens on the court, but extends backward from it. In this court was found a sword with a leather sheath, and the box for the quadrans, or piece of money which was paid by each visitor. It is probable that the sword belonged to the balneator or keeper of the *Thermæ*. The door which opens on the street where the temple of Fortune is situated, leads also into the same vestibule. By means of a corridor, we proceed through the passage into the apodyterium, or undressing-room, which is also accessible by the corridor from the street now called the Street of the Arch. In this corridor alone were found upwards of five hundred lamps, and upwards of a thousand were discovered in various parts of the baths during the excavations. Of these the best were selected, and the workmen were ordered to destroy the remainder. The greater number were of terra-cotta: some had an impression of the graces on them, and others the figure of Harpocrates,—both of inferior execution. The

ceiling of this passage is decorated with stars. The apodyterium has three seats, made of lava, with a step to place the feet on. Holes still remain in the wall, in which pegs were fixed, for the bathers to hang up their clothes. This chamber is stuccoed from the cornice to the ground; it is highly finished, and coloured yellow. The cornice is of large dimensions, and has something of an Egyptian character; below it is carved a frieze, composed of lyres, dolphins, chimeræ, and vases, in relief, upon a red ground. In the centre of the end of the room is a very small opening or recess once covered with a piece of glass: in this recess, as is plain from its smokiness, a lamp has been placed. In the archivolt, or vaulted roof, immediately over is a window two feet eight inches high and three feet eight inches broad, closed by a single large pane of cast glass, two-fifths of an inch thick, fixed into the wall, and ground on one side to prevent persons on the roof from looking into the bath: of this glass many fragments were found in the ruins. This is an evident proof that glass windows were in use among the ancients. The learned seem to have been generally mistaken on the subject of glass-making among the ancients, who were far more skilful than had been imagined. The vast collection of bottles, vases, glasses, and other utensils, discovered at Pompeii, is sufficient to show that the ancients were well acquainted with the art of glass-blowing. The floor is paved with white marble worked in mosaic, and the ceiling appears to have been divided into white panels within red borders. It has six doors: one leads to the præfurnium; another into the small room, perhaps destined for a wardrobe; the third, by a narrow passage to the Street of the Arch; the fourth to the tepidarium; the fifth to the frigidarium; and the sixth along the corridor to the vestibule or portico of the bath. At one of the exits was a latrina, the uses of which are still unequivocally visible.

The Frigidarium.—The frigidarium, or cold bath, is a round chamber, encrusted with yellow stucco, with indications here and there of green, with a ceiling in the form of a truncated cone, which appears to have been painted blue. Near the top is a window, by which it was lighted. In the cornice, which is coloured red, is modelled in stucco a chariot-race of cupids, preceded by cupids on horseback and on foot.

The plinth or base of the wall is entirely of marble. The entrance is by the undressing-room. There are four niches, disposed at equal distances, painted red above and blue below. In these niches were seats (*scholæ*) for the convenience of the bathers. The basin (*alveus*) is twelve feet ten inches in diameter, and two feet nine inches deep, and is entirely lined with white marble. Two marble steps facilitate the descent into it, and at the bottom is a sort of cushion (*pulvinus*), also of marble, to enable those who bathed to sit down. The water ran into this bath in a large stream, through a spout or lip of bronze four inches wide, placed in the wall at the height of three feet seven inches from the edge of the basin. At the bottom is a small outlet, for the purpose of emptying and cleansing it; and in the rim there is a waste-pipe, to carry off the superfluous water. This frigidarium is remarkable for its preservation and beauty.

The Tepidarium.—The tepidarium, or warm chamber, was so called from a warm, but soft and mild temperature, which prepared the bodies of the bathers for the more intense heat which they were to undergo in the vapour and hot baths; and, *vice versâ*, softened the transition from the hot bath to the external air. On this account the tepidarium was sometimes called *Cella Media*. It is divided into a number of niches, or compartments by Telamones,* two feet high, carved in high relief, placed against the walls, and supporting a rich cornice.

The ceiling is worked in stucco, in low relief, with scattered figures and ornaments of little flying genii, delicately relieved on medallions, with foliage carved round them. The ground is painted, sometimes red and sometimes blue. The room was lighted by a window two feet six inches high, and three feet wide, in the bronze frame of which were found set four very beautiful panes of glass fastened by small nuts and screws, very ingeniously contrived, with a view to their being able to remove the glass at pleasure. In it was found a brazier, seven feet long and two feet six inches broad, made entirely of bronze, with the exception of an iron lining; the two front legs are winged sphinxes,

* So called from the Greek *τελναι*, to endure. The etymology of Atlas is the same.

terminating in lion's paws; the two other legs are plain being intended to stand against the wall. The bottom is formed with bronze bars on which are laid bricks supporting pumice-stones for the reception of charcoal. There is a sort of false battlement worked on the rim, and in the middle a cow to be seen in high relief. Three bronze benches also were found, alike in form and pattern. They are one foot four inches high, one foot in width, and about six feet long, supported by four legs, terminating in the cloven hoofs of a cow, and ornamented at the upper ends with the heads of the same animal. Upon the seat is inscribed, M. NIGIDIUS. VACCULA. P. S. Varro, in his book upon rural affairs, tells us that many of the surnames of the Roman families had their origin in pastoral life; and especially are derived from the animals to whose breeding they paid most attention. As, for instance, the Porcii took their name from their occupation as swineherds; the Ovinii, from their care of sheep; the Caprilli, of goats; the Equarii, of horses; the Tauri, of bulls, &c. We may conclude, therefore, that the family of this Marcus Vaccula were originally cow-keepers, and that the figures of cows so plentifully impressed on all the articles which he presented to the baths, are a sort of *canting arms*, to borrow an expression from heraldry, as in Rome the family Toria caused a bull to be stamped on their money.

Caldarium.—A doorway led from the tepidarium into the caldarium, or vapour-bath. It had, on one side, the laconicum, where a vase for washing the hands and face was placed, called labrum. On the opposite side of the room was the hot bath called lavacrum. Here it is necessary to refer to the words of Vitruvius as explanatory of the structure of the apartments (cap. xi., lib. v.). "Here should be placed the vaulted sweating-room, twice the length of its width, which should have at each extremity, on one end the *laconicum*, made as described above, on the other end the hot bath." This apartment is exactly as described, twice the length of its width, exclusively of the laconicum at one end and the hot bath at the other. The pavement and walls of the whole were hollowed to admit the heat. Vitruvius never mentions the laconicum as being separated from the vapour bath; it may, therefore, be presumed to have been always connected with it in his time, although

in the *Thermæ* constructed by the later emperors it appears always to have formed a separate apartment. In the baths of Pompeii they are united, and adjoin the *tepidarium*, exactly agreeing with the descriptions of Vitruvius. The *laconicum* is a large semicircular niche, seven feet wide, and three feet six inches deep, in the middle of which was placed a vase or *labrum*. The ceiling was formed by a quarter of a sphere ; it had on one side a circular opening, one foot six inches in diameter, over which, according to Vitruvius, a shield of bronze was suspended, which, by means of a chain attached to it, could be drawn over or drawn aside from the aperture, and thus regulated the temperature of the bath. Where the ceiling of the *laconicum* joined the ceiling of the vapour-bath, there was, immediately over the centre of the vase or *labrum*, a window, three feet five inches wide ; and there were two square lateral windows in the ceiling of the vapour bath, one foot four inches wide and one foot high, from which the light fell perpendicularly on the *labrum*, as recommended by Vitruvius, "that the shadows of those who surrounded it might not be thrown upon the vessel."

The *labrum* was a great basin or round vase of white marble, rather more than five feet in diameter, into which the water bubbled up through a pipe in its centre, and served for the partial ablutions of those who took the vapour bath. Sir William Gell supposes the water to have been cold, or as nearly so as was judged expedient for pouring upon the head of the bather before he quitted this heated atmosphere. It was raised about three feet six inches above the level of the pavement on a round base built of small pieces of stone or lava, stuccoed and coloured red, five feet six inches in diameter, and has within it a bronze inscription.

There is in the Vatican a magnificent porphyry *labrum* found in one of the imperial baths ; and Baccius, a great modern authority on baths, speaks of *labra* made of glass.

This apartment, like the others, is well stuccoed, and painted yellow ; a cornice, highly enriched with stucco ornaments, is supported by fluted pilasters placed at irregular intervals. These are red, as is also the cornice and ceiling of the *laconicum*, which is worked in stucco with little figures of boys and animals. The ceiling of the room

itself was entirely carved with transverse fluting, like that of enriched columns, a beautiful ornament, and one but little used for this purpose ; no other instance occurring except in certain ruins of villas on the shores of Castellone, the ancient Formiæ. The hot water bath occupied the whole end of the room opposite to the laconicum and next to the furnace. It was four feet four inches wide, twelve feet long, and one foot eight inches deep, constructed entirely of marble, with only one pipe to introduce the water, and was elevated two steps above the floor ; while a single step let down into the bath itself, forming a continuous bench round it for the convenience of the bathers. About ten persons might have sat upon the marble pavement, without inconvenience, at the same moment, immersed in the hot water. It is evident from the shallowness of this cistern, that persons must have sat on the pavement in order to have been sufficiently immersed ; and, accordingly, the side next the north wall is constructed with marble, sloping like the back of a chair in an angle well adapted to the support of the body in that position. Hot water entered this bath, at one of the angles, immediately from the caldron which boiled on the other side of the wall. There appears to have been a moveable stone in the pavement, near this cistern, possibly for permitting the entrance of a column of hot air on certain occasions ; or it may have served the purpose of an outlet or fusorium for the water distilled from the vapour rising from so large a quantity of heated liquid.

In these baths at Pompeii, the laconicum and the caldarium, or the dry and hot air bath, and the hot water and vapour bath are, as we have just seen, in one chamber. In the larger baths at Rome, or those of the emperors, they were separate. The laconicum has been generally regarded as a great chamber, in which people entered for the purpose of sweating. Cameron, after repeating this opinion from Galiani, adds : " I for myself hold it certain that the apartment for this purpose has been improperly termed,—the laconicum is nothing more than a little cupola which covered an aperture in the pavement of the hot bath, through which the vivid flame of the hypocaustum or furnace passed and heated the apartment at pleasure. Without this means the hot bath would not have had a

greater heat than the other chambers, the temperature of which was milder." He then refers, in confirmation of his opinion, to ancient paintings found in the baths of Titus, and to the authority of Vitruvius. Wilkins says that the *laconicum* is a circular stove. It is probable that in the larger baths required for the accommodation of immense numbers, it might be necessary to have a distinct room appropriated to a purpose for which a part of the *caldarium* or hot bath proper was sufficient in the time of Vitruvius. In the painting discovered in the baths of Titus, the hot bath proper and the *concamerata sudatio* are contiguous to each other, and both of them directly over the hypocaustum. In the second of these rooms, the *laconicum* rises, in a cone, in the form of a small cupola, as described by Cameron.

Hollow Floors.—The Romans, who, according to Vitruvius, called their vapour baths *caldaria* or *sudationes concameratæ*, constructed them with suspended or hollow floors and with hollow walls* communicating with the furnace, that the smoke and hot air might be spread over a large surface and readily raise them to the required warmth. The temperature was regulated by the *chlypeus* or bronze shield already described.

In the Pompeian bath the hollow floors are thus constructed. Upon a floor of cement made of lime and pounded bricks, were built small brick pillars, nine inches square, and one foot seven inches high, supporting strong tiles fifteen inches square. The pavement was laid on these, and incrustured with mosaic. The hollow walls, the void spaces of which communicated with the vacuum of the suspended pavement, were constructed in the following manner. Upon the walls, solidly stuccoed, large square tiles were fastened by means of iron cramps. They were made in a curious manner. While the clay was moist some circular instrument was pushed through it, so as to make a hole, at the same time forcing out the clay and making a projection or pipe about three inches long, on the inside of the tile. These being made at the four corners, iron clamps passed through them and fastened

* The Italians call these floors *vespajo* from their resemblance to a wasp's nest.

them to the wall, the interval being regulated by the length of the projections. The sides of the apartments being thus formed, were afterwards carefully stuccoed and painted. The vacancy in the walls of the Pompeian baths reaches as high as the top of the cornice, but the ceilings are not hollow, as in the baths which Vitruvius described, and which he distinguishes for that reason by the name of *concameratæ*.

The Women's Bath.—The women's bath resembles very much that of the men, and differs only in being smaller and less ornamented. It is heated, as we have already mentioned, by the same fire, and supplied with water from the same boilers. Near the entrance is an inscription painted in red letters. All the rooms yet retain in perfection their vaulted roofs. In the vestibule are seats similar to those which have been described in the men's baths as appropriated to slaves or servants of the establishment. The robing-room contains a cold bath; is painted, with red and yellow pilasters alternating with one another, on a blue or black ground, and has a light cornice of white stucco, and a white mosaic pavement with a narrow black border. There is accommodation for ten persons to undress at the same time. The cold bath is much damaged, the wall only remaining of the alveus, which is square, the whole incrustation of marble being destroyed. From this room we pass into the tepidarium, about twenty feet square, painted yellow, with red pilasters, lighted by a small window far from the ground. This apartment communicates with the warm bath, which, like the men's, is heated by flues formed in the floors and walls. There are in this room paintings of grotesque design upon a yellow ground; but they are much damaged, and scarcely visible. The pavement is of white marble laid in mosaic. The room in its general arrangement resembles the hot bath of the men; it has a labrum in the laconicum, and a hot bath contiguous to the furnace. The hollow pavement and the flues in the walls are almost entirely destroyed; and of the labrum, the foot, in the middle of which was a piece of the leaden conduit that introduced the water, alone remains. On the right of the entrance into these women's baths is a wall of stone of great thickness and in a good style of masonry.

These baths are so well arranged, with so prudent an economy of room and convenient distribution of their parts, and are adorned with such appropriate elegance, as to show clearly the intellect and resources of an excellent architect. At the same time some errors of the grossest kind have been committed, such as would be inexcusable in the most ignorant workman; as, for instance, the symmetry of parts has been neglected, where the parts correspond; a pilaster is cut off by a door which passes through the middle of it: and other mistakes occur which might have been avoided without difficulty. This strange mixture of good and bad taste, of skill and carelessness, is not very easily accounted for, but it is of constant recurrence in Pompeii.

The example set by the capital was extensively followed in the different provinces of the Roman empire, such as Spain, Gaul, Germany, and Britain, in which the thermæ were numerous, and occasionally constructed in a style of great magnificence. In Asia Minor, of course they were not neglected; and we learn that Herod erected them at Tripoli, Damascus, Ptolemais, Cæsarea and Ascalon, in order, as it was alleged, to ingratiate himself the more effectually with Augustus. When Constantinople became the seat of empire, it could hardly fail to imitate Rome in its public baths. Not only were baths common in the Roman colonies and municipalities, but their use, and that of the gymnasia, were claimed as a right by the Roman legionaries, wherever they were stationed.

Private Baths.—Although the Thermæ were constructed on a scale of such magnificence and extent, principally for the use of the poorer classes, yet all ranks frequented them for the sake of the various conveniences which they contained. We gather, however, from the direct descriptions in some cases, and the frequent allusions in others, of their writers, that most of the wealthy Roman citizens, both at the capital and in the provinces, even as far as Britain, enjoyed the luxury of private baths. These were said to have amounted to 1860 in number, in Rome (Baccius—*De Thermis*, &c.). I shall not give an account of these buildings in detail, since they resemble in their general arrangements the public baths. Before bathing in the basin of the frigida-

rium, the frequenters of the bath used various exercises to heat and give suppleness to the body; such as lifting heavy rings, kneeling on the pavement and bending backwards, till their heads were brought in contact with their feet, and similar feats which women practised as well as men. In wealthy families, the females usually had baths separate from those of the men, but adjoining them that they might be heated by the same fire.

Seneca, in a letter contrasting his own times with the period of the republic, gives a lively picture of the splendid adornments of a private bath. "That person," he says, "is now held to be poor and sordid whose walls shine not with a profusion of the most costly materials, the marbles of Egypt inlaid with those of Numidia; unless the walls are laboriously stuccoed in imitation of painting; unless the chambers are covered with glass; unless the Thrasian stone, formerly a rare sight even in temples, surrounds those capacious basins, into which we cast our bodies, weakened by immoderate sweats, and the water is conveyed through silver pipes. As yet, I speak only of plebeian baths: what shall I say when I come to those of our freed men. What a profusion of statues! What a number of columns do I see supporting nothing, but placed as an ornament merely on account of the expense! What quantities of water murmuring down steps! We are come to that pitch of luxury that we disdain to tread on any thing but precious stones."

Various modes of using the bath in private were resorted to by the ancients, with most of which we are familiar at the present time. Such are hip baths and the douche or spout bath. The *Pensiles Balneæ*, mentioned by Pliny, were small baths suspended by ropes from the ceiling of the house, in which luxurious persons were rocked. The *Clibanus*, mentioned by Celsus, was probably a portable stove. The hip baths were either of plain water or water medicated with herbs, or of oil and water.

Medical Directions for the Use of the Bath.—The directions for the use of the Thermæ by the Roman physicians are not very full or precise. Galen, in treating of a case of marasmus, calls the frigidarium the first, the tepidarium the second, and the caldarium the third room of the baths. He then orders the person afflicted with

this disease to be carried upon a bed into the frigidarium, where there ought to be ready at hand a cotton sheet to cover him, should this room be sufficiently warm for him to undress in; if not, some slight covering should remain on him, until he is carried into the tepidarium, where his whole body must be anointed with oil. He is next to enter the caldarium and be carried to the place where the bath is, that he may pass completely through these three rooms. Those who carry him should not go with a quick pace, but stay as long in the first room as they were in taking him out of bed; as long in the second as they were in anointing him. The air in these three chambers ought to be neither too hot nor too cold, but it should be moderately humid, which may easily be effected if there is a plentiful flow of warm water into the Labrum, so as to dissipate the steam of it throughout all the rooms. After having continued a short time in the warm bath, he should be brought back, and immersed in the cold bath as quickly as possible; then wiped with sponges and cotton cloth, put into his litter and carried home.—*Lib. X.*

Celsus, in giving advice to those who suffer from affections of the head, directs them on entering the bath to sweat a little in the tepidarium, where they are to be anointed, then to pass into the caldarium, where they should continue to sweat; they are not to descend into the warm bath (*in solium* non descendere*), but only to have a quantity of the warm water poured upon their heads, after that the tepid and then the cold, and longer on the head than on other parts; the head ought then to be rubbed for some time, afterwards wiped, and anointed anew.—*Lib. ii., Cap. 3.*

It is evident from the directions of Celsus, that there was water in all the three rooms of a degree of heat in proportion to that of the air; and that the order of passing through them was similar to that commonly practised by

* It has been already said, in the description of the different parts of the public baths, that *solium* was a reservoir or great vace of water into which the bather descended; it might be either cold or warm, according to the apartment in which it was placed. We must infer from the context, that *solium* referred to by Celsus, on the present occasion, was the warm bath.

the daily frequenters of the bath in his time. The chief difference consisted in the affusion of water on the head and body generally, in place of exposure to the heated air alone, and general immersion in the warm or the cold bath, and often in the two in succession. On occasions in which there was no convenience for immersion in the *solium frigidum*, affusions or aspersions of cold water, like a shower bath, were recommended, and this is, in fact, resorted to in the Turkish baths, where the *solium* or *natorium* is commonly not found.

We learn from both Celsus and Galen, that the bathers anointed in the tepidarium, and it would appear that this room was warm enough to raise a perspiration when the clothes were on. It was customary, we may also infer, for those in the room to sweat a considerable time at the edge of the labrum or basin before they went into it. The frigidarium, Galen leaves us to imply, was far from being cold; it was only more so than any of the other rooms.

CHAPTER VIII.

NEGLECT OF THE BATHS IN ROME—CAUSES OF THIS NEGLECT—
 PROPER POLICE NOT PRESERVED—GROSS ABUSES—INCURSIONS OF THE BARBARIANS—PECULIARITIES OF THE ROMAN BATHS—IMITATION OF THE ROMAN BATHS RECOMMENDED—CAUTION AGAINST THEIR ABUSES—BATHS AT ALEXANDRIA—BATHS OF THE ARABIANS AND MOORS.

Neglect of the Baths in Rome.—In process of time, some of the baths in the capital were found unnecessary. Aurelius shut up several. Heliogabalus, among other caprices, bathed only once in some of the baths, and then destroyed them. The Romans continued, however, to be still attached to the practice of bathing until the removal of the seat of Empire to Constantinople, after which we have no account of any new thermæ being built, and we may suppose, that those which were then frequented in the city of Rome, for want of imperial patronage, gradually fell into decay. Causes yet more potential for their destruction in Europe, generally, grew out of the wars with

and irruptions of the Vandals, Goths, Huns, and Longobardi, after which the ruined thermæ were frequently converted into churches.

It is not difficult to understand why the early and distinctly recognized character of the warm bath, as renovating the strength, after labour or exhausting exercise, should have gradually been replaced by a belief in its enervating effects. At first resorted to, by the Romans, for the purposes of cleanliness and refreshment, after the bodily exercises in the palestra, or the intellectual efforts at the forum, it was, after a time, made a pretext for indulging in various frivolous amusements, in the apartments and courts accessory or contiguous to the bath proper. In this way, idleness and its attendant evils were encouraged, and the minds and manners of the people, if not their bodies, were relaxed, by frequenting the warm bath. But there was still another reason for a change of opinion. The bathing itself underwent a change. When the crowds who visited the baths were mainly attracted to them by a desire to pass away time, it may readily be supposed that the stay in the water would be unduly protracted; and still more, that the frequency of use and the length and period of bathing would require an augmented temperature of the water, in order to procure the same pleasurable sensations which were first obtained from immersion in this fluid of a moderate warmth. The Ediles, part of whose duty it was to regulate this matter, yielded to, or rather participated in the increasing corruption of manners and morbid craving for excitement among the degenerate Romans. Hence, no longer satisfied with the warm, their usage eventually was to use the hot bath, almost, according to Pliny, at a boiling heat. Nor was this all: utterly neglectful of exercises and rational recreations by which digestion is accelerated and natural appetite renewed, they adopted, as a means of exciting a desire for food, or at least of creating a languor and a sensation of emptiness which should give a momentary appetite, another modification of bathing, which is erroneously confounded with the use of the warm bath. "The crapulous glutton entered a small chamber which was heated, to as high a degree as the person could possibly endure, by means of lamps, or flues conducted round the walls. The circulation of the

blood being greatly accelerated, and the solvent power of the air much increased by this dry heat, a copious flow of perspirable matter ensued, and artificial hunger and thirst succeeded this unnatural mode of depletion, while appetite, thus excited, was gratified by a return to the festive board." After being apprized of this mode of renewing appetite, one experiences less feeling of astonishment, though undiminished disgust, at that other practice of the more luxurious Romans under the Empire, which consisted in taking a mild emetic in order to enable them to return to the table and gorge themselves once more with a fresh variety of delicacies. It was time for Goths and Vandals to be allowed to issue out from their northern hive and scourge such a people.

A laxer police of the baths, attendant on the frequent changes and revolutions of government at Rome, was followed by great disorders in these institutions which became, in process of time, the favourite resort of the vicious and the profligate. As such they were liable to the reprehensions of the fathers of the church, whence the name of bagnio has become synonymous with brothel. J. B. Casalius, who has written a treatise, "*De Thermis et Balneis*," makes the assertion which, though plausible in appearance, is scarcely borne out by the facts of the case. It is, that as Christianity prevailed, the taste for ablution diminished. We should be more disposed to take the opinion of a divine, who affirmed that an uncleanly man is no Christian, and that a good Christian cannot endure any dirt upon his outer man.

Peculiarities of the Roman Baths.—Before describing the various modes of bathing practised by different nations, at the present time, it will be well for the reader to note the peculiarities that distinguish the Roman from the modern usages relating to the bath and its accessories. Between the baths of the East and those of Rome, there is a close resemblance in the gradual passage of the bather from a cool to a warmer medium, and in this medium being of air rather than water; after which ablution and aspersion were resorted to. The Roman and Russian bathers, also, resemble each other in the transition to which the former often subjected himself, from a hot or vapour to a cold bath. But there was this distinguishing feature in the *Thermæ*

of ancient Rome; that they were all constructed with a view to the union of bodily exercises with the bath, in a certain order of succession, and, sometimes of alternation. Under this aspect these institutions deserve to be carefully studied, and it may then become a question how far they are worthy of being imitated in the present day. The aid which bathing and exercise mutually give in keeping up the most vigorous health, and, under judicious direction, of renovating the attenuated and weakened frame can hardly be contested. Physiology is here in accordance with ancient experience.

In the early period of the republic the Roman youth were in the habit of plunging into the Tiber, after the exercises of the Campus Martius. Later, when public baths or the Thermæ were erected, provision was made for all kinds of gymnastic and military exercises being taken by the young and robust before they entered the bathing rooms. The more sedate and the aged or infirm contented themselves with a brisk walk in the *exedræ*, or mild exercises in the *spheristerium*. Large numbers would allow themselves time, before taking the bath, to be spectators to the races at the Hippodrome, the contests of the *athletæ*, or at a later period the *Naumachiæ*. Nor were intellectual pleasures lost sight of. Reading aloud, recommended to the dyspeptic by Celsus, declamation, philosophical discourse and disquisitions were the occupation of some, and were listened to by a still larger number. In this way both mind and body were suitably prepared to derive the full hygienic and pleasurable effects from the bath, which, in its turn, would agreeably impress both, and produce in those who had gone through its successive stages in the several *Cellæ*, and been subjected to strigillation and inunction, a feeling of comfort and enjoyment to which the simple immersion in water, after the prevalent fashion in Europe and America, can make no approach.

Imitation of the Roman Baths.—Physical education is becoming more and more a subject of deep and anxious inquiry, in our large cities, in which children are now deprived of the requisite amount of exercise in the open air, to say nothing of the sports to which a healthy instinct naturally, we might say providentially, prompts them. If

existing defects are to be remedied and still more grievous ones prevented, no plan would seem to be so fit as an imitation of the Roman thermæ, with modifications required by our social usages. All classes and all ages might congregate in institutions of this nature, when placed under suitable supervision, and might indulge in recreations at once healthful and strengthening, casting aside cures which already give to nearly all ages an almost national expression.

With so much to imitate in the Roman thermæ there are, also, lessons of warning, growing out of their misapplication and abuse. Of these I have just now spoken.

Bathing by the Arabians and Moors.—In the seventh century Alexandria rivalled ancient Rome in the splendor of her public edifices, as she did in the number of her baths. There were no less than four thousand of these when the city was taken by the Moslems under the command of Amrou. Willing and prompt to adopt the arts and sciences of the people whom they conquered, and with a keen relish for all that could minister to tasteful enjoyment, the Arabians and Moors soon erected baths, which, in their richness of decoration, rivalled those of their Roman predecessors, as, in their general arrangements, they may be supposed to have resembled them. Mr. Irving, in describing the interior of the Alhambra says, with his usual felicity of language: "An abundant supply of water brought from the mountains by old Moorish aqueducts, circulates throughout the palace, supplying its baths and fishpools, sparkling in jets within its walls, or murmuring in channels along the marble pavements. When it has paid its tribute to the royal pale, and visited its gardens and parterres, it flows down the long avenue leading to the city, tinkling in rills, gushing in fountains, and maintaining a perpetual verdure in those groves that imbower and beautify the whole hill of the Alhambra." Ample provision was, also, made for baths in the Oriental style, by means of flues distributed through the walls, from the subterranean furnaces.

We can have little sympathy with the conquerors of a people whose very graces and refinements seem to have been regarded in almost as abhorrent a light as their religion itself. One of the steps adopted by the Spaniards for the conversion of the Moors of Granada, after the con-

quest, was a prohibition of the use of baths, either public or private, in addition to that of their own language and dress. The baths which existed even in private houses were ordered to be destroyed.

CHAPTER IX.

BATHING IN MODERN EUROPE—BATHS RESORTED TO IN THE MIDDLE AGES—VAPOUR BATHS CONTINUED IN FRANCE—ORDER OF THE BATH—THE CRUSADERS—GREAT NUMBER OF VAPOUR BATHS IN PARIS—BATHING PART OF THE EVIDENCES OF HOSPITALITY AND OF FASHION—ITS DISUSE—WARM BATHS IN PARIS—THEIR GREAT NUMBER—PORTABLE WARM BATHS—SWIMMING SCHOOLS—COLD BATHS.

IN Europe, generally, the neglect and destruction of the thermæ were almost unavoidable during the centuries of semi-barbarism that succeeded the irruption of the northern hive. But even the descendants of these latter, in some instances, were not backward in imitating usages so congenial with health and pleasure ; and it was reserved for a more modern and enlightened age to see them fall into nearly entire oblivion. In times past, which we are accustomed to speak of as barbarous compared with our own, large public baths were erected in the chief cities and towns of the continent of Europe, for the use of the poor people : “every Saturday evening people formerly went in procession through the streets, beating on basins, to remind the lower classes of bathing ; and the tradesman, who laboured at dirty work, washed off, in the bath, that dirt which now adheres to him during his whole life.”*

Bathing in France.—The names of different streets and courts in Paris, affixed to them in times long gone by, attest the number of baths, especially those of vapour (*etuves*), in that city during a period of comparative barbarism. In fact, the Franco-Gauls continued, though in

* Hufeland: Makrobiotik.

a very restricted manner, the thermal practices of the Romans. The most ancient Roman edifice discovered in Paris was the *Thermæ of Julian*, which received its water by means of an aqueduct from the environs of Rungis.

Papal Recommendations—Order of the Bath.—The early Christians in Gaul are not open to the accusations brought against them elsewhere, of not only neglecting baths but of bringing them into disrepute. It was customary for bathing establishments to be constructed in the convents. We believe it will be found that the declamations of the early Fathers of the church were directed against the gross abuses and licentiousness which prevailed in the Roman thermæ, on the decline of the empire; and not against the practice of ablution, of the purification from which baptism itself may without irreverence be considered as typical. Pope Adrian I. recommended the parochial clergy to visit the baths, in grand procession, every Thursday in the week. In the period of the crusades, most of the institutions of chivalry required that the knight, before receiving his armour, should be subjected to a more or less complete ablution. The order of the Bath was, at one time, held in great honour in France and Italy, and in nearly all the countries of Europe, although now it is only retained in England. It owes its name to the circumstance of the candidate on whom the honour of knighthood was about to be conferred remaining immersed in a richly decorated bath up to his chin, while the knights charged with the duty gave him instructions for his future guidance, and taught him the practices of the order.

Number of Vapour Baths in Paris.—It has been suggested, and with a show of plausibility, that the use of vapour baths, with which the crusaders during their campaigns and stay in the East had become familiar, was more extended on this account—dating from the twelfth century. Vapour baths (*etuves*) were thenceforth resorted to in place of the ancient Thermæ. These baths (the Italian *stufe*, from the Latin *stufa*), were multiplied in Paris. They were situated chiefly along the banks of the Seine and near the city gates, and likewise in courts and small streets otherwise little frequented. In the reign of St. Louis, the number of vapour baths was so great as to allow of their keepers, who are call *Estuveurs* or *Estu-*

riers, forming a trade or guild. The price of a bath for those who bathed separately was about four c nts, or four sous French ; and if a bath by immersion was taken afterwards, the charge was eight cents. This distinction shows that, while many would be content with exposure to simple vapour, others made this merely preparatory to a warm water bath,—as is now the practice in the public baths of the East. The price of a bath was, however, dependent on that of wood and charcoal ; and hence the Provost of Paris used, after hearing a statement of the case from the parties interested, to increase the former in proportion to that of the fuel.

Bathing and Hospitality.—It was the general practice in the thirteenth and fourteenth centuries to bathe before dinner ; and whenever a fete was to be given, or a debauch to be indulged in, some of the nobility and opulent citizens were wont, in imitation of the Greeks and Romans, to place a bath at the disposal of their guests, who passed from the apartment in which they had taken it into the dining saloon. In the Chronicle of Louis XI. we read of entertainments given by the officers of the court and of the city to the king and his attendants, and to the queen and her ladies, part of which consisted in the preparations of baths for their use before the repast.

In the thirteenth century, criers went through the streets of Paris to announce to the inhabitants that the baths were ready. Their notice was sufficiently clear, although not couched in the most classical language. It ran thus :

Seignor, car vous alez baingnier,
Et étuver sans délaier :
Li baing sont chaut ; c'est sans mentir.*

The public baths of Paris were sometimes closed for a considerable period ; on one occasion from the middle of November to the following Easter, during the prevalence of a contagious disease. For recommending this closure Dr. Jacques Desparts was near becoming the victim of popular vengeance.

Judging from a description, in Latin verse, of the baths of Paris at this time, by Brixianus, an Italian writer, we

* *Hist. Physiq. Civ. et Mor. de Paris*, Tome ix.

should infer that the bather went through nearly the same processes—washing with warm water, friction, and inunction—as in the Roman *thermæ*.

Bathing and Fashion.—Not only were the baths frequented from motives of cleanliness and health, but, also, in compliance with the exigencies of fashion, which could be gratified in them at a small expense. The *estuveurs* (cannot we say stovers or stovists?) used to perform all the offices of the bather, in cutting the hair, shaving, and adjusting the portion of beard which was retained. But although thus trenching on the duties of barbers, these *estuveurs* ranked lower than the former in the classification of trades made by Henry III., in 1581; the barbers being in the second, the latter in the fourth, out of the five classes in all. After a time an alliance was formed between the barbers and the *etuvistes* as they were begining to be called; and when, in the seventeenth century, perruques came into vogue there were *barber—perruque—etuvistes*; and a little later, *barber-perruque—bather-etuvistes*. The number of these latter was fixed by a royal edict in 1673, at two hundred. It was farther ordained that their shops should be distinguished by the sign of a white basin, while that of the *barber-surgeons* was a yellow basin. With a view of increasing the revenue, in one of the exhausting wars carried on by Louis XIV., it was proposed in council to add two hundred more members to this composite body, whose office was a matter of regular sale. A still farther increase was made not many years after, so that the entire number consisted of six hundred persons. But, although their legal rights were equal, all were not alike able to encounter the expense of fitting up and keeping bathing and dressing establishments in a style demanded by the increasing refinements of the age. Even they who continued the business were obliged to raise greatly the terms of admission to the baths; and hence these ceased to be frequented by the people at large, and were visited only by the rich and the luxurious. By the latter, a bath with its then accessories furnished by the barber, was regarded as a completion of bodily enjoyment and adornment, as we learn from the lines of Voltaire in the *Mondain*:

“Il court au bain, les parfumes les plus doux
Rendent sa peau plus fraîche, et plus polie.”

Public Warm Baths.—The high price of the vapour and warm baths drove the people to the practice of cold bathing, which became quite common during the summer months in the river Seine. The first regular bathing establishments for this purpose were of very simple construction; being large barges, over which was spread a sail-cloth as a kind of roof and awning, which extended, also, beyond the sides of the barge. The clothes of the bathers were deposited in the body of the barge.

Something more than this was required for the middle classes in Paris; who, while they love pleasures, love, also, that these pleasures should be cheap and social, without being vulgar. Accordingly, M. Poithevins, a bather-*etuviste*, one of the vapour bath company, had a large barge or boat constructed expressly for the purpose, in its internal fitting up resembling closely that which he had previously had the charge of, so as to give warm baths. Soon he erected two boats joined together, and on those a frame building, with more extended accommodations. About the same time a Monsieur Tarquin devised baths, which he called Chinese, and which were made to rest on a firm flooring on the bed of the river, and be open at each side, so as to allow of the water traversing them like a stream. This plan, it was alleged, was an infraction on the privileges granted to M. Poithevins; and, although the baths of the latter were warm, M. Tarquin was obliged to yield. He afterwards opened a swimming school, which met with entire success, and has been continued with sundry extensions, down to the present day.

Baths at the Hospitals, and Bains Vigier.—At this time Paris can boast of a large number of establishments for warm and cold bathing, and connected with the hospitals are both common and vapour baths. In a single year no less than 127,752 baths have been furnished to out-door patients. What an example this of considerate charity to those who have the direction of our hospitals in the chief cities of the United States! Among the public baths the most remarkable are the floating baths (*bains vigier*) on the river Seine; in one alone of which, of the length of a large ship, and consisting of two stages with each a portico running entirely round, there are a hundred and forty separate cabinets for bathing. These are occu-

pied by a succession of visitors, during the summer season, from morning-dawn until eleven o'clock at night. Externally, shrubbery and flowers lend their aid to ornament the whole. The attendants are civil and punctual; and refreshments can be obtained according to the tastes of the bathers. The price of a bath is twenty-five cents, not including the use of towels. In a majority of the bathing establishments at Paris the price is fifteen-cents.

M. Girard, whose instructive Memoir* has furnished me with much of the preceding narrative of the progress and fluctuations of bathing establishments in Paris, enumerates their number and locality, and their increase up to the year 1832. They amounted to seventy-eight; and contained 2,374 bath-tubs. In addition to these, there were 335 of the latter in boats on the river Seine; making a grand total of 3,768 separate warm baths, accessible to the public for pay.

There are, also, portable baths belonging to fifty-eight, out of the seventy-eight bathing establishments, which are carried to any part of the city for individual use. Not only is the bath-tub thus carried, but warm water, also, to fill it. The number of these portable baths is no less than a thousand and fifty.

Cold Baths and Swimming Schools.—For cold bathing there are several spots along the Seine covered over, so as to allow of easy access, and, at the same time, a certain degree of privacy, or at least exemption from public gaze. Of these places, twenty-two in number, sixteen are for males, and six for the other sex. The largest is seventy yards long by twenty-two broad; and the smallest is only twenty-seven yards long by six broad. There are also three swimming schools on the banks of the Seine, in Paris, which have seven hundred and eight cabinets attached to them.

In the provinces, the numerous warm and hot springs are, each, the sources of supply for large bathing establishments; the chief ones of which will be brought before the notice of the reader in a subsequent part of this work. Sea bathing has also come into vogue of late years in those parts of France contiguous to the Atlantic ocean and the

* Annales d' Hygiène Publique et de Médecine Légale, t. vii., 1832.

Mediterranean. In the north we meet with Di  ppe, Ca  n, and Boulogne ; in the west, Rochelle ; and in the south, Marseilles and Cette.

CHAPTER X.

**BATHING IN ENGLAND—WARM BATHING LITTLE PRACTICED—
COLD BATHS—THE PEERLESS POOL—DOMINICETI’S AT-
TEMPTS IN LONDON—SEA BATHING—BATHING IN GERMANY
—IN SWITZERLAND—IN ITALY.**

Bathing in England.—England, as the reader has been already informed, had her share of public baths during the period of Roman supremacy. Remains of these have been found in different parts of the island, as at Nordleigh, near Blenheim in Oxfordshire, at Wroxter in Shropshire, at Hope near Chester, at Whitcombe near Cheltenham, at Bignor in Sussex, and still more extensively at Bath. Those at Wroxter and Hope were hypocausta, with hollow floors and flues. Lucas gives a description of the remains of a Roman bath which were laid open on the occasion of pulling down the old Priory, or Abbey house, in 1755, in the city of Bath. Different rooms with hypocausta, laconica, and flues under the floors and between the walls, were thus brought to light. Subsequent investigations have shown that what Lucas calls the *Great Bath* was, in fact, only one wing of a regular and spacious building. It is conjectured that the great spring which now rises in the King’s bath, once rose in the western wing of the ancient Roman structure. The names of *Fontes Calid  *, and *Therm  *, given to the city by the Romans, show their appreciation of the nature of its waters.

The decay of the baths built and sustained by the Romans in England, may be dated from their abandonment of the island in the early part of the fifth century ; and the destruction of these institutions from its conquest by the Saxons. Bath, then called Achmanchester or *Het Bathan*, was by this people reduced to ashes, and the baths fell to

ruins, which even choked up the hot springs as well as the Roman sewer by which the excess or refuse water was carried off.

The introduction and spread of leprosy in England and indeed throughout the island, after the Norman conquest, might be supposed to have brought bathing into vogue, and have revived to a certain extent at least, the Roman practice in this respect. But although numerous hospitals were built and endowed for the reception of the victims to this disease, we do not learn that bathing constituted a part of their treatment. The reputation obtained for bathing in leprosy, was chiefly if not exclusively in the water of cold springs, as referred to by Floyer (*Hist. Cold Bathing*). The people of England seem to have been, perhaps it may be said they still are, content with the fame of the natural warm and hot baths, at the city of Bath, and of the tepid at Buxton; and to feel no desire to extend the known benefits from the use of these by the erection of establishments for artificial baths. Unlike the ancient Romans, who had moist vapour baths over the hot springs at Baia, and the modern Neapolitans, who have similar sudatories over the warm and hot springs of Ischia and Solfaterra, the English allow the vapour that arises from the hot springs at Bath to go, in a great degree, to waste.

Sir William Temple, who wrote about the middle of the seventeenth century, tells us, that bathing was scarcely practised at all in England on the score of health; and that if resorted to it was merely for amusement. That this remark was well founded, seems to be the more probable from the fact that the word bath is not, I believe, met with in the writings of Sydenham, who ranks so deservedly high among the English medical classics. Since then, the use of cold baths for medical purpose has been carried to an extreme; but warm bathing, except by invalids at Bath, is of late usage.

The Peerless Pool.—There would be less ground of complaint were there many such establishments in the great cities and towns of the Empire, as the Peerless Pool, in the City Road, back of St. Luke's Hospital, London. This bath, a hundred and seventy feet long, and upwards of a hundred feet wide, is nearly surrounded by trees, and has an arcade, divided into boxes, for privately dressing

and undressing. It is nowhere so deep as five feet, and on one side only three; and hence the experienced and the inexperienced in swimming are alike safe. Adjoining this Pool is a cold bath, forty feet long, and twenty feet broad, supplied by a remarkably cold spring. Mr. William Kemp, "an eminent jeweller and citizen of London," had these baths made.

About the middle of the last century, the attention of the English public was directed to the subject of warm and vapour baths by Dominiceti, a man of some enterprise, not deficient in ingenuity and medical information, but an insufferable boaster, and withal querulous and pragmatistical. He formed an establishment at Chelsea, near London; and his son one in the capital itself. He wrote a book of nearly six hundred pages octavo, entitled, "*Medical Anecdotes of the last thirty years, illustrated with Medical Truths, and addressed to the Medical Faculty; but in an especial Manner to the People at large; with an Appendix and copious Index.*" The real object of this work was to set forth his wonderful cures, by what he was pleased to call his "arbitrarily medicated and heated water and vapour baths, fumigations, and frictions." He would seem to have united in himself the various functions, and invented the means of cure, which, in later times have been divided among panacea manufacturers, steam doctors, and natural bone setters. Throughout his whole book one looks in vain for a detailed account of his various apparatus for bathing, and a rational exposition of the circumstances under which his boasted remedies are to be used. Of his singular modesty the following "Observation," duly emphasised by Italics, on the methods of cure recommended by some authors of repute, will serve as no bad specimen. Time has not added much, in this line, to the boastful slang of quackery. After admitting that the most eminent physicians, both ancient and modern, were convinced of the utility of stoves and fumigations, he continues in the following strain:

"Nevertheless it appears from their own words, faithfully quoted, that the methods they employed *in the practice* of such operations were irrational, absurd, founded on the grossest ignorance, and calculated rather to harass, torment, and, I wish I could not add, even *destroy*, the

patient, than to procure to him *a sure and permanent relief* from his complaints. Before the happy introduction and establishment of my inventions, there was not a physician or surgeon in Europe who had formed the most remote conception of my salutary modes and means of not only preparing moist and dry *fumigations*, and of supplying them with ease and safety, whether unitedly or separately, whether internally or externally, whether partially or universally, but of preparing also—what are essentially requisite to obtain from *fumigations* the *grand end proposed*, and what, *till then*, they were equally ignorant of—arbitrarily-medicated and heated water baths, and vapourous and dry baths, and of administering them in the like manner either unitedly or separately, according to the disorder, the constitution, and the vital heat of the patient, the state of the atmosphere, and other critical circumstances ; so as not only, as Hippocrates teaches us, *to retrench* from the animal frame, through the pores of the skin, what is *redundant*, but to supply the body, by means of the absorbent vessels, with what is *deficient*.”

But, in justice to Dominiceti it ought to be stated, that, however backward in describing his establishment in his book, he was willing enough to show it to all inquiring visitors. Perhaps he made his main secret to consist in the medicated substances which were added to the different kinds of baths, and which he did not feel himself called upon to divulge. With a vanity not unnatural for a man in his peculiar situation—a foreigner, and suspecting that he was suspected of charlatanry, he informs the reader of the number of distinguished persons who visited his establishment, indicating by particular marks those who honoured his table, those who had been under his care, and those who examined his apparatus. Among the cards sent to him is one containing among many other names that of Benjamin Franklin, L.L.D. There must have been a good deal of *naïveté* about the Venitian doctor, for him to think it such high honour for nobles and honourables, foreign and English, occasionally to dine with him ; as if a man who keeps a good table and open house should ever be in want of guests of quality and mark.

In reply to the complaints of the backwardness of Dominiceti to explain his apparatus in his book, the reader

might perhaps cite the following as ample specification. It certainly promises enough. If the projectors and builders of hospitals and alms-houses can accomplish half as much as is here alleged to have been done, by means of a single fire, we invoke them in the name of humanity to set about the task forthwith,

"To convey an idea to those who have not had an opportunity to witness the amazing powers of my apparatus, as I had the honour to display them to my illustrious guests above mentioned, I must observe among its other economical and salutary properties:

"First: That thereby, with the assistance of *such a fire* as is commonly used in the kitchen of a private family to boil or roast a single joint of meat, a dinner of three courses may be dressed, and bread baked for one hundred people, with the utmost ease.

"Secondly: That *at the same time* it renders either putrid or salt water sweet, and in a sufficient quantity to supply a ship's company, as it distils without interruption at the rate of one pint in one minute.

"Thirdly: That *at the same time* it also not only prepares the medicinal effluvia of vegetables and mineral substances unitedly with, or separately from, the salubrious dry fumes of gums, balsams, and minerals, so as to be *instantaneously* conveyed to several vapour baths, and to more than thirty rooms, built for the use of the sick and infirm; but applies them *effectually*, by means of various machines invented by me for that purpose, *to the whole* or *to any part of the body*; and, when required, introduces them also with the utmost decency and safety, by the help of my pliable catheters, into the urethra, bladder, or anus, with every different degree of heat and species of medicinal substance, which the complaint may demand; and all this, notwithstanding the bed-chamber of the patient is *at two hundred or more feet from the aforesaid little fire*.

"Lastly: That *with the same fire*, and *at the same time*, more than thirty bed-chambers may be thoroughly warmed, and in each, *without any additional fire*, the linen and woollen garments may be dried, and *any quantity of water kept boiling*, for whatever purpose may be required. In a word, it so far surpasses conception, that no judgment can be formed of the extensive utility with which it might

be employed, particularly *in ships of war, garrisons, hospitals, and lazarettoes*, without actually seeing the apparatus itself.

“In either of these, with a common kitchen fire, or with any other fire, however distant, if it be sufficient to boil a single gallon of water, whether salt or putrid, not only such water is made fresh and potable, but any number of soldiers, sailors, or prisoners, may be preserved from fevers and other contagious distempers; and at the same time, by the volatile effluvia and dry fumes of cephalic herbs and gums, the spirits may be revived and comforted. If either of the above maladies hath already made its appearance, it presents likewise an easy and effectual remedy. It is farther to be observed, that by means thereof ships of war, barracks, hospitals, &c., may be exempted from all sorts of vermin, and from the fatal effects of bad air, pestilential infection, and poisonous effluvia.”

I should not have thought it necessary to enter in these details, were it not to show that Dominiceti, himself a borrower, has been in his turn imitated, after more than half a century, by quacks of all degrees. First, is that original teacher of botany by transparencies, for the love of science, and the eulogist and self-styled inventor of medicated vapour baths* “for the benefit of the whole human family” as he says, in his broad Doric, that he once told the Duke of York.

With a centesimal part of Dominiceti’s medical knowledge, and we do not mean to rate his very highly, are certain itinerants of the present day, “steam doctors,” who go about our country, vexing, first the people’s ears with strange jargon, and next their stomachs with cayenne and lobelia, and their skins with hot vapour. The botanical school itself, as some millenium herbalists call themselves, which cannot see safety in any mineral, nor poison in any vegetable, could not hold the surgeon’s knife in much greater dread than did Dominiceti.

If we ever have doubts about the real nature of a quack’s pretensions to discoveries and improvements in the healing art, during his life time or in the period of his

* Whitlaw, who honoured these United States with visits in both capacities.

successful career, the question is completely solved by his death, or after his declining business, or business him. All his boasted inventions die with him—his ready impudence is not a direct transferable matter, and he cannot will to friends or successors the precise amount of the credulity of the public, which had been his chief stock in trade. How different the real discoveries of genius. They may not at the moment be fully appreciated, but they are not forgotten ; the discoverer invites attention and inquiry, and puts it in the power of others to improve on his own suggestions, and to make them public property. Measured by this standard, we shall not be disposed to estimate very highly the boasted inventions of Dominiceti, which seem to have consisted in the application of vapour, generally or partially, and of douching, followed by frictions,—in imitation of the practice pursued by his countrymen in different parts of Italy. His personal industry gave his practice some vogue ; but, unsupported by the principles which he so pompously announced to be its basis, in his work, it was not kept up with any spirit after his death. Indeed, it would seem that here, as in some other instances of quackery, boastful promises and lying asseverations indispose the quiet and reflecting from continuing a practice which they see associated with, and made the vehicle of, so much moral turpitude.

Dr. Kentish, in his "Essay on Warm and Vapour Baths," relates, that establishments similar to those of Dominiceti, were attempted in various parts of the kingdom ; but they all more or less partook of the defects of the original one—namely, too exclusive advantages to the proprietors, instead of laying them open that the faculty might vie with one another, who could perform the most by their use. When a patient was recommended to Dr. Dominiceti, he became in a manner lost to the rest of the medical faculty.

Of later years the attention of the English physicians has been directed to the use of vapour baths, by the writings of Sir A. Clark, Dr. Blegborough, and Dr. Kentish, and the experience of Basil Cochrane and others, with, we hope, beneficial results. The Oriental practice of the vapour bath, and of shampooing, have also been made fashionable at Brighton, under the direction, perhaps we ought to say under the hands, of a certain Sake Deen Mahomed,

a native of Hindostan. This person has sent forth a small volume in praise of his practice, the processes of which he carefully omits to give, but, in their stead, favours the public with letters of gratitude from numerous distinguished individuals, and a list of the patrons of his bath, including, among the latter, his grace the Duke of Wellington. More to the point is a postscript, in which we read that "a large body of the most respectable inhabitants of Yarmouth and its neighbourhood have associated for the purpose of forming an establishment for bathing." Also, "The formation of similar establishments is contemplated at most of the principal towns in England." To what extent these plans were realized I have not learned; but I fear they were never carried out.

Doctor Kentish tells us, that when he resided at Newcastle-upon-Tyne, he possessed an establishment of baths for several years, of every description. He also remarks: "The relief afforded by vapour bathing at Chelsea, at Knightsbridge, at York, at Manchester, and at Newcastle, is of such a nature as to leave no doubt of its efficacy. Dr. Bardsley, in his Medical Reports, has given his testimony to the superior power of heat, applied through the medium of vapour, to heat applied by the means of warm water. These are the only sources whence we can derive information of the powers of the vapour bath in England." This author erected a Bath house in Bristol, in which he "placed intelligent attendants, with powers to apply general or partial heat or cold to any part of the body, according to the wishes of the practitioner." Mr. Cochrane published a pamphlet upon vapour baths. After being at great expense in erecting baths in London, and infinite trouble in rendering them complete, he put the public in possession of various plans and estimates, by which they could be erected. Still more, he gave the diseased poor the use of these baths.

With some exceptions, bathing to any extent among the people of England is confined to the period of the annual visits of so many of their number to the sea shore; and beyond this and the use of the ordinary cold bath, we can glean but little either from their experience or their teaching.

The writer whom I quoted* in the first chapter, on the neg-

* Ten Chapters on the Bath. London, 1829.

lect of bathing in England, and on the short summer hydro-maniac fever of the people of that country, thinks a great obstacle to the use of the bath is the cost which attends its use. "Cold bathing," he says, "looking at it with regard to the Metropolis, is not a practice which will readily prevail there. It is not adapted to the state of health and the mode of life of by far the greater part of its inhabitants." He adverts to an unsuccessful attempt made to erect an extensive suite of baths by public subscription, on a magnificent scale, in a central spot of London, "just before the birth of the stock-company mania, and out of which attempt it was that the mania first arose."

Incidentally, and without an expense beyond that of the construction of plain sheds and cabins, the warm bath is now, however, beginning to be enjoyed in England. The example set by a few large proprietors of steam-mills for manufacturing purposes, of letting off the waste hot water for baths and washing of clothes, will, we must hope, soon be followed in all parts of the three kingdoms. Similar facilities are found in steam-packets and steamboats, for both passengers and crew enjoying that which is now called a luxury, but which ought to be, ere long, a common daily requirement for cleanliness and health.

Bathing in Germany.—The Germans, as we have already seen, on the authority of Tacitus, were addicted to bathing. Their alleged preference for the warm bath was most probably manifested in those districts in which hot and warm springs abounded. The Romans were not backward in turning to account the existence of these waters, for the gratification of their love of warm bathing, and, accordingly the spots, where afterwards stood Aix-la-Chapelle, Ems, &c., were selected for this purpose. Charlemagne, who did so much to revive literature, and restore social order in western Europe, imitated the Roman emperors in more particulars than in merely taking their title. He was very partial to warm bathing, and in the selection of his capital he would seem to have consulted more the means of indulging this partiality, than the convenience of his subjects or the security of his empire. Be this as it may, Charlemagne used to hold his court, or at least sit in council, in a large warm bath of the waters of Aix (*Aachen*).

A hundred persons could bathe together in the large piscina, constructed by his orders.

In the middle ages, during the prevalence of leprosy, bathing was made a religious duty. One could wish that it were every where still so regarded. In conformity with the vows of the pious, bath houses were erected in connection with convents and hospitals, in which the poor were received gratuitously. No man could be knighted, or received into an order of chivalry, unless he had previously taken the bath. Afterwards, during the Crusades, bathing establishments became more and more common. They were divided into two apartments, one for the men, another for the women; and in them, also, if required, persons were bled or cupped. A bride always visited the bath before her nuptials; and, still more, all the nuptial guests were required to do the same. As already noticed, every Saturday, the attendants of the baths went through the streets, and called the people to the bath with the gingle of basins. In the present rage for reviving Gothic architecture and interior decorations for our churches, and bringing back the olden style of furniture, and the Gothicity of long hair, and long beard and moustaches, how much more desirable it would be to revive these neglected balneatory practices. In our own city, we could very well agree to bear the ringing of bells every Saturday, to give notice that the baths were ready for the public, in substitution for the present fashion of firemen's noise, without fire, every Sunday.*

In the fourteenth century the keepers of the baths were promoted to the honours of a corporation or guild by the Emperor Wenceslas. Gradually, however, as these establishments became more and more the resort of those suffering from contagious diseases, people for the purposes of recreation and cleanliness began to bathe in rivers.

Since then, although the Germans as a people cannot be said to be particularly addicted to domestic bathing, yet, at their numerous watering places, the practice has acquired no little vogue, and is enjoyed by a large number of persons every year. Visits to the baths connected with the thermal springs, both for recreation and the recovery of health, are

* Die Bader und Heilbrunnen Deutschlands und der Schweiz. D. Carl Friedrich Wosch. In zwei Theilen.

reduced to a regular system in Germany, France, and Italy. There is an established medical police both for the internal and external use of the waters, for the most part under governmental direction, in these countries; and, altogether, they furnish more copious instruction for our imitation and guidance on this side of the Atlantic, than can be obtained from English writers, in describing their own balneatory processes and results. In the case of sea bathing we are more accustomed to turn a deferential ear to English precepts; but even in this particular there is great room for a better method of observation and record.

Bathing in Switzerland.—In no country, writes Marc-card,* do the people bathe more than in Switzerland. He refers, of course, to the countries of western and middle Europe. This author acknowledges to have received more information from Zimmermann, Tissot, Hirzel, and Holze, than from all the physicians with whom he ever conversed on the subject.

There is no longer the same ground of complaint as that made by Poggio, the Florentine writer, of the abuses at the baths of Baden, in Switzerland. It would seem, from his representation, that during the sitting of the Council of Constance, these baths were less resorted to for health than for luxury—one might say debauchery. Men and women and young girls and children and priests, all took the bath at the same time without any reserve or restriction.

Bathing in Italy.—Italy, the first among the countries of the western empire to recover from the stunning violence of barbarian attack and conquest, was also, naturally enough, the first to offer in her numerous mineral and thermal springs, facilities for bathing; but nowhere among her noble and beautiful structures, in the palmy days of Florence, Genoa, Venice, and Milan, or in Rome, during the brilliant periods of Papal rule and ascendancy, do we find even a faint imitation of the magnificent Thermæ of republican and imperial Rome. . All that meet the eye of the traveller in this way are ruined remains. From the country around the bay of Naples, and the islands with which it is studded, there still gush out thermal springs, and sulphurous and

* De la Nature et de l' Usage des Bains—a French translation.

other vapours, which almost compel the inhabitants of the city and its environs, now as heretofore, to resort to them for their sanative and healing powers. But architecture either refuses its aid entirely, or gives, at the best, scant covering and no embellishment to these fountains of Hygeia.

In the northern part of the peninsula, the thermal springs near Padua have always been celebrated. Bathing in all its varieties, of immersion, douche and illutation, is largely practiced there. To the existence of these springs, are we most probably indebted for some of the most esteemed contributions by Italian writers to the medical history of baths and of mineral waters. Montagna, Savonarola, and Dondi, were natives of Padua. Savonarola's work (*De Thermis Totius Orbis*), was the first systematic treatise on the subject, in modern literature; having precedence by a century over the celebrated one of Baccius.

Let us not forget, however, that although the traveller in Italy meets with no modern edifices resembling the Thermæ of ancient Rome, yet he will see the nobler workings of Christian charity, which makes the sick poor participant, free of charge, in the benefits derivable from using the baths and drinking the waters at some of the more celebrated springs. To the honour of French philanthropy, it ought, also, to be mentioned, that, attached to some of the most celebrated mineral springs are hospitals, in which the invalid soldiers and the poor are received for the treatment of their cases, with more especial reference to their enjoying the advantages of bathing and drinking the waters. At Bath, in England, there is a hospital for the reception of patients whose treatment consists chiefly of the use of the thermal waters there.

CHAPTER XI.

BATHING IN NORTHERN EUROPE AND IN ASIA AND AFRICA—A RUSSIAN BATH—MODE OF USING IT—PRIVATE BATH—ITS CONSTRUCTION AND ARRANGEMENT—DETAILS OF RUSSIAN BATHING—SAFETY OF TRANSITIONS OF TEMPERATURE—SUDATORIES OF THE FINLANDERS—BATHS COMMON IN ALL NORTHERN EUROPE—ORIENTAL BATHS—TURKISH BATHS—THEIR DIVISIONS AND MODE OF USING—THEIR PRIVATE BATHS—THE LUXURIOUS AND SANATIVE EFFECTS OF TURKISH BATHS.

It is not in civilized and central Europe that we can look for systematic bathing by the great body of the people. The practice is carried out to its full extent in the eastern and northern portions of that continent, among the Turks, Russians, and Finlanders; and in central Asia and northern Africa, among the Asiatic Turks, the Persians, and Hindoos; and the inhabitants of Egypt and Barbary. Its origin and continuance can hardly be referred to climate, when we find it under latitudes so remote from each other as the North Cape and the Gulf of Persia; nor to religion, since it is participated in by the immense population of the Greek church, as well as by the hordes professing the Mahometan faith. There is this difference, however, that the people of the north are most partial to the moist, those of the south to the dry vapour bath.

Russian Bath.—A Russian bath is for the most part constructed of wood. It consists of one great hall, in which there is a stove against the wall, containing, besides fuel, large stones in a state of incandescence. Opposite to this, and at regular degrees of elevation, are two or three rows of benches on which the bathers sit and sometimes recline. Some apertures at the top admit a faint glimmering of light, and give vent to the vapour in which the bather is involved, and which is supplied by pouring water on the heated stones, or shot. Some of these buildings have an antechamber, for the purpose of dressing and un-

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dressing. The heat of the vapour to which the bather is exposed is from 122° to 133° Fahrenheit. After the expiration of a quarter of an hour, or even double this time, when the body is in a profuse sweat, it is washed with soap and water and gently switched with small brooms formed of the twigs of the birch tied together: affusions of tepid and finally of cold water are then practised, by pouring bucketfuls of it on the head. Sometimes, when there are no conveniences for a supply of cold water, a Russian will rush out from the bath and plunge into the nearest stream or lake; or even roll himself in the snow.

At one period both sexes used to visit these baths at the same time, without any reserve, and apparently without a consciousness of the want of delicacy, to say the least of it, of such a proceeding. Now, however, the men and women have, respectively, separate baths.

Separate Baths.—Adjoining the public ones, and forming part of the same building, are others of which a person may have the exclusive use so long as he desires, by his paying a small sum additional. The arrangements of these latter are of a more comfortable character, and greater attention is paid in them than in the former to entire cleanliness. The one visited by Dr. Granville consisted, 1st, of a spacious anteroom, seventy-five by thirty-three feet, and of considerable height, furnished with chairs, a table, &c. It was kept at a temperature of about 90° to 100° Fahrenheit; but in this respect could be diminished or increased by opening the door of communication, or a small wicker in the window of the inner or bath room. This latter has a wooden floor, is about seventy by thirty-three feet, and of proportionate elevation. The stove is in one corner of the room; part above the floor and part beneath, where it is supplied with fuel. The upper part forms a chamber, something like our common cooking stoves, on opening the door of which are seen, resting on a horizontal grating, stones and iron shot (cannon balls) kept constantly heated. From this to the opposite wall there are three stages, and a fourth at right angles to the second, six feet long by two broad, with a scroll to support the head, and reached by steps. On the floor opposite the door is a low dresser, on which are displayed large pans highly polished, and wooden pails of all sizes. Under the lofty double windows

are two spouts from corresponding cisterns, giving out hot and cold water in abundance; also a brass tube rising between them to a height of ten feet, bent horizontally, and terminating in a rose, pierced with many holes, through which, by turning a small cock, water, either hot or cold, may be showered instantaneously and with considerable force. The temperature of the bath room is seldom less than 120° Fahrenheit, and frequently rises to 132° or 140° F. It is generally kept at from 15° to 20° higher than the ante-room, and increases with the height of the different seats, the lowest of which is first tried by the bather, next the second. Dr. Granville could not remain more than an instant on the third.

Processes in Bathing.—The bather undresses in the outer room, and soon gets into a general perspiration. He then enters the bath room, in which the *parilstchick* or bathing youth has been preparing soap suds, and filling vessels with cold and tepid water. The atmosphere of the apartment is generally clear; the light from a lamp, placed between the inner and outer sash of one of the windows, being in no way obscured. The first sensations after being a short time in a bath are unpleasant, consisting of fulness of head, hot skin, and difficult breathing. The *parilstchick* now approaches to feel the skin, and not finding it overspread with sweat, opens the door of the stove and throws into it, and of course over the shot on the grating, a bucket full of water. Volumes of steam are instantly poured forth into the room, and a thick fog pervades every part: the body breaks out into a most profuse perspiration; the breathing becomes natural; the head clear and light. In this state, and while the atmosphere clears away, the vapour rising to the upper part of the room, the bather lies down in a sort of apathy and general relaxation, by no means disagreeable. The *parilstchick* next brings his large pail of soap suds, and grasping with both his hands a quantity of the inner bark of the lime tree (commonly called bass), cut into fine slips, and soaked in the soap suds, rubs every part of the body, softly pressing on each joint, and bidding the bather to turn when he thinks it requisite. After continuing this operation for some time, tepid, or perfectly cold water, at the pleasure of the bather, is scattered over him as he lies; and lastly,

over the head and body generally, while sitting. Some at this stage of the operation jump from the bench to the floor, and have cold water showered over them, without feeling any inconvenience.

In the public baths no attendance is afforded, and the persons bathing either perform on themselves or on each other the several operations of rubbing, lathering, and washing.

After the bath, the man of rank takes a drink composed of a mixture of English beer, French or German white wine, and sugar, to which are added toasted bread and a few slices of lemon. The peasant or the slave will content himself with a drink of spirits, or warm beer, into which, at times, mint is infused.

Safety of Transitions of Temperature.—The reader has already seen that this fashion of bathing is not without parallel in history. Very nearly similar was the practice of the Romans, already adverted to. In fact there is less to surprise us in these abrupt transitions of temperature than would at first appear. The higher the animal heat, the greater is the power of resisting cold; and hence, in the present case, the highly excited state of the skin, it being both red and hot, enables it to bear with impunity the sudden application of cold water or snow: just enough of its heat is lost by the change to establish a pleasant medium temperature. It would follow, therefore, that the naked Russian is enabled to roll in the snow without injury, precisely because he has just come out of the excessively hot medium of the vapour bath; for had his skin been of the common temperature and ordinary sensibility; or had he waited until this part had become cool, and in that state of indirect debility following excessive excitement, it could not, any more than the internal organs with which it so closely sympathizes, have tolerated the great reduction of temperature and sedative operation effected by cold. An inhabitant of the north makes, by a stay in hot vapour, a sudden indeed, and excessive, but not less real preparation for meeting intense cold without injury, similar to that which he has more gradually and habitually made in keeping up his animal heat by means of hot stove rooms, a clothing of furs and woollens, and full diet. As I shall have occasion to take up this question hereafter, I

shall not dwell on it any longer in this place, but continue my historical sketch of the different modes of bathing.

Sudatories of the Finlanders.—The Finlanders have two species of sudatory; the dry and the moist. In the first the thermometer of Fahrenheit is from 140° to 167° (48° to 60° of Reaumur): in the second the heat does not exceed 122° Fahrenheit. The vapour in this last is pungent, and irritates the eyes; it extinguishes flame and causes great suffering, and even death to animals, if they be kept long enough in it. Individuals exposed to it become vertiginous, and are almost in a state of stupour: their animal heat is augmented one or two degrees, and the pulse in an adult gives one hundred and fifteen to one hundred and twenty-four beats in a minute; and in a child of ten years of age gives one hundred and sixty. Infants when in it appear almost dead; and yet there are some who have had the boldness to expose these little beings twice a-day to such a punishment. This is probably the reason why so many perish during the early period of life in Finland. We are, of course, prepared to hear of these baths producing a state of fever, easily recognizable by redness of the skin, heat, and burning thirst, extreme debility, oppressed breathing, stupour in some, and obstinate watchfulness in others. With the augmented perspiration there is a diminished flow of the other secreted fluids, such as milk, &c.: the senses are deadened, and the flesh in general becomes more flabby than usual. But after a while, as in all cases of increasing feverish heat, the perspiration ceases, nor can it be renewed by any increase of the temperature of the bath, even were this carried to the extent of 144° F. It has been ascertained that the dry sudatory, from 140° to 144° F., is more supportable than a moist one of 117° to 122° F. Formerly the Finlanders used, like the Russians, to roll themselves in the snow; but at present the custom is almost universally abandoned. In parts of Finland the females who have been recently delivered are conducted to the baths with their offspring, on whom a thousand superstitious ceremonies are practised, while their little limbs are pulled about in every possible direction, in order that their horoscope may be satisfactorily cast. Some take a bath once a-day; others, and they are the larger number, once or twice a-week.

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Baths Common in Northern Europe.—Baths are met with in all northern Europe, viz., Finland, Lapland, Sweden and Norway, attached to or forming part of the houses of all classes. Almost all the Finnish peasants, says Acerbi, have a small house built on purpose for a bath; men and women use it promiscuously, without any concealment of dress, or being in the least influenced by any emotion. The apartment is nearly dark, as there is no other window but a small hole, nor any light but what enters in at some chink in the roof of the house, or crevices between the pieces of wood of which it is constructed. My astonishment, says the writer just quoted, was so great, that I could scarcely believe my senses, when I found that these people remain together for the space of half an hour, and sometimes a whole hour, in the same chamber, heated to the 70 or 75th of Celsius, equal to 167° of Fahrenheit, or within 8° of boiling spirits. The bath, here, was of vapour evolved by pouring water on stones of a red heat. The Finlanders will sometimes come out, still naked, and converse together, or with any one near them, in the open air. If travellers happen to pass by while the peasants of a hamlet or little village are in the bath, and their assistance is needed, they will leave the bath, and assist in yoking or unyoking, and fetching provender for the horses, or in anything else, without any sort of covering whatever, while the passengers sit shivering with cold, though wrapped up in good wolf's skin. The Finnish peasants pass thus, instantaneously, from an atmosphere of 167° of Fahrenheit to one in which the thermometer is as low as 24° below zero, which is the same thing as going out of boiling into freezing water; and what is more astonishing, without the least inconvenience; while other people are very sensibly affected by a variation of but five degrees, and in danger of being afflicted with rheumatism by the most trifling wind that blows.

Oriental Baths.—But it is to the East that we must look for the most numerous and splendid baths. They are naturally places of great resort to a people, who, like the followers of Mohammed in Turkey, Persia, and Egypt, are enjoined by him to frequent purifications as a ceremonial of religion; and who, indolent by the nature of the despotism

under which they live, seek in them a means of passing away a portion of their time, and of obtaining pleasing corporeal sensations when those of a higher character are denied to them.

Turkish Baths.—The public baths in Turkey are represented to us as elegant and noble structures, built with hewn stones; though, according to Buckingham, the approach to them is dark and mean. The inner chambers are capacious, and paved with slabs of the rarest and most beautiful marble. A Turkish bath consists of three, or sometimes only two apartments: the entrance is into a spacious and lofty hall, well lighted, and having a fountain in the centre: round the sides are high and broad benches, or raised galleries, slightly divided into compartments, and on which rich carpets, mattresses and cushions, are arranged. Here the bather undresses, and receives a loose wrapper or gown, and a napkin is put round his waist; he slips on, also, a pair of wooden sandals. Thus prepared he goes into the second room, which is of a moderate degree of heat, or if there be but two, he passes at once into the bathing room proper, which is of an octagonal form, vaulted, and receives light from the top. Its temperature is about 100° Fahrenheit. In the middle there is a marble estrade, elevated about eighteen inches, on which the bather stretches himself at full length, and is soon thrown into a profuse perspiration by the heated air of the room. During this time an attendant rubs and washes the skin strongly with a horse-hair brush, or bag, so as to cleanse it of all impurities: he then kneads and moulds the body with his hand for a considerable length of time, and, if required, stretches the limbs in succession, so as to make each joint snap most audibly, and give a person unaccustomed to the operation, the idea that his limbs are actually dislocated. To this operation succeed rubbing and washing the body with a lather of perfumed soap: an operation performed in one of the recesses or cabinets at the sides of the room, where is a marble basin supplied by pipes with streams of hot and cold water, so as to allow of the bather giving himself a final ablution of such a temperature as may be most agreeable to him. These recesses have a heated marble pavement. There is a slight slope of the floor near the wall, by which the water falling from the body of the

bather trickles down, and is carried off by suitable pipes. After the last washing he returns to the second or middle room, in which he stays a few minutes, and covers himself with a dry wrapper, extending from the breast to the feet. Thus prepared, he issues out to the first apartment or hall, where he dresses; and where he now lies down on a mattress for about half an hour, or reclines on the same, while smoking or drinking coffee.

In the cities, the public baths are distinct for the two sexes: in the smaller towns and villages, if there be but one bath, the women resort to it during the day time; the men in the night. No distinction of rank prevails on these occasions; each person is attended to in the order in which he enters the bath room: nor are religious prejudices allowed to prevent any description of people from availing themselves of the enjoyments and comforts which it furnishes. The cost of the bath is very trifling, as may be supposed when it is within the means of the very poorest, who use it frequently.

Females, when taking the bath, substitute for their usual dress a loose linen wrapper, but which soon becomes so saturated with vapour as to reveal "the whole outline of the figure." Miss Pardoe* remained about two hours and a half in a public bath, which she visited at Constantinople: an hour and a half of this time was spent, under the hand of a young Greek slave, on her hair alone. On the return of the traveller to the ante-room, or hall for unrobing, a new feature had been added to the scene: "most of the ladies were at dinner. The crimson glow of the bath which throws all the blood into the head, had passed from most of their faces, and was replaced by the pure, pale, peach-like softness of complexion, that its constant use never fails to produce. Numbers of negresses were entering with covered dishes, or departing with the relics of those that had been served up; and as the Turkish mode of eating lends itself to these *pic-nic* species of repasts, the fair ladies appeared to be as much at home squatted round their plated or china bowls, spoon in hand, in the hall of the bath, as though they were partaking of its contents in the seclusion of their own harems. Sherbet, lemonade, *mohal ibei*, a species of inferior blanc-manger, and fruit, were constantly handed

* The City of the Sultan. *Letter VIII.*

about for sale, and the scene was altogether so amusing that it was almost with regret that I folded myself closely in my cloak and veil, and bowed my farewell to the several groups which I passed on my way to the door."

Miss Pardoe declares that she witnessed none of the unnecessary and wanton exposures, described by Lady Mary Wortley Montagu, whose stay in Constantinople did not change her habits of neglect of personal cleanliness.*

Well may Miss Pardoe represent the Turkish bath to be the "terrestrial paradise of Eastern women, where politics—social and national—scandal, marriage, and every other subject under heaven, within the capacity of uneducated but quick-witted females, is discussed; and where ample revenge is taken for the quiet and seclusion of the harem, in the noise, and hurry, and excitement of a crowd."

Nothing can be more luxurious than the private baths of the wealthier and titled Turks. The rooms are lined with the finest marble; the basins supported by columns with gilded capitals; all the vessels are of gold or silver; the linen is of the finest kind, and the sandals even are studded with pearls, emeralds, and diamonds.

The Greeks, Armenians, and Jews, though not in the habit of bathing so frequently as the Turks, are not backward in displaying considerable luxury in their establishments for the purpose.

Luxurious and Sanative Effects of Turkish Baths.—Of all Turkish remedies, the vapour bath, says Dr. Madden, is the first and most efficacious in rheumatic and cutaneous diseases. He has seen them removed in a fourth part of the time in which they are commonly cured in England. In such cases, he continues, I cannot sufficiently extol the advantages of the Turkish bath: the frictions employed is half the cure, and the articulations of every bone in the body are so twisted and kneaded, that the most rigid joints are rendered pliant. He has trembled to see them dislocate the wrist and shoulder joints, and then reduce them in a moment: their dexterity is astonishing, and Mahomed's shampooing at Brighton is

* Many of my readers are no doubt familiar with the reply of Lady Mary to a French lady, who was expressing her surprise at the unwashed state of the hands of the former. "Ah, madame, if you were to see my feet!"

mere child's play in comparison. As a luxury, Turkish bathing cannot be better described than in the words of Savary: "If life be nothing but the succession of our ideas, the rapidity with which they then recur to the memory, the vigour with which the mind runs over the extended chain of them, would induce a belief that, in the two hours of that delicious calm that succeeds the bath, one has lived a number of years."

CHAPTER XII.

PERSIAN BATHS—MORE AN AFFAIR OF THE TOILET—EGYPTIAN BATHS—THEIR STRUCTURE AND ARRANGEMENTS—FASHION OF BATHING—LONG DURATION OF THE FEMALE BATHS—VISIT OF THE BETROTHED TO THE BATH—DESCRIPTION BY PROSPER ALPINUS—EAST INDIA BATHS—BATHING BY THE MEXICANS AND NORTH AMERICAN INDIANS.

The Persian Baths.—The Persian baths, in the approach to them and in their external appearance, as well as in the cleanliness, lightness, and style of ornament of the first hall and undressing room, are superior to the Turkish; but, in their internal arrangements and conveniences, they are by no means equal to these latter. The bather has to lie down on the floor in place of on an estrade: and he is merely well, though roughly scrubbed; and subsequently the impurities of the skin are rinsed off in a large cistern, from which there was neither a running stream to carry off the foul water, nor cocks of hot and cold to renew and temper it at pleasure, as in Turkey. A still more marked and characteristic national difference is thus described by Mr. Buckingham. (*Travels in Assyria, Media, and Persia.*) In place of the luxurious moulding of the muscles, the use of the hair bag, or glove for removing the dirt, and the profusion of perfumed soap, with which the Turks end a course of treatment full of delight, the Persians are occupied in staining the beard and hair black, the nails of the toes and fingers of a deep red, and the whole of the feet and hands of a yellow colour, by different preparations of

henna. This operation is the most unpleasant that can be imagined. The Persians do not shave the whole of the head, as is usual with most of the Turks and Arabs, but taking off all the hair from the forehead, over the crown and down the neck, for about a hand's breadth, they leave on each side two large bushy masses depending over their shoulders. These are almost as full in some individuals as the apparent wigs of the Sassanian medals; and in others, they are sufficiently long and large to meet and cover the neck behind, which would deceive a stranger into a belief that they wore the whole of their hair without either cutting or shaving it. This, then, with a very long and full beard, in which all the people take pride, is plastered with a thick paste, of the consistence of hog's lard, and not less than two pounds weight, is sometimes used on one person. It possesses a strongly astringent and penetrating quality, and requires great skill in the use of it to avoid doing considerable mischief. As the eyebrows are plastered with it, as well as the rest of the hair, and as it softens by the heat of the room and of the body, it frequently steals into the eyes and produces great pain. The mustachios also sometimes give a portion of this paste to the nostrils as well as to the mouth, and never fail to yield a most unpleasant odour to all within their reach. The patient (as he may well be called) reclines on his back, naked, and on the warm stone floor, with his eyes and mouth completely shut, and not daring to breathe with too great freedom. He remains in this manner for an hour or two at a time, while the operator visits him at intervals, rubs his hair and beard, patches up the paste where it has dissolved, or is fallen off, and lays on fresh coats of the dye on the nails, the hands, and the feet. Some of these beard-plastered elders, fresh from the hands of their attendants, look oddly enough, with different shades of red, black, and grey in their beards; for it takes a day or two, according to the quality of the hair, to produce a uniform blackness; and this requires to be renewed every week at least, to look well, as the roots of the hair which grow out after each time of staining, are either brown or gray, according to the age of the wearer, and contrast but badly with the jet black of the other parts.

When all is finished, and the visiter leaves the inner

bath, he is furnished with two cloths only, one for the waist and the other to throw loosely over the head and shoulders: he then goes into the outer room into a colder air, thus thinly clad and without slippers or pattens; no bed is prepared for him, nor is he again attended to by any one, unless he demands a nargeel to smoke; but most generally he dresses himself in haste and departs.

The Turkish bath, continues Mr. Buckingham, is far more capable of affording high sensual pleasure, and is consequently visited as much for the mere delight to the feelings which it produces, and to lounge away an agreeable hour, as for the performance of a religious duty; while the Persian bath seems altogether resorted to for the purpose of the toilette, as one would submit to a hair dresser to have his hair cut, curled, powdered, and set in order for a party.

Egyptian Baths.—The baths of Egypt and India differ but little from the Turkish ones. Savary gives a most glowing description of the first, so much so, indeed, that other travellers, who could not view things with the same partial eye, have not been backward in accusing him of being rather too imaginative. There are, as we learn from Mr. Lane,* between sixty and seventy *Hamhamma' ms*, or baths in Cairo, to which the public have access for a small expense. Some of these are for men only; others, only for women and young children; and some for both sexes—the men during the forenoon, and in the afternoon the females. When the bath is appropriated to women, a napkin, or any piece of linen or drapery is hung over the entrance to prevent the men from entering: all the male servants having gone out a short time before, and females having taken their places. The front of the bath is generally ornamented in a manner similar to that in which most of the mosques are decorated, but usually more fanciful, in red and white, and sometimes other colours, particularly over and above the entrance. The building consists of several apartments, all of which are paved with marble, chiefly white, with an intermixture in some parts, of black marble, and small pieces of fine red tile, in the same man-

* An account of the Manners and Customs of the Modern Egyptians, vol. ii. p. 35–43.

ner as the *doncka 'ah* of a room in a private house. The inner apartments are covered with domes, which have a number of small, round, glazed apertures, for the admission of light.

Divisions of the Bath.—In the first apartment in which the bathers undress, there is a fountain of cold water in the centre, and two raised seats, one of which, for persons of the higher and middle orders, is furnished with mattresses and cushions: upon the other or others, which are for the lower orders, there is usually no furniture excepting mats. In many baths there is, also, opening into this room a small stall for coffee. But, in winter, the bathers undress in an inner closed apartment, between which and the one first mentioned is a short passage, with one or two latrinæ on each side.

The first warm apartment into which the bather passes is an antechamber to the principal apartment. Here the bather receives a napkin in which to put his clothes; and another to put round his waist—this reaches to the knees, or a little lower; a third, if he requires it, is brought to be wound round his head, in the manner of a turban, leaving the top of the head bare; a fourth, to put over his chest; and a fifth, to cover his back. The bather is now ushered into the inner or principal apartment by an attendant. This, in general, has four seats, or estrades, near the floor, which give it the form of a cross; and in the middle there is a fountain of hot water, rising from a small, shallow basin in the middle of a high, octagonal seat, cased with white and bluish marble, and pieces of red tile. The *hhrara' rah*, or chief apartment, occupies, together with several chambers connected with it, an exact square. The antechamber just now described, is at one of these angles. Two small chambers adjoining each other occupy a second angle: they contain, one, a tank or reservoir of warm water, to which there is an ascent of a few steps: the other consists of two taps, projecting from the wall, one of hot, and one of cold water, with a small trough beneath, before which is a seat. A third angle of the square is occupied by two other small chambers similar to those just described, one containing a second tank of water not quite so warm as the former; the other a second trough and taps. Each tank is filled by a stream of water pouring down

from the dome of the chamber. The fourth angle of the square is generally occupied by a chamber which has no communication with the great room, and which contains the fire that feeds the boiler over it.

Stages of Bathing.—The bather having entered the *hhara' rah*, or bathing room proper, soon perspires profusely, from the humid heat which is produced by the hot water of the tanks and fountain, and by the boiler. If the bather be covered with more than one napkin, the attendant takes them off and gives him a wet napkin; or the former one is retained and wetted. The bather sits on the marble seat of the fountain, or lies upon a napkin in one of the estrades, or by the edge of one of the tanks, to submit to the first operation, which is that of cracking his joints. The limbs are wrested with apparent violence, but with, as Mr. Lane asserts, such skill, that an untoward accident in this operation is never heard of. The flesh is often kneaded at the same time. After this, or previously, the attendant rubs the soles of the feet with a kind of rasp of baked clay. There are two kinds of rasps: one very porous and rough; and its rasping surface is covered with several lines: the other is of a fine close clay; and the surface with which the rubbing is performed is rendered rough artificially. Both are of a dark, blackish colour. Those which are used by ladies are generally incased (the lower or rasping surface of course excepted) in thin embossed silver. The rougher rasp is of indispensable utility in persons who do not wear stockings, which is the case with most of the inhabitants of Egypt; the other is for the more delicate, and is often used for rubbing the limbs, to render the skin smooth. The next operation is that of rubbing the bather's flesh with a small, coarse woolen bag. This done the bather dips himself, if he chooses, in one of the tanks. Next he is taken to the small chamber with the trough and taps of water of different temperatures. A napkin having been hung before the entrance to this, the attendant lathers the bather with *leef* (or fibres of the palm-tree), and soap and sweet water, which last is brought in a copper vessel and warmed in one of the tanks. The *leef* is employed in the same manner as a sponge is by us. The attendant washes off the soap with water from the taps, and, if required, shaves the bather's arm-

pits: he then retires, leaving him to finish washing, &c. The latter then calls for a set of napkins, four in number, and having covered himself in the same manner as before described, returns to the antechamber or first chamber, where a mattress is spread for him on the estrade or divan, covered with napkins, and having one or two cushions at one end. On this he reclines, sipping a cup or two of coffee and smoking, while a fresh attendant rubs the soles of his feet and kneads his body and limbs; or two attendants perform this operation together. The bather generally remains half an hour, or an hour, or more, smoking his shib' ook, or *shee' sheh*; then dresses and goes out. The foreman, who has charge of drying the napkins, and who guards the watch and purse of the bather, brings the latter a looking-glass, on which he places a piastre, or it may be four piastres.

Many persons go to the bath twice a-week, others once a-week, or less frequently; but some are merely washed with soap and water, and then plunge into one of the tanks; for which, of course, they pay less.

Miss Lane's description of an Egyptian bathing scene in the women's bath imparts mixed impressions of pleasure and annoyance, which could be realised only in the East, where, notwithstanding a grinding despotism, one sees more examples of personal equality in the mosque and the bath than are met with in other parts of the world. The general arrangement and divisions of the bath are the same as those already described by Mr. Lane. The same may be said of the various processes and manipulations to which the bather is subjected. The lady writer tells us, that the chief apartment, or the bathing room proper, "was full of steam." She then adds the following account, which we give in her own words, as follows:—

A Bath for Females in Egypt.—"On entering this chamber a scene presented itself which beggars description. My companions had prepared me for seeing many persons undressed; but imagine my astonishment on finding at least thirty women of all ages, and many young girls and children, perfectly unclothed. You will scarcely think it possible that no one but ourselves had a vestige of clothing. Persons of all colours, from the black and glossy shade of the negro to the fairest possible hue of complexion, were

formed in groups, conversing as though full dressed, with perfect *nonchalance*, while others were strolling about, or sitting round the fountain. I cannot describe the bath as altogether a beautiful scene ; in truth, in some respects it is disgusting ; and I regret that I can never reach a private room in any bath without passing through the large public apartment.

"I will turn to the more agreeable subject—the operation of the bath, which is quite luxurious. The sensation experienced on first entering the hottest chamber is almost overpowering—the heat is extremely oppressive ; and at first I believed that I could not long support such a temperature ; but after the first minute, I was relieved by a gentle, and afterwards by a profuse perspiration, and no longer felt in any degree oppressed. It is always necessary for each lady to send her own bathing-linen, a pair of high clogs, a large copper vessel for hot water, two copper bowls, and towels."*

Miss Lane, in common with most travellers, tells us, that the operation of bathing in the Eastern manner was to her very agreeable ; and that she found it singularly beneficial in removing that lassitude which is occasioned by the climate. It is true, that it is soon followed by a sense of fatigue, but a delightful repose ensues ; and the consequences, upon the whole, she found almost as enjoyable as the process itself.

Bathing, as truly observed by Mr. Lane, is one of the greatest luxuries enjoyed by the people of Egypt. The inhabitants of the villages of that country, and those persons who cannot afford the trifling expense incurred in the public bath, often bathe in the Nile. Girls and young women are not unfrequently seen indulging themselves in this way in the warm weather, and generally without any covering ; but mostly in unfrequented places.

It is customary for the betrothed female in Cairo, and other cities of Egypt, to go in grand procession to the bath, accompanied by her relations and intimate friends, a day or two before her marriage. The procession is called *ziffet el hammam*. Persons of wealth engage the establishment for their own use on these occasions, and spend

* The Englishwoman in Egypt. *Letter XXVII.*

hours in the different details of the bath, and often in feasting the company.

Were we deprived of the descriptions by recent travelers of the baths and of the fashion of bathing in Egypt, we might fall back with entire confidence on those recorded by Prosper Alpinus, two hundred and fifty years ago. This writer, who had resided some time in the country, speaks of the number and richness of decoration of the public baths in Cairo and Alexandria, and of the different temperatures of the dry and moist air in the apartments through which the bathers pass. The Egyptians, he tells us, visit the bath to sweat, to be rubbed, and to be washed—three processes gone through in different apartments, and with distinct appliances. He is most minute, however, in his account of the frictions which every Egyptian who takes a bath undergoes. Shampooing is described with all the precision of a professor of this art. The three stages of mild, moderate, and rough, with corresponding degrees of duration are detailed, in such a manner that we think we see the sufferer—patient at any rate, considering his passive endurance, he may be called—in the act of undergoing the process. First, we see a gentle rubbing by the extended hand of the operator, of the muscles of the limbs, beginning with those of the feet and ascending to those of the thighs and haunches, and then a similar course pursued with the muscles of the hands, and arms, and shoulders; and afterwards of the face, neck, chest, and abdomen. The bather now turning round on his face, has the same gentle friction given to all the muscles on the back part of his body. Sometimes oil of the sesame seed is rubbed in at this time. In the second stage, the operator works with the flesh and joints of his subject, in a somewhat rougher fashion, by rubbing it with a coarse linen; and in the third, with still more force, goes through a similar operation with a cloth or bag of goats' hair. The bather is then thoroughly covered with a lather of soap, and washes in a bath of warm water, in order to remove all impurities. Depilatories are employed by both sexes, and the soles of the foot are rubbed with a composition that removes all fetor and strengthens the skin. Finally, the dye of the henna is not forgotten by the women, to give the desired tint to the nails of their feet and

hands. Aromatic unguents are used in a fashion which forms part of the mysteries of the bath-toilet of the Egyptian women.

The writer, to whose description we now advert, speaks of the extreme desire of the females in Egypt to become fat, and with this view they indulge themselves in various comestibles and drinks in the bath. We must not forget, that it is an Oriental bathing establishment, in one of the apartments of which, and not a simple bathing tub, such good cheer is indulged in. We shall, also, be less surprised, by bearing in mind this difference, when we learn from our author that the Egyptians not only resort to the bath to be sweated, rubbed, and scrubbed, and washed, but that, when there, they eat and drink, and take physic in its various modes.* When they propose to derive all the anticipated benefits from shampooing, they take an emetic, so as to cleanse the stomach before the skin is subjected to its detergent course, after having undergone the sweating.

East India Baths.—In the East India bath, the visitors are subjected to nearly the same process as in the Egyptian ones. The women are passionately fond of these baths, and often pass the greater part of the day in them, extended on a couch, and surrounded by slaves, who gently rub with their hands their lower limbs, and sometimes the whole body, so as to produce the most delightful sensations. It is, in fact, animal magnetism, with all the aids devised by voluptuousness.

The Bramins, like the orthodox Mahometans, are required to perform their ablutions three times daily; and pilgrimages are made by all classes in Hindoostan, to the Jumna and the Ganges, to bathe in these sacred streams.

Among the accessories to the bath may be mentioned the practice of depilation, so common with the followers of the prophet. It is performed by applying to the hair, or rather to the skin itself, a mixture, called *rusma*, consisting of orpiment (sulphuret of arsenic) and quick lime,

* ——— multis diebus, dulcibus, tepidis balneis indulgent, in iisque diu morantes, comedunt, potant, chysteribusque ibi ex variis pinguedinibus ac adipibus paratis utuntur, multaque etiam medicamenta per os assumunt.—*De Medicinâ Ægyptiorum*, Lib. iii., cap. xv.

made up, by the addition of some fatty matter, into a kind of pomatum.

Bathing by the American Indians.—The aborigines of North America were not without the appliances for bathing.

Original Mexican Bath.—Clavigero describes the original Mexican bath in somewhat the following terms: "They are built with raw bricks, and their form is similar to that of ovens for baking bread; but with this difference, that the pavement of the bath is a little concave, and lower than the surface of the earth; whereas the surface of most ovens is plain, or a little elevated for the accommodation of the baker. The greatest diameter of a bath is about eight feet, and its greatest height six. The entrance, like the mouth of an oven, is wide enough to allow a man to creep easily in. In the place opposite to the entrance, there is a furnace of stone or raw bricks, with its mouth outwards, to receive the fire, and a hole above it to carry off the smoke. The part which unites the furnace to the bath, and which is about two feet and a half square, is shut with a certain dry stone, of a porous texture. In the upper part of the vault there is an air-hole, like that to the furnace.

"This is the usual structure of the Temazcalli, for so these baths are termed by the Mexicans. When any person goes to bathe, he first lays down a mat, a pitcher of water, and a bunch of herbs, or leaves of maize. He then causes a fire to be made in the furnace, which is kept burning until the stones which join the bath and furnace are quite hot. The person who is to use the bath enters commonly naked, and generally accompanied, for the sake of convenience, or on account of infirmity, by one of his domestics. As soon as he has entered, he shuts the entrance close, but leaves the air-hole at top for a little time open, to let out any smoke that may have been introduced through the chinks of the floor. When the bath is clear of smoke, he likewise stops up the air-hole. He then throws water upon the hot stones, from which immediately arises a thick steam to the top of the bath. While the sick person lies upon the mat, the assistant drives the vapour downwards, and gently beats the sick person, particularly on the ailing part, with the bunch of herbs,

which is dipped for a little while in the water which has then become warm. The sick person falls immediately into a soft and copious sweat, which is increased or diminished at pleasure, according as the case requires. When the desired evacuation is completed, the vapour is let off, the entrance is cleared, and the sick person clothes himself, or is transported on the mat to his chamber, as the entrance of the bath is generally within some apartment of his habitation. This species of bath is used by the natives for many disorders, particularly in fevers arising from costiveness. The Indian women always use it after childbirth, and also those persons who have been stung or wounded by any poisonous animal.”*

The Indians of the north pursue nearly the same course as that just described, but, like the Russians, they plunge, after coming out of the hot sudatory, into an adjoining river. Lewis and Clarke describe the Indian bath in the following terms: “We observed a vapour bath, or sweating-house, in a different form from that used on the frontiers of the United States or in the Rocky Mountains. It was a hollow square of six or eight feet deep, formed in the river bank by damming up with mud the other three sides, and covering the whole completely, except an aperture about two feet wide at the top. The bathers descend by this hole, taking with them a number of heated stones and jugs of water; and after being seated round the room, throw the water on the stones till the steam becomes of a temperature sufficiently high for their purposes. The baths of the Indians in the Rocky Mountains are of different sizes, the most common being made of mud and sticks, like an oven; but the mode of raising the steam is exactly the same. Among both these nations it is very uncommon for a man to bathe alone; he is generally accompanied by one, or sometimes several of his acquaintances; indeed it is so essentially a social amusement, that to decline going in to bathe when invited by a friend is one of the highest indignities that can be offered to him. The Indians on the frontiers generally use a bath which will accommodate only one person, and is formed of wicker-work, about four feet high, arched at the top, and

* Kentish—Essay on Warm and Vapour Baths.

covered with skins. In this the patient sits till, by means of the heated stones and water, he has perspired sufficiently. Almost universally these baths are in the neighbourhood of running water, into which the Indians plunge immediately on coming out of the vapour bath, and sometimes return again and subject themselves to a second perspiration; and the bath is employed by them either for pleasure or health, being in esteem for all kinds of diseases."

William Penn's Description.—William Penn, in a letter to Dr. Baynard,* relates what came under his own observation during a journey into the interior of the then colony of Pennsylvania, relating to the bath of "an Indian of note, whose name was *Tenoughan*, the Captain-General of the Clans of Indians of these parts." The bath being prepared after the fashion already described, and the patient, for he was a sufferer from fever, being duly introduced, Mr. Penn further tells us: "Now while he was sweating in this bagnio, his wife (for they disdain no service) was, with an axe, cutting her husband a passage into the river (being the winter of '83, the great frost, and the ice very thick), in order to the immersing himself, after he should come out of his bath. In less than half an hour he was in so great a sweat that, when he came out, he was as wet as if he had come out of a river, and the reek or steam of his body so thick that it was hard to discern any body's face that stood near him. In this condition, stark-naked (his breech-clout only excepted) he ran to the river, which was about twenty paces, and ducked himself twice or thrice therein, and so returned, passing only through his bagnio, to mitigate the immediate stroke of the cold to his own house, perhaps twenty paces farther, and wrapping himself in his woollen mantle; lay down at his length near a long (but gentle) fire in the middle of his wigwam, or house, turning himself several times, till he was dry, and then he rose and fell to getting us our dinner, seeming to be as easie and well in health as at any other time."

Peru, under the Incas, with its numerous aqueducts, one of which measured between four and five hundred miles,

* History of Cold Bathing—Both Ancient and Modern. Part First, by Sir John Floyer. Part Second, by Dr. Baynard. Fifth Edition. London 1722.

could hardly be destitute of numerous public baths, the more especially when we reflect that every thing connected with social wants was created by the State. Caxamalca, the city in which Pizarro entrapped Atahualpa, the reigning Inca, had hot springs in its neighbourhood, which supplied baths much frequented by the Peruvian princes. (*Prescott—Conquest of Peru.*)

Bathing in the United States.—The chief successors and supplanters of the Indians in North America—the Anglo-Americans—have not retained the fondness of the aborigines for the vapour bath. They imitate them in their love for hunting and pursuit of game, but omit the means of refreshment and invigoration after the fatigue incident to these exercises. Of late years, however, a salutary change is coming over us in this respect; and Hygeia is continually increasing the number of her votaries, who have recourse to bathing in their houses, and, during the summer months, at the sea shore and the numerous mineral springs so bountifully dispersed over the country. In Philadelphia, the number of private baths in 1847, was 3,521, and of public baths four. A small proportion of the private baths are arranged so as to allow of warm bathing and to be used in the winter season. Even if there be a supply of hot water for the bath, the room itself is too cold to allow of this latter being turned to useful account. The resort to the public baths, that is to baths accessible to all for a moderate sum, is not by any means such as might be expected from the deficiencies at home and the consequently presumed demand for ablution. But as I have already said, we are improving in all our cities; and hopes may be entertained that the people, generally, will, before a long period has elapsed, be able to enjoy the health-supplying aids of the Oriental and the Russian baths—and that in the very spots most needed, as in the neighbourhood of large manufactories and wherever numbers are assembled for labour or mechanical employments. The means for procuring the requisite warmth for dry air baths, and of steam for moist air, and for warm water baths, with scarcely any additional cost, could be supplied in every factory and vessel in which steam is wanted for propelling machinery.

As a part of domestic hygiene, tepid bathing ought

never to be overlooked. A bath house should be deemed in importance only secondary to a kitchen, or a cooking stove, and certainly take the precedence of rooms filled with costly furniture and devoted to company-keeping. A house thus supplied furnishes its inmates with an opportunity of washing the whole body, daily, with cold water, if the circulation be sufficiently active to cause reaction and the requisite salutary phenomena, or of using the tepid bath, which will be found generally most congenial to children and delicate females, and to all of both sexes who are constitutionally feeble. Other older and invalid members of the family can with facility enjoy the luxury of the warm bath, and thus all, according to constitution and habit, will have an opportunity of daily practising an usage which is instrumental to health, adds to comfort, and is essentially necessary for the preservation of personal beauty and vivacity of movement.

We might with great propriety, in our own republic, take a hint from the Romans, and require our public authorities to make some provision for the benefit of the people, by erecting suitable bathing establishments, the admission to which, if not entirely gratuitous, ought to be at so low a price that all could have it in their power to visit them. Taxes are levied for purposes less useful than this; and, assuredly, if we have Boards of Health in our chief cities, the duties of which are to guard us against contagion, either imported or domestic, and to remove nuisances which would give rise to disease, it ought to be made a part of their duty to protect the citizens against the bad effects of personal uncleanness and the numerous ailments which grow out of it. If their jurisdiction be already thought too extensive, or their duties too burdensome, officers might easily be appointed by the courts for each ward in a city, to watch over the baths, regulate their temperature, the hours of bathing, the period for each person to remain in the bath—and to see that they are preserved clean, and, in the intervals between bathing, freely ventilated. What constituted part of the duty of one of the chief officers in the Roman republic would hardly be thought unworthy the attention of many of our plain citizens.

CHAPTER XIII.

DIVISION OF BATHS—ACCORDING TO THEIR TEMPERATURE—
THE NATURE OF THE WATER—THE EXTENT OF THEIR
APPLICATION—THE MANNER OF THEIR APPLICATION—VA-
RIETIES—SEMIFLUID AND SOLID SUBSTANCES FOR A BATH—
INSOLATION—LOCAL BATHS—LIMITS OF COLD, WARM,
AND HOT BATHS—MISAPPLICATION OF TERMS—A COMMON
STANDARD—VAPOUR BATHS.

THE most simple and natural division of baths, as far as regards temperature, that recognised by our sensations, and most applicable to the purposes of hygiene and of medicine, is into *cold*, *warm*, and *hot*. The intermediate degrees between positive cold and warmth, are vaguely expressed by the terms cool, temperate, and tepid; but, for all practical and available purposes, it will be sufficient to include the first two of these under the distinct head of cold; while the third, or tepid, will be classed with that of warm.

Baths are either *simple*, as of river or spring water, or *medicated*, as when the water holds various mineral or vegetable substances in solution. Baths are also variously named, according to the part of the body to which the fluid is applied, and the mode of its application. Thus, it is a *semicupium* when only the lower half of the body is immersed; a *pedituvium*, when a foot bath; a *manuluvium*, or hand bath; a *hip*, or seat bath, &c.

According to the Manner of their Application.—According to the mode in which the water is applied, bathing is practiced either by *immersion* of the naked or lightly covered body, constituting the common bath; or by *affusion*, or dashing or pouring the water over the body from a vessel, or in smaller stream from one or many canals. There are two chief varieties of affusion. The first is the *shower bath*, in which the water falls from a tub or reservoir placed above the body, through numerous perforations, like rain. The second is the *douche*, or *spout bath*, or *dry pumping*; it consists in the application of water, or of any mineral

or medicated fluid, through a small canal or pipe, falling from some height, or projected with some force on the skin, and if need be, on the accessible passages of the body. *Aspersio*, or sprinkling, is a modification of affusion; as when water is squeezed from a sponge, and made to fall in rills on the body, or a similar distribution is made with the fingers of another person, in what we commonly term sprinkling. Water distributed through a rose, as from the expanded and perforated top of the spout of a watering-pot and falling on the body, would represent a blending of affusion and aspersion. *Ablution* is simply washing the skin with a wet towel or sponge, or with the hand previously immersed in water. The Athenian bathing during the time of the republic was, if we may form an opinion from representations on vases, chiefly by ablution and aspersion. The bathers stood naked at the side of a round or oval basin, resting on a stand, and washed themselves. An attendant is represented with a vessel in hand, from which, when required, he would pour cold water on the back and shoulders of the bathers. Strigillation followed this fashion of bathing.

Variety of the Materials of a Bath.—Baths derive their names, also, from the kind of fluid, and even semifluid, and almost solid substances employed. The ancients were partial to *hydroleic* baths, or those consisting of oil and water; also to baths of *oil* alone, and sometimes of *milk*, and of *wine*. History relates that even baths of *blood* have been used. At the present time, on the continent of Europe, baths are sometimes made of the husks of grapes and other residual matters, after the expression of the juice; and also, those from the similar residue of the olive, after expression of its oil.

Gelatinous baths consist of dried gelatin dissolved in water.

Illutation (*illutamentum* or *lutamentum*), *mud* or *earth bath*, consists in covering the body up to the neck, or a single limb, as the case may be, with mud or earth. This is seldom practiced except at thermal springs, the alluvial soil near which, mixed with the warm water that has just left the spring and with sulphurous and saline deposit, is of a warm temperature. It may be regarded as a thermo-mineral bath, and as such finds favour in Germany, where it is called *Schlammbad*; in France, where it is termed *Boue*; and

in Italy, *Lutatura*—not accorded to it in England or the United States. The ancient Romans made use not only of this kind of illutation, as we learn from Pliny, but also of another described by Galen, and which consisted in coating, or we might say luting, the trunk and limbs with a fat or greasy earth (*pinguis terra*) procured from Egypt. It was the deposit left after the overflow of the Nile. When thus applied, it was reported to possess desicating and deterging properties, and was used in cases of œdematous swellings and tumours resulting from chronic inflammation; also swelled joints, and the like. The deposit at the warm springs near Padua was famous, in Galen's time, for softening indurations, and for warming, desicating, discussing, and resolving obstinate tumefactions, and removing pains in any part. It still retains, I believe, its reputation in this way.

Illutation, according to Baccius, is practiced in two ways; after several days use of the water bath, or for ten or fifteen days in connection with it. He advises those who would strengthen any part weakened by chronical diseases, or who would discuss tumours, or extend contracted members, first to prepare themselves, then to bathe for some days, and then to besmear the part affected with the mud yet warm and near the source of the spring. He orders them to go into the bath early, and to use the mud when the sun begins to grow powerful; and as it dries to change it, defending the head and the rest of the body, meantime, from the scorching heat. Or, to put a new coat of mud over the old, till, after two or three hours, it falls off of itself, or is scraped off; then bathe, rub dry, anoint, and breakfast. After four hours, when the first digestion is completed and the limbs have had rest, he orders the same process. In the evening, he directs bathing or sprinkling, so as that the same water and operation may wash off the luting and strengthen the parts, which are to be then anointed; after which the patient takes his supper or evening meal. For *Anasarca*, *Ætius* orders *illutaments* mixed with *discutients*, and then bathing. *Montagnana*, for obstinate contractions, or contractions, advises illutaments, and afterwards unguents. For swellings of the spleen, and other inflations from thick cold impacted phlegm, he orders illutation of ashes or of salt earth. For

burns, or scalds, such illutations are commended. Few will be able or willing to submit to such repeated illutations on the same day. A complete immersion of the whole body in mud, rather than merely luting the skin with it, ought not to be performed more than once in the twenty-four hours. Its duration, at first, ought not to exceed three-quarters of an hour. By repetition, and when locally used, it is borne for a longer period. Some management is required if the neck or throat is to be invested with muddy luting, to avoid inconvenient compression.

Among artificial illutaments we may reckon the *Cæromata*, a composition of powder, oil, and sweat, scraped off the bodies of the *Athletæ*, and saved for use, according to *Pliny* and *Suetonius* in *Nerone*. Wrestlers anointed their bodies, that they might the more easily evade the grapplings of their antagonists. They again threw dry powder on each others bodies, that they might the more easily lay hold.

These scrapings were, according to *Pliny*, sold at a monstrous price. *Dioscorides* says, that they had an emollient and discutient effect, and were used for piles, which were beneficially anointed, we learn, with unguents made of this odd residue. The scrapings which were gathered in the palestræ were, he tells us, used in hip-gouts by way of a poultice.

Solano, in Spain, deriving his notions from the Arabian physicians, *Fouquet*, in France, and others, have employed earth baths in pulmonary consumption, and *Marsigli* in syphilis—with similar results; for although success was claimed, a better pathology teaches us now, how little can be hoped for from such means, especially to arrest tuberculous growth, and the associated constitutional disturbance which constitute consumption. Artificial illutaments were also employed, as we learn from *Ætius*.

Akin to illutation is the bath of warm dung, resorted to in the country parts of continental Europe, for the cure of rheumatism and analogous affections. Somewhat less rustic, and allowing of rather more poetical associations, is the bath of bees-eggs, in paralysis. It consists of a mixture of wax, honey, and fœtal products of the bee, and forms an emollient for the skin, much of the good effects of which must depend on a large measure of faith possessed by the patient.

Saburation, or *Arenation*, or *sand bath*, is taken by covering the body, except the head, with sand and the exuvial matter thrown on the beach by the sea and heated by the sun. Sometimes the process is gone through in tufa or volcanic earth mixed with sand and sulphur, as found near certain hot springs. Inunction was occasionally practiced before saburation,—the subjects of which, at times, stood, or walked, or even ran about during the time. Saburation was either general or partial; and was prescribed for *atrabilis*, elephantiasis, and the nodosities left by gout, and even in paroxysms of this disease. The Tartars of the Crimea are partial to this kind of bath during the great heats of summer. They think it serviceable in hypochondriasis, scrofula, scurvy, &c. A cavity is made by scooping out the sand, and the patient is placed in it and covered over as if he were in a bathing tub. A mild heat is produced, followed by sweat and an eruption. With similar intent and effect, recourse has been had to salt, and to grain. Baccius recommends rubbing with salt and water in the sun or before the fire; taking care to cover the head. The beneficial operation consisted, for the most part, in free diaphoresis. Pliny relates, that Sextus Pompeius, being in command in Spain, was seized, while superintending the winnowing of his grain, with a fit of the gout in his feet. But by speedily burying his legs up to his knees in the wheat, the pain was carried away from the affected part in an astonishing manner.

Insolation.—Of a kindred character with the remedy just described, is the being enveloped in leather, or in the hide of an animal, and then exposed to the sun—*insolation*; although neither of them can properly be included under the head of bathing, except in so far as they resemble the warm bath by their inducing diaphoresis and moderate revulsion. A large hide is to be procured, which is to be oiled, stretched out on fine sand, and warmed through by a hot sun. The patient is next to lie down on this, and throw a light covering of linen over his head, and, if he perspires, the face is to be carefully wiped with a sponge. Having lain some time, until the body is greatly heated, he turns on the other side, and so round and round; first on one side and then on the other. The operation is to be frequently repeated; and, according to the indications in the disease, after each one, washing with sea or aluminous or sulphurous water will

come in appropriately enough. This used to be a popular remedy in sciatica, nephritic affections, paralysis, uterine diseases, and elephantiasis; and, also, within the experience of Baccius himself, in contractions of parts from wounds. Sometimes the patients were laid on a bed of discutient and desiccating herbs such as pennyroyal, sage, wormwood, chamomile, &c., in cases of dropsy, cachexia, &c.

Local Baths.—*Fomentation* is a topical warm bath, in which the heat and moisture are applied by means of cloths, or any substances equally retentive of the heated fluid. Various herbs and flowers or powdered barks, are, also, employed for the purpose. To meet the different indications for their use, cataplasms of an emollient, aromatic, or astringent nature, are frequently had recourse to. For the most part, however, the emollient basis is preferred, such as ground flaxseed, oat, and Indian meal, crumbs of bread, carrots, &c., boiled in water, or sometimes in milk, to a certain consistence, so as to allow of their being spread on a piece of strong linen or muslin, and applied to the injured part. Marcard thinks that the term fomentation is most applicable to a partial bath, which consists in surrounding a limb or covering a part with the entrails of an animal.

Epithem differs little from fomentation, although in its large meaning, if we attend to its derivation, it would include every topical application, whether moist or dry. By the ancients the name was chiefly restricted to topical applications to one of the viscera, as to the stomach, liver, spleen, uterus, or bladder. Galen gives directions for the use of epithems, which are to consist of different aromatic and bitter herbs, with selections of those which were believed to exert a more specific operation on a particular organ; as well to stimulate as to relax, or even to produce a compound and not very appreciable result from both relaxation and astringency. Under this head would come certain extemporaneous and domestic prescriptions of the present time, such as bags of heated sand, salt, or oats.

The best examples, however, of epithems are the modern substitutes for cataplasms, in the form of lint; lint and cotton; layers of sponge, worked up with hatters' felt,—moistened with warm water, and applied to the affected part.

Over these are placed folds of oiled silk, or of gum elastic tissue, to prevent evaporation, and the loss of caloric into the surrounding air. I shall have occasion to refer again to this practice, which is chiefly adopted by surgeons, when I come to speak of the watery regimen.

Limits of the Cold, Warm, and Hot Baths.—I recur now to what I have termed, at the beginning of this chapter, the most simple and natural division of baths, or that into cold, warm, and hot. As the sensations of heat and cold are, in a measure, relative, at least within certain limits, it is the more desirable that we should have, beyond these, a point of departure, a standard, as it were, by which every individual can judge of the first effects of bathing. When we speak of our sensations in passing from one medium to another of a different temperature, we ought to be aware of the actual differences in the heat of the different parts of our body, and the consequent shades of feeling of either heat or cold in them, until there is a perfect equilibrium established. It is only then that we can judge with any degree of accuracy of the full and uniform effect of the medium, whether aerial or aqueous, in which we may happen to be at the time. Thus, for instance, water of any given temperature applied to the feet or hands, which are of an animal heat of about 90° F., conveys a different sensation to what it would do when applied over the abdomen and about the groins, where the heat is 96° , or to the arm-pit, where it is 98° . We experience also different feelings according as we expose to air or water a part of the skin immediately over a particular organ, as of that over the stomach, or the heart, or the kidneys, each of which is impressible in different degrees, independently of the precise temperature of the outer surface or skin. We may immerse our hands in water which we should, while doing so, call milk warm; but which, after we had plunged the entire body in, we should declare to be cool, if not cold: so, for the same reason, we hardly know how to define our sensations on entering a bath of 92° or 93° : it at first feels to our extremities warm and pleasant, but hardly produces this effect on the central parts of the body; and we are, finally, constrained to acknowledge, after a short stay in it, that we sometimes feel a slight creeping, an approach to coolness; at least this is my own experience. Others may

select a lower temperature to illustrate the same idea. During this time, an equilibrium is being established between the water and the body immersed; the extremities lose little or no caloric, but the trunk, being warmer, parts with this fluid: hence the difference in our sensations experienced during the immersion. It would follow, as a necessary inference from this, that when a pediluvium or foot bath is directed to be used, its temperature may, and on occasions ought to be more elevated than would be proper in the case of a general bath.

But although there are temperatures of the bath, which some will call cold and others tepid—while to some, again, the tepid will be warm—there is a boundary at which all difference of opinion depending on feeling ceases; it may be called that of invariableness of temperature, and corresponds with the animal heat. This last is, with slight differences, every where the same; and a watery fluid of this temperature will impress every person immersed in it in very nearly a similar manner. A bath of 95° to 97° of Fahrenheit, will be called warm, both by the Laplander and the intertropical African. It will be grateful to their feelings and soothe them nearly alike. It is precisely that degree of external stimulation or, less theoretically speaking, that amount of impression, which is most congenial with the wants of the nervous system. It is alike removed from enfeebling depression and perturbing excitement, and it places the animal economy in a state of quietude most favourable to a correct balance of all its functions. In fixing the above as a positive standard to which the experience of all mankind will conform, we are not, however, excluded from allowing a somewhat wider range to the warm bath. We are the more justified in this, not only from individual differences of animal temperature, it being lower in some than in others, but, also, from the average heat of the skin, and especially of the extremities being some degrees lower than the blood and internal parts of the body. Hence, a bath of 92° or 93° F., as of a temperature equal that of the extremities and most of the external surface, will at first feel warm, and to some will continue to convey the sensation. But, as already mentioned, we believe that, after a short immersion in it, there will be, with many persons, a slight feeling of uneasiness,

or at least want of the complete and diffused sensation of warmth. For, while a very small part of the surface shall crave more warmth, there will not be a feeling of entire comfort; whereas the application of a fluid sufficiently warm for this circumscribed part will not be ungrateful to other regions of the skin of a lower temperature, provided always, that the bath be not above the point of animal heat.

These remarks apply to the common healthy condition of the animal economy, where the evolution or supply in the system and discharge or loss from the skin take place with regularity. In other conditions, as where the skin of an individual feels to himself habitually hot, where it has been thrown into a state of excitation by active exercise, short of sweating and fatigue, or by stimulating drinks and medicines, then the evolution of caloric being excessive, a bath of even a lower temperature than that mentioned above will be called warm, because it will not exhaust or convey off the caloric so fast as it is formed. These persons, immersed in water of 90° , or even 88° F., may call it warm, at least they will declare that it conveys no sensation of chillness or coolness. But, if we have regard to the declaration of a large majority of those who have recourse to the warm bath for hygienic purposes, and who retain their healthy sensations, we are safe in taking 95° F., as indicating the temperature of this kind of bath—and if we take the space of six degrees, three above, and three below this standard, we shall have a sufficient latitude, viz. from 92° to 98° for the *warm* bath, and every reasonable adaptation, within these limits, to individual peculiarities, whether of animal temperature or sensibility. If an extension of the scale be thought necessary, experience and authority agree in making it downwards, that is to say, as low by the thermometer as 90° ; but in very few cases, indeed, could an extension upwards, or above 98° , be admitted, consistently with the general indications for using the warm bath, or for obtaining the effects which follow its use.

Immersion in water, of a temperature ranging a few degrees below 92° or 90° F., if we admit this latter to be the lowest limit of the warm bath, gives rise to no very decided sensation. It constitutes a *tepid* bath, which some

call pleasantly warm, others cool, or which, agreeable on first immersion, will, after a few minutes stay in it, cause feelings of occasional creeping and discomfort. Its use is not to be denied, in particular cases, as a remedial agent, but we can seldom speak with any certainty of its hygienic operation, or effects on healthy persons, other than as far as it is instrumental to the general purposes of ablution, without imparting the shock to the human body which it receives from the cold bath. The want of definite ideas, attached to the term tepid, is unfortunately too common even among medical men,* and its vagueness in the minds of other persons of the community is evident enough, if we ask from a few individuals for lukewarm or tepid water. Each, according to his absolute, or even temporary sensibility, has a different notion of this kind of temperature. We may take, as the probable representative of the tepid bath, water of a temperature between 84° and 90,° or 92° F. ; but we cannot, as in the case of the warm bath, take a specified degree, respecting which there shall be a general, if not universal, accordance of opinion ; that is, of opinion directly deduced from sensation.

Equal difficulty is met with in an attempt to separate, in a marked manner, a cool from a cold bath. In both there is more or less of a shock felt, at the moment of immersion : and if we are to recognise a difference, it will mainly consist in the circumstance of the bather being soon accustomed to the cool bath, owing to his moderate loss of caloric, and his even ceasing, after a minute or two, from complaining of any unpleasant feeling of chillness ; whereas, in a truly cold bath, the body is in a continual struggle to resist the strong exhausting agency of the medium in which it is immersed ; and the feeling of cold, though in a

* "I apply," says Currie, "the term *tepid* to water heated to that degree which is warm, but not hot to the sensations, and which in the way of affusion, is from 87 degrees to 97 degrees of the scale of Fahrenheit." This estimable writer, in an apparent desire to vary his language, has singularly obscured our ideas on the very point respecting which he proffers explanation. In other parts of his work, he makes use of tepid and warm as synonymous terms—as when he tells of his prescribing, "the tepid bath (from 92 degrees to 96 degrees)," in scarlatina.

vigorous person it may cease to be painful, is, nevertheless continued, and in a measure uniform in its direct effects and phenomena. A good illustration of the effects of *cool* bathing is presented to us in the instance of the Buxton water in England. This is of a temperature of 82° F., and although at the moment of immersion there is felt a shock of cold, this is soon succeeded by a rather pleasant and soothing sensation, amounting at times to a glow over the whole body.* Such a bath might, however, be considered as near the upper limits of cool, although I have myself experienced a decided sensation of cold and shivering, or real shock, on going into a bath of 84° F., the temperature of the air being also 84°. A favourable specimen of the cool bath, for habits not much enfeebled, and tolerably well-balanced functions, is presented in the Sweet Springs, in Monroe County, and at Bath, Morgan, formerly Berkeley, County, Virginia, &c. The temperature of the water is about 74° F. The shock to the bather is very sensible, and in some too enduring to be pleasant, whilst others, even in advanced life, after a short delay in it, experience rather agreeable sensations. I have myself found it pleasant after two or three minutes' immersion, and

* The discrepancy of language, to express the same state of fluid, or kind of bath, is vexatiously exhibited, when we contrast Currie and Saunders, both authors of merit. "By the term *cool*," says the former, "I indicate the temperature from 87 degrees to 75 degrees." Now, 87 degrees represents tepid as nearly as may be,—a tepid bath, which we have seen in a former note, this author believes to range 10 degrees higher. Saunders speaks of Buxton as celebrated for its warm spring; and again he tells us, that "its temperature in the gentleman's bath is invariably 82 degrees, which, therefore, entitles us to consider Buxton water as a *thermal* spring, though but low in the scale of these natural waters." Now, both of these terms, which I have italicised, are wrongly applied, and must increase the difficulty of correct classification. Saunders's warm and thermal come within the range of Currie's cool bath, and the limit assigned by this latter to cool, will include by several degrees what is called warm by the former.

Still more erroneous is the division by Maret, who makes the range of the cold bath to extend from 32° to 60° F.; of the cool from 60° to 93°; of the tepid from 93° to 109°; and of the warm from 109° to 122°. And yet to this writer was awarded the prize of the Academy of Bordeaux for his Treatise.

especially after swimming in the bath at the Sweet Springs.

A Common Standard.—In a bath under 70° F., there will be a pretty general sameness of sensation experienced by those using it. The shock will be evident, and there can be no hesitation in our designating it as cold. The spring water of every country furnishes a bath of this kind to the inhabitants, although there is a range of thirty degrees between the two extremes, as we find it in the northern climate of Europe, and in the West Indies. In the former it is 40° F., and in the latter as high as 70° F. In middle Pennsylvania, the cold bath of our springs is about 52° F. Now, all persons, no matter in what country or climate they may have lived, or by what peculiarity of temperament and constitution distinguished, whether they be in a state of health or disease, will immediately and with one accord, acknowledge that they experience nearly the same sensation on immersion in such a bath. There will be no difference of opinion among them, as to its being cold.

It would seem, therefore, that among the kinds or varieties of watery bathing of which we have just spoken, the only ones productive of distinct and universally recognized sensations, are the cold and the warm. Of these we can speak to one another, with the conviction that we shall be readily understood, when directing them to be used.

Hot Bath.—But, if the first sensations, in a bath above the degree of pleasurable, and what, in reference to animal heat, we may call natural warmth, be not so clear as we could wish; and if some are found speaking of such a bath as quite warm, or very warm, there are still certain obvious effects, and which serve as symptoms, that ought to guide the most unwary and inexperienced. These are, acceleration of pulse, augmented and preternatural heat of the skin, felt especially in the cheeks and temples, and some fulness of the head, and slight confusion of thought. As these effects are unpleasant, and in delicate habits and invalids to be especially deprecated, it is necessary to draw on general experience, in order to prevent the risk of individual experiment, and to give, in advance, such cautions as shall prevent their occurrence. On data, furnished by these means, we have discovered and affirm it as a truth,

applicable to the large majority of the human species, that immersion in a bath above 98° F., produces the phenomena already described. In other words, it displays the stimulating effects of heat on the animal economy, and hence it is to be used with that reserve which so powerful a stimulus as high heat indispensably requires. The line of agreeable warmth is past, and we are, when immersed in water above 98° , in a *hot* bath. If any distinction between different varieties of baths be of practical importance, and conducive to comfort and health, and to the cure of disease, it is that which ought to be made, and to be generally understood, between the warm and the hot bath. Much of the disrepute into which warm bathing has fallen, and most of the erroneous conceptions respecting its hygienic and medicinal powers, have originated from an oversight of this distinction, and from confounding two agencies and modes of impression, the warm and the hot, the effects of which differ from each other in a most marked manner.

Vapour baths we must suppose to affect the animal economy in virtue, mainly, of their heat, when they are of the dry kind, and of their heat and moisture when they are the product of hot or boiling water. They are also susceptible of another division, viz., into *simple* and *medicated*. The first, when they consist of merely hot, dry air, or watery vapour; the second, when holding in solution or suspension, various medicinal substances. The effects of vapour, whether of the dry or moist kind, applied to the human frame, are also greatly modified by the circumstances of its application; that is, whether the whole body be immersed in it, so that it shall be inhaled, and applied to the lining membranes of the lungs, or only to the skin, the head being free, and a direct communication established with the common atmospherical air. Of these differences I shall speak hereafter.

CHAPTER XIV.

**HYGIENE OF BATHING—GUIDES FOR THE USE OF THE BATH—
IDENTITY OF EFFECTS—EXERCISE FROM THE COLD AND HOT
BATHS—THE SOOTHING INFLUENCE OF THE WARM BATH—
TRANSITION BATHS—GENERAL SAFETY OF TRANSITION
BATHS—THE AUTHOR'S PERSONAL EXPERIENCE—EXERCISE
OF SWIMMING—CONDITIONS FOR BATHING IN HEALTH—
THE COLD BATH—ILLUSTRATIONS—STATE OF THE DIGES-
TION AND CIRCULATION—DURATION OF THE BATH—REPE-
TITION OF THE BATH—SUBSTITUTES FOR IMMERSION—
METHODICAL FRICTION—ITS IMPORTANCE—SOAPS—AN-
CIENT METHODS OF DETERSION AND WASHING.**

THE guides to regulate us in the use of baths generally are, the temperature and sensibility of the skin, the ranges of sympathies between it and other parts, and the vigour or weakness of the individual constitution. The sedation by a cold, excitation by a hot, equable action by a warm, and increased nutritive activity, in absorption and exhalation, by a vapour bath, which are undergone by the skin, are all, severally, participated in by the internal membranes—mucous, serous, synovial, and fibrous, and by the glandular and other viscera, with the modifications growing out of their peculiar tissue. As far as the nervous expansions blended with capillaries, red and white, and the absorbents, secretors, and exhalents are concerned, all these parts are subjected, in bathing, to analogous sympathies: the difference is merely in mode or degree. The measure in these cases can never be furnished by an arbitrary estimation of the amount of fluids alleged to be driven from the surface on one occasion, or drawn to it on another; as if the skin on one side and the internal organs on another represented two sides of a hydraulic machine, the fluid in which was driven backwards and forwards by countervailing forces. Equally erroneous would be the supposition that baths operate on the system as they would on a piece of dead fibre or leather—by constricting and relaxing, approximating

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parts and separating them. All these are notions derived from physics and the laws of dead and inorganic matter; and ought not to find countenance with any intelligent physiologist. They have served no other purpose than to favour the rankest empiricism, and to retard our knowledge of agents of great power, and, under proper management, of unquestionable utility.

Bathing in all its divisions, as respects temperature, where the entire surface is subjected to the action of the water or to watery vapour, is attended, to a certain extent, by identity of effects. It acts as a detergent—cleansing the skin from adherent impurities; and thus enables this organ to perform with more effect its various functions. It calls into additional exercise the heart and bloodvessels—particularly the capillaries, both of the skin and of all the internal tissues and organs. This exercise is most obvious in the two extremes of the scale of baths, viz., the cold and the hot. In the first, or cold bath, the increased action of the heart and capillaries is secondary to a state of depression, and is dependent very much on the temperature of the atmosphere or air of the room, and the degree of muscular or bodily exercise taken subsequently to the bath. In the second, or hot bath, the excitement amounting to increased action of the heart and capillaries is direct and immediate. Similar changes, in both cases, are undergone by the nervous system, on which, however, first and more immediately occurs, in cold bathing the strong impression called shock; and through which system the reaction is, also, brought about.

Intermediate between these two extremes, the cold and the hot, is the warm bath—which, except in cases of torpid states of the system, with languid circulation, when it moderately increases the heart's action by bringing it up to the natural standard—can hardly be said to excite at all. Its impression on the nervous system is of an analogous nature. On both the circulatory and nervous systems it exerts a soothing influence, as when it allays undue or morbid excitement. Few agents of hygiene are in more direct harmonious relation with the wants of the animal economy than is the warm bath. The movements to which it may subject the fluids in the different orders of vessels of the body, and the contractile tissues generally,

are of the most moderate kind ; and consist almost entirely in those incident to a restoration of the equilibrium between the several organs. One manifestation of this effect is the feeling of ease and well being, and an inclination to repose, succeeded by one of alacrity and readiness for exercise and labour, either bodily or mental, experienced after taking the warm bath. Persons of a sanguine temperament and vigorous frame, in whom animal heat is largely evolved, will derive similarly pleasant effects from the tepid bath.

Transition Baths and Friction.—In order to procure a temporary acceleration of the heart's action and of respiration—in short, to obtain effects from bathing analogous to those of muscular exercise, and in this way to render the process something more than mere ablutio—recourse must be had either to transition baths, as practiced by the Greeks and Romans in ancient times, and by the Russians and the people of the East at the present day, or to the auxiliary manœuvres of strigillation, switching the skin, use of the flesh brush, shampooing, &c. ; or, finally, to swimming. By transition or succession baths I mean the quick passage from a cold to a warm or even hot medium, whether this be air or water, as from the frigidarium to the caldarium, or the reverse, as in the Roman thermæ, and from high heat to cold, as in the Russian and Indian baths. The Greeks must have very early resorted to this course of bathing, for Homer, in the Iliad, describes Ulysses and Diomed on their return from the Trojan camp, with the captured horses of Rhesus, to have first bathed in the sea, and afterwards to have refreshed themselves with a warm bath. The Lacedæmonians used the cold bath, by immersion in the Eurotas, and afterwards subjected themselves to a dry sudatory of air heated by a stove. From them the chamber used by the Romans for a similar purpose was called *LACONICUM*. By means like this, the whole animal economy undergoes a certain degree of commotion, extending to even the minutest organ and portion of organ of the body. The circulation in the most important membranes, those lining the stomach and the lungs, or the cavity of a joint, is subjected to a kind of exercise ; and not only is the secretion of sweat increased and arrested in alternate periods, but we have good reason

to believe that the secretions from the internal membranes are also modified in a similar manner. These effects are farther increased by the auxiliary manœuvres just mentioned; so that when this more protracted and complicated practice of bathing now referred to, and in former chapters particularly described, is gone through, more varied and more satisfactory results are obtained than in our common fashion of passive bathing by simple immersion and a hurried and too often imperfect drying of the skin.

Of the safety, generally, with which persons in common health can use transition baths, the experience of the multitudes, both in ancient and modern times, who habitually resorted to them furnishes abundant proof. Facts to this purport have been given in a former chapter. The following experiment, among many others of a similar character, made by me, may be, however, not without some interest to the reader. While it will serve to substantiate the main position, of the impunity with which one may pass from a highly heated to a cool medium, it also exhibits the decidedly stimulating operation of the hot bath.

July 18th, 1830.—My pulse regular and giving seventy-eight beats in a minute, at half past twelve I went into a bath of 84° F. The immersion was productive of a decided shock, being unpleasant and attended with shivering. After two minutes the pulse fell to sixty beats in a minute; after five minutes it was sixty-six. Left the bath, and remained out three minutes, in which time the pulse rose. On a second immersion the pulse, after two minutes, beat sixty, and so continued. Raised the temperature of the bath to 94°, the pulse gave sixty-two beats in a minute: then to 100°, when the pulse rose to seventy-eight; and to 106, when it was, in two minutes, at eighty-four, and in five minutes at a hundred. I now left the bath, with the skin excessively hot and quite red, face flushed, arteries of the head and neck throbbing, and giddiness; large drops began to form on the face, and I could feel a beginning moisture on the body, distinct from the trickling drops of water along the skin. Reduced the temperature of the bath to 84°; and on immersion in it, the pulse in two minutes fell to eighty beats; and in five minutes it was seventy-three: the heat and flush had disappeared, and

my feelings were nearly the same as at first. After a quarter of an hour, having come out of the bath and dressed, the pulse was eighty-seven: at three P. M., just before sitting down to dinner, it was seventy-seven.

In the month of August, 1847, during a visit to Newport, Rhode Island, I took repeatedly the Russian, or, as it was called by the proprietor and superintendent, Mr. Peckham, the Oriental bath. After being immersed for a short time (eight to ten minutes) in a vapour bath of from 100 to 105° F., I received a shower bath at a temperature of 65 to 70° F., for a very brief period—not exceeding a minute. In this way the excitement, manifested by heat and redness of the skin, flushed face, frequent pulse, fulness of the head, and thirst, caused by the vapour bath, was removed by the cold shower; and the whole system was brought to nearly its customary state. Unless the transition from the hot to the cool bath had been made I should have been in a highly excited and, in fact, feverish state for the ensuing twenty-four hours. If I had restricted myself to the shower bath alone, or used a common plunging bath of the same temperature, I should have suffered from aching of the head, back, and limbs, and a feeling of general discomfort during the whole of the day after the bath; for such are the effects which, with me, follow the use of the cold or the cool bath. It was a common practice in the Roman baths, if the cold immersion, or swimming in the piscina was not had recourse to after the warm or the vapour bath, to wet the head with cold water—as recorded in a former chapter.

Swimming, of which notice has been already taken, is, for most persons, an active exercise—by which respiration and muscular movements are greatly accelerated, and the evolution of caloric, as a consequence, induced. It is, of course, essentially opposed to the sedative operation of the cold medium in which the body is immersed at the time. Invalids able to swim, even during a few minutes' stay in the water, need have less hesitation in venturing to bathe—although the excitement of their system generally and the heat of skin be little above the natural standard.

It is sufficient, then, for us to be aware, without entering into farther details at this time, that the person who moves

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about freely in the water, and, still more, who swims during the period of bathing, resists better, at the moment, the sedative operation of the cold, and will be more likely to experience a salutary reaction and glow, after coming out from the water, than if he had remained still during the same time.

The conditions for bathing, in health, are either imperative or conditional. The first apply to all kinds of baths ; the second depend upon the particular kind. Of the former, we require that the process of digestion, at least as far as the stomach is active, shall have been completed. The time, therefore, for taking a bath, whether cold or warm, will be when the stomach is empty, as before breakfast or before dinner, or late in the evening, provided, in the last case, that a light dinner has been eaten, not far from the middle of the day. Much mischief has ensued from a neglect of this rule, both in the use of the domestic bath, and in sea-bathing. A favourite time with many persons during the summer season, for their enjoying the cool bath in the house, is in the afternoon, before stomachic digestion is half completed. At the sea shore, although a similar fault is of less frequent occurrence, yet the morning bath is generally taken too soon after breakfast ; and the bathers are seen returning from the shore at an hour, when, at the earliest, they ought to be going there. When treating of the different kinds of bath, I shall mention some modifications of the rule, as now laid down, in the case of invalids, and of individuals constitutionally feeble.

A short time ought to elapse after the bath, before sitting down to a meal. Time should be given for the digestive mucous membrane, as well as the skin, to recover from the excitement, whether it be indirect, as after the reaction from the cold bath, or direct, as after a hot or vapour bath.

If cold bathing is to be resorted to, a prime condition for its use is a certain degree of sanguineous excitement, whether this be habitual as in the young and the robust, or temporary as after active exercise, exposure to a warm medium, or feverish heat of the skin. Most persons, on first rising in the morning, have, to a certain extent, accumulated animal heat in their bodies ; and they can bear better at that time its abstraction by the cold bath, and will more probably react under its first reducing or sedative opera-

tion. Failing to avail themselves of this period, or not feeling themselves strong enough for the effort, the next most favourable juncture will be about noon, before the healthy excitement from the morning repast has entirely subsided, and after that from muscular exercise, short of fatigue, has been procured. As the day advances, even though dinner should not offer an impediment, there will be more or less wear and fatigue of the system; and as evening approaches this will be still more manifest, so as to prevent safe recourse to the cold bath, owing to the diminished probability of salutary reaction. Still more evidently is this kind of bath interdicted, if protracted exercise or labour have left the body exhausted, or suffering from feelings of great weariness and fatigue. It was under these circumstances, after a long and fatiguing march, that Alexander of Macedon nearly perished from plunging into the river Cydnus; as did, nearly fifteen centuries later, the German emperor, the aged Frederick Barbarossa, at the head of his crusading army. In allusion to the latter event, Fuller quaintly and truly remarks: "and no wonder if the cold water quickly quenched those few sparks of heat left in him at seventy years of age."

A knowledge of the relative effects of the cold bath, according to the degree of previous exercise, and the general excitement, or the fatigue in consequence, is of great importance in a hygienic point of view. The following narrative, which I derive from Currie (*Reports, &c.*), comes in most appropriately at this place.

"On the first of September, 1778, two students of medicine at Edinburgh set out on foot on a journey, a considerable part of which lay along one of the rivers of Scotland. They started by sunrise and proceeded with alacrity in the cool of the morning. At the end of eight miles they breakfasted, rested for an hour, and then resumed their journey. The day grew warm as it advanced, and after a march of eight miles more they arrived heated, but not fatigued, on the banks of the river above-mentioned, about eleven in the forenoon. Urged by the fervor of the day, and tempted by the beauty of the stream, they stripped instantly, and threw themselves into the river. The utmost refreshment followed, and when they retired to the neighbouring inn this was succeeded by a disposition to

sleep, which they indulged. In the afternoon they proceeded, and travelling sixteen miles further at a single stretch arrived at the inn where they were to sleep, a little after sunset.—The afternoon had been warm, and they sweated profusely ; but the evening was temperate and rather cool. They had travelled for some miles slowly, and arrived at the end of their journey, stiffened and weary with their exercise.

“ The refreshment which they had experienced in the morning from bathing induced, however, one of them to repeat the experiment, and he went perfectly cool into the same river, expecting to relax his limbs in the water, and afterwards to enjoy profound sleep. The consequences were very different. The Tweed, which was so refreshing in the morning, now felt extremely cold ; and he left the water hastily. No genial glow succeeded, but a feverish chill remained for some time, with small frequent pulse, and flying pains over the body. Warm liquids and friction brought on at length considerable heat, and towards morning perspiration and sleep followed. Next day about noon they proceeded on foot, but the traveller who had bathed was extremely feeble ; and though they had to perform a journey of a single stage only, as some part of it was difficult and mountainous, he was obliged to take the assistance of a carriage which overtook them on the road. It was several days before he recovered his usual vigour. This relation will not, I hope, be deemed of the less authority because it is given by the person who suffered by his imprudence. It is unnecessary to point out the application of these incidents to the doctrines already laid down.”

A sudden reduction of strength, such as may occur after intemperance at table, an evening debauch, or excess of any kind, or even excessive exercise in walking or in field sports, will forbid recourse to the cold bath on the following morning, even though the individual thus offending may have been in the habit of using it regularly. Under the circumstances enumerated, the warm or at most the tepid bath is preferable. But on this head I shall have more to say, when treating formally of the effects of cold and sea bathing ; I shall then show, in harmony with preceding observations, that dancing and late hours are disturb-

ing and enfeebling causes, which will require a suspension of the morning visit to the beach.

When the circulation is languid and the skin cool, the cold bath ought to be withheld, until active exercise induces a certain degree of excitement and feeling of warmth. So, likewise, if there be chilliness or imperfect reaction after the bath, active exercise ought to be taken. In this respect the practices in the Roman thermæ are worthy of imitation. The usual custom was to take the bath after exercise and before the principal meal, the *cæna* corresponding with the hour of a modern fashionable dinner, or that selected by the wealthier classes in Europe at the present time. The antepandial hour was that chosen by the Athenians, also, for the bath.

In order to obtain the most healthy and pleasurable effects from bathing, the digestive organs should not, at any time, be overtasked by excessive repletion or highly seasoned food. A simple repast will be craved and enjoyed within a short time after the bath, particularly after the cold one, if it has been used under appropriate conditions.

Of the hot bath, hygienically considered, I say nothing just now, as it cannot be employed with advantage, or even safety in common health. It is, in fact, a therapeutic agent, applicable only to the cure or relief of diseased states of the system. This remark holds good, also, with respect to the vapour bath, except as a part of transition bathing, in its immediately preceding the use of the cold bath, either by immersion or shower. The entire process constitutes then a kind of exercise of the circulatory and nervous systems, useful to the sedentary, the aged, and the otherwise feeble—provided that there be no tendency to apoplexy, or existing organic disease of the heart.

The *duration* of the bath will vary according to its temperature, as well as the constitution and habit of the individual. The colder the bath the shorter will be the period of immersion in or exposure to it. In many cases, particularly in delicate persons, whom we wish to get accustomed gradually to the cold bath, simple immersion, or a momentary shower, will serve for a beginning. On no occasion, except in certain violent diseases, will it be prudent to remain more than a minute or two in a very cold

bath, if at the same time the bather be prevented from the exercise of swimming.

The stay in the tepid bath may be from ten to fifteen minutes, if the bather does not suffer from chilliness; and in the warm bath from half an hour to an hour. I have repeatedly enjoyed a nap of some duration in the warm bath, after having been previously much fatigued, or been deprived of sleep during the night preceding. In cases of disease, as the professional reader will learn hereafter, the period of its use may be of several hours. At some of the warm springs on the continent of Europe, the bathers spend many hours in the water, as at Baden and Argan in Germany, Plombieres in France, Pfeffers and Leuck in Switzerland, &c.: some for their pleasure, others as part of the treatment of their disease. Speaking of the waters of Pfeffers, Dr. James Johnson,* tells us, that the frequenters to them, German, Swiss, and Italian, lie daily, from two to six, eight, ten, and sometimes sixteen hours. At Leuck the bathers, robed in a loose flannel garment from the neck to the feet, are seated together in the water, and amuse themselves for many hours at a time in conversation and reading, to which the ladies add sewing and embroidering.

The repetition of the bath will be contingent on various circumstances, depending on its temperature and the constitution and state of health of the individual. A cold bath is taken daily by persons in full health, with, often, manifest comfort and advantage; provided that the period of immersion or of affusion, according to which of the two is preferred, be very brief. More than once in the day it does not promise the same benefits, and for the most part is hazardous, especially if the second bath be taken in the evening, either after abundant repletion or much and fatiguing exercise or labour.

Twice a-week will answer, in general, if a tepid or warm bath be used, for the purposes of cleanliness. When a methodical course of warm bathing is undertaken, the immersion should be daily, unless it be followed by unpleasant symptoms; such as increased heat, lassitude, &c. My remarks now are intended to apply to those in common health.

* *Pilgrimages to the Spas, &c.*

They are equally applicable if the vapour bath should be used. This, which will be found refreshing and salutary when resorted to twice or even once a-week, will often be too exciting when used every day.

Simple ablution and aspersion of the entire body, as by sponging the surface with cold or tepid water, combined with partial irrigation, may, and as a general rule, in default of immersion baths, ought to be practiced every morning on rising from bed, as a part of the duties of the toilet. Deferred to a later period in the day, the process will not be so serviceable, nor, under many circumstances, safe. If the skin is perspiring, the result of fatiguing exercise, and the body is to remain afterwards at rest, or if the day is far advanced, the water should be warm, for the intended ablution.

The hygiene of bathing would be incomplete without the aid of those processes so universally carried out in ancient times, and among the people of the East in the present day, but so generally neglected in the greater part of modern Europe and on this continent. I mean methodical friction or chafing of the entire cutaneous surface with the aid of strigils, brushes, or coarse toweling. The deserved importance attached to this practice in ancient Rome may be inferred from the fact of Celsus devoting a chapter (lib. ii., cap. xiv.) to the subject of friction, and Galen a book (in *De Sanitate Tuendâ*) in praise of the strigils. Both these writers follow Asclepiades, who himself repeated the recommendations of Hippocrates in favour of friction. Plutarch relates that Cicero recovered his health, which in early life was for a long time very precarious, by travelling, and great perseverance in rubbing and chafing his body. There were servants or slaves who attended their masters in the Roman baths, and who scrubbed and anointed them, as the reader has already learned in the anecdote related of the emperor Hadrian and his veteran soldier.*

* With the same functions, but of a higher order, were the Greek *aliptæ*, who anointed the bodies of the *athletæ* preparatory to their entering the *palestræ*. The oil on these occasions was not only spread over the surface but was also well rubbed into the skin. The oil was mixed with African sand, several jars full of which were found in the baths of Titus, and

In one respect we have an advantage, in modern times, over the Greeks, and also to a certain extent over the Romans, viz., in the abundance and variety of soap, an article which was not known to the former people, and not to the latter during the republic. The first soaps came from Gaul and Germany; and the first express mention of them occurs in Pliny and Galen. For cleansing the skin and for washing clothes, the ancients made use of a lye prepared from wood ashes or lime, and also of *nitrum*, or mineral alkali, and fuller's earth. Of the different kinds of this last, that of Chios is still used in the baths of the Levant. Perfumes are often mixed with it, and it is formed into small balls, which when used are suffered to dissolve in the water.

Inunction.—Although we can hardly expect to see a renewal of the practice of inunction, either after the bath or between its stages, to the same extent as in ancient times, yet, certainly, in many cases it might advantageously be revived, both as a part of medical treatment and as a means of protection against great and sudden exposures to extremes of temperature.

CHAPTER XV.

THE WATERY REGIMEN—IMPORTANCE OF WATER TO ANIMAL AND VEGETABLE LIFE—ITS PRESENCE IN ALIMENTS—NECESSARY TO DIGESTION AND NUTRITION—ALSO TO DEPURIFICATION—MEDICAL TESTIMONY, ANCIENT AND MODERN—FREE USE OF WATER, A TEST OF ADVANCED CIVILIZATION.

HAVING described the different modes of bathing in ancient and modern times, and shown the great value which so many different people in nearly all periods of the world

one of these is now in the British Museum. The *athleta* was again anointed after the contest, under a belief of restoring the tone of the strained muscles. He then bathed, and had the dust, sweat, and oil scraped off his body by means of an instrument similar to the strigil of the Romans. (See Smith's *Dictionary of Greek and Roman Antiquities*, art. *Aliptæ*.)

have attached to it, I shall now make some observations on the watery regimen in general. In doing so, I shall collect and arrange the facts which are recorded in my former works, especially in that on *Baths and Mineral Waters*, and more recently in my *Regimen and Longevity*, and shall introduce additional illustrations, the result of subsequent reflection and experience. By the watery regimen I understand the regulated use of water, both internally and externally, for the promotion of health and the treatment of disease. It is both hygienic and therapeutical; and under these two aspects cannot fail to secure the notice both of the great world and of the more limited class of medical men.

Importance of Water to Animal and Vegetable Life.—Water, considered in its physiological relations, is still emphatically one of the elements, as described by the ancient philosophers. It makes up the chief bulk of all animal and vegetable bodies; and it gives the necessary fluidity to the blood of the former and the sap of the latter, without which neither could flow nor be distributed to the several tissues and organs, of which water is the largest constituent. Diffused through the atmosphere in the form of vapour, water renders the air fit, physically, for respiration. Air deprived of all humidity, would cause a rapid and exhausting evaporation both from the skin and lungs, and reduce the being to an extreme of exhaustion if not to death itself. As a proof of the large proportion of water entering into the composition of the human body, I may mention a fact stated by Blumenbach, viz., that a perfectly dry mummy of an adult Guanche (one of the original inhabitants of Teneriffe), with all the muscles and viscera or internal organs entire, did not exceed seven pounds and a half in weight. Not only does the blood contain four-fifths of its weight in water, but even the parts of the body termed solids, that is, the muscular mass of flesh of which animals consist, contain in reality scarcely one-fourth of solid matter; the remainder being water. Bone itself, and cartilage in still greater proportion, contain water as a necessary constituent part.

In Alimentary Substances.—Water enters largely into the composition of all the vegetable and animal substances used for food. To take a familiar example, that

grand esculent root, the potato, holds from seventy to eighty per cent. of water between its solid farinaceous particles. Animal matter, as we have just seen in the case of muscular flesh, that part chiefly used for food, shows equal abundance of the aqueous principle.

Necessary to Digestion and Nutrition.—"Digestion cannot be carried on in any of its stages without a due, and that is a large, proportion of water. Without this liquid, the alimentary matter could not be reduced to chyme, nor the chyme furnish chyle, nor the chyle become blood. By it is this vitalizing fluid fitted to flow in its vessels, and be conveyed to all the organs and tissues, in order to deposit in them their appropriate materials for growth and renovation. Largely introduced into the body for its support and vitality, water is also largely given out in the various secretions. It is indispensably necessary for a balance of the functions to be preserved.

"Thirst can only be allayed by water, or drinks mainly composed of water, with the addition to it, in a small degree, of some other principle, acid, saccharine, mucilaginous, or sometimes bitter. Whenever man is left to the cravings of the instinct of preservation of his frame, as when wandering in the desert, or on a wrecked vessel, or tossing about with fever, he snatches at water as the only beverage to quench his thirst, cool his system, and renovate his decaying strength. Next to the nutritive fluid furnished by the maternal bosom, water is the one taken with avidity by the infant, as, if left to his primitive taste, it ever would be by adult man; and even he who, in the madness of his evening revel, drinks deep of the intoxicating bowl, and stoutly denies the fitness of water as a beverage, will, on the following morning, entreat for and clasp with eagerness the full pitcher of this liquid, which a few hours before he had so insolently derided. Both instinct and recovered reason now suggest the choice of the proper beverage; and, but for the curse of imitation and evil example, their joint influence could never be mistaken.

"When we say that water is the only fitting drink for man's daily and habitual use, we are sustained by the facts of the case. Water is the only liquid which is essential to the formation, development, and support of his

frame: it is equal to all the exigencies of thirst, for the relief of present inconvenience, and of dilution, by mixing with his blood and other fluids, to prevent farther suffering and disease. Water is found in all climates and habitable regions of the earth; and Providence has nowhere offered in fountain, stream or well, in river or in lake, any liquid as a substitute for water. To be the universal beverage, it ought to be, as it is, everywhere attainable, and adequate to all our natural wants,—of appetite, growth, bodily and mental exercise, and activity. Even when the health suffers, and the body and mind are ill at ease, where is the restorative liquid or agent of any kind which can revive and renovate like water,—whether taken alone, in its purity or with some slight saline and mineral impregnation? It is the beneficent menstruum and conductor of medicinal matters into the blood; and even when they are refused entrance, it readily finds its way, and not seldom accomplishes the cure for which they are lauded.”*

I may as well finish the paragraph as found in the work from which I have just been borrowing. It will scarcely be thought irrelevant to the praises of water, since it is in opposition to alcohol. It reads as follows: “How different the case with alcohol. If it is the menstruum of medicinal substances,—it soon abandons them, and can neither obtain for them entrance, nor find its own way into the blood; and if, in strange and anomalous cases, it is even introduced, its action is deleterious, and, if in quantity, is soon deadly. It does not form a constituent part of any tissue or of any fluid in the healthy body; it retards, in place of aiding, those series of changes which the aliment undergoes before it is converted into blood: it is perturbing always, and deleterious generally to the functions, whether they be merely of nutrition, or those by which man is enabled to speculate on his own situation, and to fulfil his higher destiny.”†

Water, besides its serving the purposes of dilution, and being the indispensable menstruum by which other substances are kept in solution, and the medium of their conveyance from one part of the body to another, has also nutri-

* Regimen and Longevity. By John Bell, M.D. Chap. XIII—Drinks.

† Bell, *op. cit.*, p. 319–20.

mental properties of its own. A large proportion of that which is drunk is speedily absorbed by the veins, and finds entrance, at once, into the circulation some time before the product of the digested food, or the chyle itself, largely consisting of water, is introduced by the way of the lacteals. We have well authenticated cases of persons who have lived for a length of time entirely abstinent from all customary aliment, and whose only drink was water. In the "Transactions of the Albany Institute," for 1830, Dr. McNaughton relates the case of a man of the name of Reuben Kelsey, who lived on water alone for fifty-three days. "For the first six weeks, he walked out every day, and sometimes spent a great part of the day in the woods. His walk was steady and firm, and his friends even remarked that his step had an unusual elasticity. He shaved himself until about a week before his death, and was able to sit up in bed to the last day." At the time of his death, Kelsey was twenty-seven years of age. His fasting from food was entirely voluntary, and under the influence of a delusion, manifested in his assigning as a reason, at the beginning of this course, that when it was the will of the Almighty that he should eat, he would be furnished with an appetite.

Dr. Prout, while holding these views of water in its physiological relations, is not less decided in his appreciation of the dietetic value of this fluid, since, among the four great elementary proximate or primary staminal principles, he ranks the aqueous. The other three are the *saccharine*, the *oily*, and the *albuminous*.

When summing up the conditions for selecting and using water as a drink, some additional facts will be adduced to show how this fluid contributes to nutrition.

Necessary to Depuration.—Not only is the agency of water required for transporting the solid, organized, and vital constituents from one place to another, and for arranging them in the place desired, in the animal organism, but it is also enlisted for their removal and expulsion from this latter, when they are no longer necessary, or when their retention would be deleterious. This fluid is alike important for the performance of the functions of assimilation or supply, and of dissimulation, and depuration. Water imparts, also, to the more solid constituents of the body that peculiar

flexibility and power of extension so characteristic of animal solids. The quantity of water they possess is continually changed by the operation of organic bodies. The lungs, the skin, the act of drinking, the kidneys, all affect it. In fine, water and its elements enter into all organic processes. Liebig (*Animal or Organic Chemistry*) shows how water contributes to the greater part of the transformations in the living body.

Medical Testimony, Ancient and Modern.—Some years ago, in order to correct misconception respecting medical opinion, which was referred to in a wrong sense, I presented an array of the testimony of the most celebrated physicians, in favour of the hygienic value of water as a beverage,* from Hippocrates to Dr. James Johnson. The list, although embracing a great many distinguished names, is capable of extension. The father of medicine shows his appreciation of water by the title of the most philosophical of his works, *On Air, Waters, and Situations*, in which this fluid comes after air itself, as constituting, by its use, one of the main conditions for health, and a chief cause of modification of the physical character of man. "And I wish," he says, "to give an account of the other kinds of waters, namely, of such as are wholesome, and such as are unwholesome, and what bad and what good effects may be derived from water; for water contributes much towards health." Galen gives water, both as a drink and for external use, a high rank among the means of preserving health. He particularly cautions against allowing any other drink than water to children before their seventh year; and, elsewhere, prohibits the

* *Journal of Health*, vol. ii., 1830–1. In availing myself of the privilege, sanctioned by common usage, of referring to my own articles in a *Journal*, the editorship of which was not publicly announced at the time, but the publication of which is terminated, I shall take this occasion to do justice to my friend, and associate at the time, Dr. Condie. Chance may have led to my writing most of the initial articles in the successive numbers of the *Journal*; but, whether regard be had to the proportion of the matter, or to its variety, or its intrinsic importance, Dr. Condie contributed his full share, which, under the circumstances, was just one-half of the entire work. With the exception of a few pages, the literary support of the *Journal*, from first to last, devolved on the two editors, Dr. Condie and myself.

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use of wine to young people before they had attained the age of eighteen years, as Plato had done before they were twenty-two. Pliny considered it a great absurdity for mankind to bestow so much trouble and expense in making, artificially, such a variety of liquors, when nature has prepared to their hands a drink of so superior a quality as pure water.*

The learned Boerhaave lays down the axiom, that food not too fat or gross, and water as a drink, give most firmness and strength to our bodies. Hoffmann, the contemporary of Boerhaave, and who was distinguished as a practitioner, a teacher, and a writer, utters several sentences in praise of the dietetic value of water. Among these we read the following positions: 1st, "That pure and light waters are agreeable to the different natures and constitutions of all men." 2d, "That no remedy can more effectually secure health and prevent disease than pure water." And, again, "The drinking of water is serviceable in every complexion." "Water proves agreeable to persons of all ages." He points out in another part of the work,† from which we are quoting, the fact of water drinkers being more healthy and long-lived, of their having whiter and sounder teeth, and being more brisk and alert than they who drink wine or malt liquors. If the language, "a universal remedy," be ever admissible, it is when applied, as by Hoffmann, to water. "We assert," he says, "that water is a remedy suited to all persons, at all times; that there is no better preserva-

* The following are the principal beverages of the Greeks and Romans: Wine diluted with water; Mulsum, or a composition of Honey and Wine, resembling the modern clary; Hydromel or humid water; Zythi, or various kinds of ales; the Spathiles, a wine prepared from palms, mentioned by Paulus Aegineta; the Sicera or cider prepared from apples; Perry, prepared from pears; Posca, or oxycrate, a mixture of vinegar and water; the Cyceon, a mixture of wine, honey, flour and water, according to Heyschius; the Dodra of the Romans very like the cyceon; Pisan, prepared from polenta; Barley-water, mentioned by Hippocrates (*de Morb. Acut.*), and well described by the Arabians; the Lora, a small table-wine prepared from the husks of grapes.—*The Seven Books of Paulus Aegineta*, vol. i., p. 67. Commentary by Francis Adams, Translator and Editor. Sydenham Society Edition.

† New Experiments and Observations upon Mineral Waters.

tive from distempers ; that it is assuredly serviceable both in acute and chronic diseases ; and, lastly, that its use answers to all indications, both of preservation and of cure." Haller, the physiologist, the natural historian, and the poet, a voluminous writer, and active in works of public utility, gave his testimony by drinking nothing but water. As Zimmerman justly remarks : water does not chill the ardor of genius. Of this assertion he adduces a cogent proof in the person of Demosthenes, whose sole drink was water. We might add the names of Milton and Locke to a list of distinguished drinkers of water, as a sole beverage.

Coming to English writers of experience and repute, we meet with Floyer, of whose work and his associate on the occasion, Baynard, I shall speak more fully very soon. Water, says Floyer, resists putrefaction and cools burning heat and thirst, and after dinner it helps digestion ; it exempts from various diseases to which free livers are prone, and renders men prudent and ingenious. That good water, Baynard tells us, has a *balsamic* and healing quality in it, I could give many instances. He adduces the case of Alexander Selkirk, the real Robinson Crusoe, with whom he conversed at Bath, who spent four years and four months alone, on the island of Juan Fernandez—eating nothing but goat's-flesh, and drinking nothing but water. On such a diet, and with exercise, Selkirk asserted that he was twice as strong as ever he was in his life. I have been assured by General Ashley, who was so long engaged in expeditions in the fur trade across the Rocky mountains, that his party has lived for many days on nothing but buffalo meat and water ; and that during the time they all enjoyed excellent health. Arbuthnot, the scholar and the wit, the cherished companion of Swift and Pope, and whose character has elicited so beautiful a compliment from Johnson, infers, from the plenteous stock of water which all bodies afford, that it *alone* is the proper drink for *every* animal. The classical Gregory, who was little prone to theorize, and who lived in what our vinous friends would call a liberal age, when alcoholic potations and computations were general, declares spring and still more river water to be the best and most wholesome drink, and the most grateful to those who are thirsty, whether they be sick or well ; and, also, an aid to digestion, and a tonic

to the stomach. He is not disposed to make exceptions in favour of those whose bodies generally are weak, or stomach is enfeebled, on the score of the coldness of the water; for he says explicitly, that water, either made tepid or boiled and allowed to cool, and thus made soft, as it were, is still suitable to these persons.*

Cheyne (George), remarkable for his practical sense and shrewdness, concludes a praise of water by this assertion: "Water alone is sufficient and effectual for all the purposes of human wants and drink." "Without all peradventure, water was the primitive original beverage, and it is the only simple fluid fitted for diluting, moistening, and cooling: the ends of drink appointed by nature."

Taking Macquart as, to a certain extent, the exponent of the views of his countrymen at the time, we see him holding forth in the praises of water, with an earnestness the more influential because he writes† as an encyclopediast, without doctrinal or other special bias. "It is not the less true," he tells us, after having mentioned the mixture of water with wine or other vegetable juices, "that man has received from the hand of nature sweet and pure water, to be used such as it is without admixture with foreign matters. We meet in fact with few countries in which the vine can grow, and yield its deceitful juice to men who have almost always misused it. Besides, there are many nations by whom it is very little used, without the people on this account exhibiting less strength, courage, and energy." He next points out the advantages of water as the exclusive drink in the physical, and he might, with still more truth, have added the moral education of children. It is, he says, a perfidious neglect to allow these little beings the use of wine, coffee, or spirituous liquors in place of water; and he shows the many benefits growing out of the latter as the constant drink. He makes, it is true, some concessions to the wine drinker, in admitting the propriety of adding a modicum of wine to water under certain circumstances; but which, it may now be said with confidence, subsequent experience has taught us, do not furnish necessary conditions for the practice. After

* *Conspectus Medicinæ Theoreticæ.*

† Manuel Sur Les Propriétés de l'Eau. Paris, 1783.

this, in another chapter, he describes the exemption from many tormenting, and some of them fatal, diseases enjoyed by the water drinker. He recommends, in a more especial manner, men addicted to science and letters to make water their favourite drink ; assuring them that their ideas will be more precise, their judgment sounder, and their senses more delicate. Londe and Levy, recent French writers on Hygiene, are clear and emphatic in their praise of water as a drink. Water, says Londe, is of all drinks, that which, by its constant use, is best fitted to aid in prolonging the life of man. Water, remarks Levy, is the drink above all others ; and then he quotes Haller at some length in praise of this fluid : adding his own favourable estimate of its utility in preserving health.

Experience has now corrected the once prevalent vulgar error, that drinks more stimulating than water, and also of an intoxicating nature, such as ardent spirits, are necessary to enable men to bear great climatic extremes and vicissitudes. Dr. Miller, of New York, had, long before the Temperance reformation, pointed out the instructive fact, that " in all the frequent attempts to sustain the intense cold of winter, in the arctic regions, particularly in Hudson's Bay, Greenland, and Spitzbergen, those crews of companies which had been well supplied with provisions and liquors, and enabled thereby to indulge in indolence and free drinking, have generally perished ; while, at the same time, the greatest number of survivors have been uniformly found among those who were accidentally thrown upon the inhospitable shores, destitute of food and spirituous liquors, compelled to maintain an incessant struggle against the rigor of the climate in procuring food, and obliged to use water alone for drink. This fact is too decisive to need any comment."

The personal experience and the observations of Dr. R. Jackson, Physician-General, and of Mr. Marshall, Medical Inspector-General, in the British army, corroborate, to the full extent, the belief of those who now assert, that the inconveniences and dangers from living in tropical climates are infinitely less for water drinkers than for those who use intoxicating beverages of any description. Acclimation is, in the opinion of Drs. Mosely and James Johnson, undergone the most safely by those who drink nothing but water.

Water, admitted to be the primitive drink in the earlier and simpler forms of society, and used externally as a bath, under the same circumstances, is, after a time, neglected in an advancing but very imperfect civilization, especially when people are congregated in villages and towns. Most of the countries of Europe present at the present day melancholy proofs of this state of things,—in the deficient supply of water, not only for the washing of clothes, but the persons of the inhabitants, who cannot even always procure enough for culinary purposes, and as a drink. The neglect of procuring an abundant supply of water is, therefore, an evident proof of defective civilization and refinement; for, in proportion as real advances are made in these respects, will pains be taken to remedy the evil. In the periods of power and splendour of all the great cities in ancient times, beginning with Nineveh itself,* we are assured, either from the language of historians or from the remains of their edifices, that no labour was deemed too great or expensive for introducing an abundance of pure water into the streets and houses for drink, for bathing, and for all needful domestic purposes, besides a profuse display in basins and fountains for gladdening the eye and diffusing coolness and refreshment around. The higher civilization of the Moslems in the middle ages, was in nothing more conspicuous than in their extensive and varied provision for carrying out the watery regimen, to which they were pledged by their religion, and with which certainly they contrived to combine all that was beautiful in nature and ornamental in art. The reader will remember Mr. Irving's description of the basins and fountains of the Alhambra, in a preceding chapter. Dr. Drake, in his "Literary Hours," is equally animated in his notices of this part of the true glories of the Kalifate. That was, he says, truly a feat of Muhadi, the son of Almanzar, in his erecting cisterns and caravenseras along a measured road of seven hundred miles, from Persia to Mecca, on the occasion of his pilgrimage to the latter city. Cordova, in the flourishing period of the kalifate, could boast of nine hundred baths. The palaces and mosques were furnished at this period, as they are in countries, even at the present day, where Islamism prevails, with capacious cis-

* Layard's "Nineveh and its Remains."

terns; and in most of the principal cities fountains played in the streets as well as in the courts of the houses.

The nations of modern and Christian Europe, and of Christendom generally, seem to be awakening, though it must be confessed somewhat slowly, to a perception of the true value of water for health, for bodily comfort, for tasteful enjoyment, and intellectual quickening. Physiology now teaches them that the blood, which courses in their heart and arteries and veins, is, in great part, the pure element, and that the slightest approach to admixture of this vitalizing fluid with the juice of the grape or the alcoholic product of the still is deteriorating and degrading, if not directly poisonous, both physically and mentally. Beyond a mere figure of speech would be the fatal curdling of the blood by the introduction of a few drops of the purest Falernan or the most sparkling Champagne into the vital current of the circulation. "Not all the blood of all the Howards" could neutralize, for a minute, the plebeian and degrading influence of such contact. Let the plain water-drinking countryman and citizen take courage then, and assert their claim to "gentle blood" without fear of taunt or disdain from those who, against all evidence, would claim patrician privileges on the strength of their attempts to poison their own blood. Let they who are the proudest of family name and descent, the Montmorencis, the Percys and the Esterhazys, or our more limited but scarcely less vain exclusives here at home, remember that their great progenitors derived the iron will and vigorous arm, by which they carved out for themselves distinction and honours, from inhaling the air of the fields and the woods in which they were born, and drinking of the water of the nearest stream, and eating of the plainest food and indulging in the most active exercise—part of which was the cultivation of the soil and the amusements of the chase.

Poetry is on the side of the watery regimen; for, assuredly, the pictures of the favourite retreats of the Naiades with their kindred Dryades, and the associations connected with Helicon and Parnassus, and other spots devoted to the Muses—the mountain rills and cascades, the gently-flowing river meandering through meadows and fields of grain and fruits, and the lake embowered in woods—have furnished, and must ever furnish, more varied

materials for the imaginative faculties of the poet and the painter, than all the invocations to Bacchus and praises of his pot-bellied companion Silenus. What charming descriptions by the poets has not bathing alone given rise to. Without leaving our own language, it will be sufficient to refer to those of Spenser* and Thompson.

The hygienic view of the watery regimen is the most important, since, if properly appreciated in its various bearings, the therapeutical will be, like all other aids derived from medicine, in much less demand.

Nearly all the writers whom I have quoted have, in imitation of Galen, laid stress on bathing as part of the watery regimen, and also on exercise, and assiduously practiced friction, "chafing," as Fuller calls it, of the skin.

CHAPTER XVI.

WATERY REGIMEN (*continued*)—USED IN DISEASE—BY THE ANCIENT WRITERS—BY THE ARABIAN WRITERS—ITALIAN AND SPANISH PRACTICE.

Watery Regimen in Disease—The Ancient Writers.—Hippocrates tells us, that whoever is in good health and strength need not mind, but may always drink whatever water is at hand. But it is different with those who are suffering from disease. To them he gives precise directions: "To persons whose bellies are hard and easily burnt up;" by which we may understand those of a bilious temperament and costive habit, and who suffer from in-

* "So hidd in lockes and waves from looker's theft,
Nought but her lovely face she for his looking left."

"Withall she laughed, and she blusht withall,
That blushing to her laughter gave more grace,
And laughter to her blushing as did fall."

Fairie Queene.

I have not room for transcribing the whole of the stanzas, in which the fountain and the bath, "an ample basin," and the bathers are pictured.

ternal heat and thirst, "the sweetest, the lightest, and the most limpid waters will be proper; but those persons whose bellies are soft, loose, and pituitous"—lymphatic temperaments with tendency to looseness of the bowels "should choose the hardest, those kinds that are most crude, and the saltiest, for thus they will be most readily dried up." The following remark, which has puzzled some commentators, is in accordance with modern observation,—it being understood that saltish or brackish waters have been drunk for some time. Water with a slight saline impregnation will act on the kidneys, but at the same time will help to keep up a costive habit. Hippocrates in the passage just alluded to, says: "People have deceived themselves with regard to salt waters, from inexperience, for they think these waters purgative, whereas they are the very reverse, for such waters are crude, and ill-adapted for boiling, so that the body is more likely to be bound up than loosened by them."—*Airs, Waters and Places*.*

In my summary of the subject of watery regimen, notice will be taken of the different drinks, and especially of barley-water, recommended by Hippocrates in the treatment of acute diseases. The aqueous portion was by far the largest in all of them, and to it is much of their virtue to be attributed.

As relates to the bath, Hippocrates declares it to be useful in many diseases; in some of them when used steadily and in others when not so. The objection to its more frequent employment in Greece and Asia Minor, in the time of the Coan sage, is, unfortunately, quite too common in modern Europe and in America: "for in few families are all the conveniences prepared, and persons who can manage it as it ought to be." As the whole passage is instructive in a medical point of view, and serves to illustrate the fashion of bathing at the time in which Hippocrates wrote, I shall transcribe it entire. It is obvious that the bathing here described was that by affusion, as pointed out to the

* I use, in the above extracts, the English version of Mr. Adams, to whose classical and medical lore the profession is so much indebted for his translation of and erudite commentaries on Paulus Ægineta, and now for an edition of the works of Hippocrates, the first volume of which has just been sent out by the Sydenham Society.

reader in a former chapter on the Division of Baths, and the different forms of bathing. "And if the patient be not bathed properly, he may be thereby hurt in no inconsiderable degree, for there is required a place to cover him that is free of smoke, abundance of water, materials for frequent baths, but not very large, unless this should be required. It is better that no friction should be applied, but if so, a hot soap (*smegma*)* must be used in greater abundance than is common, an affusion of a considerable quantity of water is to be made at the same time and afterwards repeated. There must also be a short passage to the basin, and it should be of easy ingress and egress. But the person who takes the bath should be orderly and reserved in his manner, should do nothing for himself, but others should pour the water upon him and rub him, and plenty of waters, of various temperatures, should be in readiness for the *douche*, and the affusions quickly made;† and sponges should be used instead of the comb (*strigil*), and the body should be anointed when not quite dry. But the head should be rubbed by the sponge until it is quite dry; the extremities should be protected from cold, as also the head and the rest of the body; and a man should

* The *smegma* was an abstergent composition used by the ancients in bathing for the purpose of cleansing the skin. For a full account of the *smegmata*, see PAULUS ÆGINETA, Vol. III., pp. 536-41.

† Galen, in his Commentary, remarks that the physicians usually did not put their patients into the bath, but made use of the *douche*, or affusion of hot water. He adds, that persons in good health may leave the hot bath and plunge into the cold, but that this practice is not safe in the case of invalids. He recommends, then, that there should be at hand a good supply of baths of various temperatures, so that the patient may gradually pass from one of a high to others of a low temperature. By the way, I have often wondered that Dr. Currie, who certainly had no inconsiderable pretensions to classical scholarship, should have been so profoundly ignorant as he appears to have been of the use of the warm affusion by Hippocrates and Galen in the treatment of febrile diseases. His rival, Dr. Jackson, had a much more respectable acquaintance with the ancient authorities on medicine; and I have often thought it was to be regretted that the profession at that period, in giving a trial to the affusion of cold and hot water in fever, put itself under the leadership of Currie instead of Jackson.

not be washed immediately after he has taken a draught of ptisan or a drink; neither should he take ptisan as a drink immediately after the bath. Much will depend upon whether the patient, when in good health, was very fond of the bath, and in the custom of taking it: for such persons, especially, feel the want of it, and are benefitted if they are bathed, and injured if they are not. In general, it suits better with cases of pneumonia than in ardent fevers; for the bath soothes the pain in the side, chest, and back; concocts the sputa, promotes expectoration, improves the respiration, and allays lassitude; for it soothes the joints and other skin, and is diuretic, removes heaviness of the head, and moistens the nose. Such are the benefits to be derived from the bath, if all the proper requisites be present; but if one or more of these be wanting, the bath, instead of doing good, may rather prove injurious; for every one of them may do harm if not prepared by the attendants in the proper manner. It is by no means a suitable thing in these diseases to persons whose bowels are too loose, or when they are unusually confined, and there has been no previous evacuation; neither must we bathe those who are debilitated, nor such as have nausea or vomiting, or bilious eructations; nor such as have hemorrhage from the nose, unless it be less than required at that stage of the disease (with those stages you are acquainted): but if the discharge be less than proper, one should use the bath, whether in order to benefit the whole body or the head alone. If then the proper requisites be at hand, and the patient be well disposed to the bath, it may be administered once every day, or if the patient be fond of the bath there will be no harm, though he should take it twice in the day. The use of the bath is much more appropriate to those who take unstrained ptisan, than to those who take only the juice of it, although even in their case it may be proper; but least of all does it suit with those who use only plain drink, although, in their case too it may be suitable: but one must form a judgment from the rules laid down before, in which of these modes of regimen the bath will be beneficial, and in which not. Such as want some of the requisites for a proper bath, but have those symptoms which would be benefitted by it, should be bathed; whereas those who

want none of the proper requisites, but have certain symptoms which contra-indicate the bath, are not to be bathed.”*

By no one have the conjoined effects of water-drinking and bathing in disease been more systematically considered than by Galen. He declares the bath to be one of the chief parts of *Apothepia*, or system of perfect cure, which is completed by exercise and frictions. Baccius might well reproach the physicians of his own time, and the rebuke applies to the majority of them since, for their ignorance of the method of treating the sick by the use of baths; and still more, that they who profess to imitate Galen should pass over in silence those practices in which his doctrine almost entirely consists. In the following paragraph we shall repeat some of the opinions of the physician of Pergamos, as Galen is often called.

The stomach overloaded with food, or oppressed by residual crudities, is relieved by drinking a goblet of cold water. The same drink quickens the action of the bowels, provided there be no constriction from spasm, when warm water is to be used. Water given to the sick should have been previously boiled, and then made cold with ice or snow. Cold water sometimes brings back heat. Cold drink often stops hemorrhages. It alleviates great heat of the stomach. Cold water and venesection are the remedies for continent or continued fevers. Cold drinks are good in ardent and continent fevers. When bloodletting has been omitted, from want of skill on the part of the physician, or from timidity of the patient and his friends, cold water is to be offered to the patient, and not one but several goblets full—not in the beginning nor height alone of the fever, but in its whole course. We give it the more freely if the patient had been accustomed to it in health. It discharges the redundant and peccant humours by stool, or by vomiting, or by sweat.

Galen recommends drinking of tepid and warm water under the following circumstances. Tepid water to be drunk by those who are seized with syncope from bile in the stomach, and have at the same time a small pulse and cold sweat. If they vomit they are relieved. In spasm

* *Op. cit.* Regimen in Acute Diseases. Doctor Adams, Translator and Annotator.

with contraction of the bowels, drinking of warm water is advised. Warm (or rather hot water, which we must not confound with tepid) relieves vomiting. Tepid water relieves headache from ebriety or other disorders of the stomach, and cholera morbus and hiccup; also, inflammation of the gums, fauces, and tonsils. Water always moistens, whether it be temperate or tepid or even warm. The question is put—whether a drink of hot water or of wine be most serviceable.*

The bath—and when the term is not particularly qualified by the prefix of cold or warm, &c., we are to understand the practice of succession or transition bathing, as pursued in the Roman *Thermæ* already described—is strongly recommended by Galen. It removes, he tells us, excrementitious matters from the skin. It is adapted to diseases of the voice—is useful in fevers arising from putrefaction of the humours—cures ephemeral fevers—removes pain of the eyes and obstinate ophthalmia—sometimes cures plethora—produces inclination to sleep. The bath is good both against heat and cold—it warms the chilly and cools those who are heated. It is refreshing after a journey. Baths in which the head is wet contribute to sleep. Under certain conditions they are useful in ardent fevers. The tepid is most serviceable to the young. The cold bath strengthens the body and renders the skin dense and hard. The excellent directions and cautions for the guidance of those who would have recourse to cold bathing will find their place in a subsequent chapter, when this subject comes up separately for notice.

Celsus, whom I introduce after Galen, although he preceded the latter in the order of time, recommends a draught of cold water, in undue fulness of the stomach, which will soon yield under the operation of the fluid to lightness of spirits and afterwards sleep. The remedy is certainly safer, on the score of habit at least, than the popular one in modern times, of a glass of brandy, or some other

* I do not deem it necessary to make distinct references for each of these opinions and directions of Galen, scattered as they are through the twenty volumes of the edition (by Kuhn, of Leipsic) now before me. The very copious index to this edition, making itself a volume, enables the reader to verify very readily the accuracy of what is attributed to Galen.

liquor, and water. This eminent writer praises water in cases of weak vision, pain of the head, deafness, tremors, sinking, pains of the joints, hysteria, and hypochondriasis, diarrhœa, and hemorrhoids. He cautions against cold drink when the individual has worked himself into a sweat, and after fatigue from a journey.

He directs those in health to use sometimes the warm bath and sometimes the cold. This advice follows immediately after another admirable precept and commentary. It is, to resort to labour if the body is suffering from idleness; the former prolongs the period of youth; the latter anticipates the approach of old age. Celsus boasted of having made a freer and more methodical use of the bath than his predecessors; and he especially commends it in low fevers, provided there be neither tympanites nor pain of the head. Also, in disorder of the kidneys and digestive organs and pains of the joints. When the word bath is used by him without specification, we must draw the same inference as when Galen directs the same remedy, viz., that bathing in the Roman thermæ, or at any rate, the warm, if not the vapour bath, was intended, either with or without the cold immersion or swimming in the natatorium.

Celsus was the first to advise cold immersion for the cure of hydrophobia. He went so far as to recommend that the patient, if he could not swim, should be thrown into a fish-pond, and allowed to come so near drowning as to swallow, whether he will or no, some of this fluid; and if he can swim, that he should be held sufficiently under water to compel him to take a similar draught—and so alternately immersing and emerging the patient until he is surfeited with water. By which means, adds Celsus, both the thirst and the dread of water will be effectually subdued. He preferred the cold to the warm bath in diseases of the skin. He was inconsistent, however, with his creed in urging such a liberal use of water, by restricting his dropsical patients to the smallest quantity of drink.

If weight could be attached to the opinions of the bold empiric Asclepiades, of Bithynia, he would have been quoted before Celsus, over whom he has precedence chronologically. This writer was determined to suit opposite tastes. He was most liberal in prescribing wine and gestation even in violent fevers, "laying this extraordinary

paradox down as an established maxim, that one fever was to be reduced by another." The writer who uses this language* could not have anticipated the time when this "extraordinary paradox" of Asclepiades would be the basis of a system of medicine, another feature of which would consist in the assumption, that effects are produced without the possibility of the action, or indeed the presence, of the assigned causes—called remedies. Such, however, is the system of Hahnemannism, yclept homœopathy. Asclepiades, to balance one extreme by another, was also an advocate for the use of cold water both internally and externally—in hiccup, sour eructations, and nocturnal emissions.

When we speak of Asclepiades being liberal in the administration of wine, we must remember, however, that his directions were to take, at the most, for drink, equal parts of wine and of water. As we have no reason to suppose that the wines of ancient Italy were stronger than those of the modern, we can have an idea from this of the drinking habits of the Romans.

We need not rest long on the opinions of Oribasius who echoes Galen; nor of Ætius, who also, in imitation of the latter, directs a bath of oil in protracted fevers, convulsions, retention of urine, and to relieve lassitude and nervous pains. The bath of oil was formed by adding a fifth part of heated oil to a bath of water.

The Arabian Writers.—The Arabian writers give us many precepts regarding the use of the bath, to which their Greek studies, and their own climate and diseases would naturally prompt them.

Rhazes was a strenuous advocate for the use of the watery regimen. He believed the bath to be useful in nearly all diseases. His memorable Treatise on Small-pox and Measles contains precepts for the treatment of these diseases, a neglect of which by his successors, down even to the present day, has been productive of a greatly increased mortality from those scourges of the human race. Among these precepts are, urgent recommendations to the free use of water, as elsewhere I took occa-

* Hamilton. The History of Medicine, Surgery, and Anatomy.

sion to point out.* The reader, whether general or professional, will not probably find fault with my repeating them here, in the words of the learned Dr. Greenhill, of Oxford, the last translator of Rhazes.† Among the preventives against small-pox, when it prevails in a place, the latter suggests the following: "In the middle of the day let the patient wash himself in cold water, and go into it and swim about in it."

When the precursory fever shows itself, Rhazes recommends what he terms *extinguents*. First of these is blood-letting; and in aid of it the following process of aqueous potation: "let the patient drink water made cold in snow to the highest degree, several times and at short intervals, so that he may be oppressed by it and feel the coldness of it in his bowels. If after this he should continue to be feverish, and the heat should return, then let him drink it a second time, to the quantity of two or three pints or more, and within the space of half an hour; and if the heat should still return, and the stomach be full of water, make him vomit it up; and then give him some more. If the water finds a passage either by sweat, or by the urine, then you may be sure that the patient is in a fair way of being restored to health; but if you do not see that the water has found a passage, or you find that the heat is increased, and returns as it was at first, or even is more violent, then omit giving the cold water in large quantities at several times, and have recourse to the other *extinguents* which I have described." The concluding part of this advice contrasts, by its practical philosophy, with the cruel, if not the insane empiricism of those who push a favourite remedy or mode of practice to the extreme of endurance on the part of the patient, without attention to the circumstances which clearly contraindicate its continuance.

The eruption of the small-pox and measles after the fever has fairly set in "is accelerated by well wrapping the patient up in clothes, and rubbing his body, by keeping him in a room not very cold, and by sipping cold water, a little at a time, especially when the burning heat

* Bell & Stokes's *Lectures on the Practice of Physic*, vol. ii., p. 684.

† One of the Sydenham Society's volumes, 1848.

is very great ; for cold water, when it is sipped a little at a time, provokes sweat, and assists the protrusion of the superfluous humours to the surface of the body." The farther recommendation is given to expose the body of the patient, except the face, to the vapour of warm water, which is to be quickly rubbed off as soon as it is deposited on the skin. Much oppression and anxiety, with an imperfect coming out of the eruption, will be relieved by giving "to drink from time to time warm water, either alone, or that in which there have been first boiled the seeds of sweet fennel and mucilage, and others of the same kind."

Avicenna has enlarged on the use of baths ; strengthening his own views by the writings of Galen, Rhazes, and others. He recommends the daily bathing of infants in tepid water ; and describes the benefits to be derived from arenation or sand bath in the sun, in order to bring out sweat, carry off the superfluous humours, and cure asthma and dropsy. He advises friction and inunction in the bath, but he prohibits the drinking of cold water during this time. He is an advocate for the watery regimen, in his recommending aqueous drinks, for colics : they wash out the stomach, he tells us, cause alvine discharges, and remove pain.

Meshues and Haly Abbas are advocates for the practice of bathing, in a great variety of diseases. The former prescribes the addition of various plants, according to the indication of the case. The latter, in unison with all his predecessors, tells us, that the proper time for the bath is after exercise and before eating. Thus used, it moistens the body, strengthens the vital heat, promotes digestion, opens the pores, mitigates pain, and dispels flatulence. He adds : a short continuance in the bath warms and moistens the body, but a long warms and dries it. Haly Abbas also treats, at great length, of the subject of the different kinds of water for drink. He condemns the indulgence in copious draughts after a meal.

Still more precise and eulogistic were the observations of Alsaharavius on the uses of the bath. They are, to moisten the body, open the pores, dispel flatulence, remove repletion, procure sleep, relieve pains, fluxes of the bowels and lassitude, to restore lean bodies to plumpness and obesity, if used after a full diet, to soften contracted limbs,

moisten dry bodies, and dry humid. The evil effects of the bath, when it is misapplied, are prostration of the vital powers, syncope, and determining the humours to weak parts.*

Italian and Spanish Practice.—Coming nearer our own times, or at least within the last two centuries, we meet with prominent examples of the application of the watery regimen to the cure of diseases, including fevers of the worst grade. In the early part of the last century appeared the remarkable works of Lanzani and Floyer, and accounts of the treatment of fevers by the Sicilian Fra Bernardo and the Neapolitan Cirillo.

Not having Lanzani's treatise by me, I shall rely on the following statement of his views and practice by Dr. Forbes, as I find it in the *British and Foreign Medical Review* (vol. xxii). "According to Lanzani, the true method of using cold water consists almost entirely in its internal administration, in very large doses, in certain stages of certain fevers. His work is most elaborate in every sense; learned, methodical, and comprehensive. It is divided into two books; the first devoted to an explanation of the causes, symptoms, complications, and nature of fever; the second showing that copious imbibition of cold water is the best means of combating the symptoms, on scientific grounds, and consequently the best remedy for fever. This is obviously an argument somewhat theoretical, but it is supported by a chapter of cases, and backed by the opinions of a host of learned doctors, the author's predecessors." "Lanzani appears to have had no knowledge of the external use of water, nor of its application to the treatment of chronic diseases. He used it in combination with drugs."

Fra Bernardo Maria di Castragione, priest and capuchin, at the very time in which Lanzani wrote, was carrying out the use of cold water to a considerable extent. He was the son of an apothecary, whose titles extended to chemist and doctor. Bernardo acquired the surname of the cold-water doctor (*Medico del acqua fresca*); and won no

* Paulus Ægineta, *op. cit.* Commentary by Francis Adams. The opinion of Paulus himself, on the Cold and Warm Bath, will find a place hereafter.

little reputation for the cure of various diseases ; viz., weakness of the chest, convulsions, palpitations, obstinate dyspepsia, by means of iced water. He professed, also, to cure dropsy, diarrhœa, hemorrhages, &c., by the same means. He gave three goblets of ice water in the morning, sometimes thirty-six in the course of the day ; the quantity ranging from a pint to a pint and a half. He applied ice externally in cases of gout and rheumatism, and to the parts in which great heat was experienced. The capuchin doctor would not consent to the use of his remedy during the great heats of summer ; and he avoided the inducing of sweat ; seeking in its stead to act on the bowels or the kidneys. During the first days of treatment, all food was withheld from the patient ; sometimes the yolk of an egg was allowed, and afterwards, when there was weakness, roast chicken or pigeon.*

Cirillo, a Neapolitan professor, a few years after (1729), carried out what he called the watery diet, in the treatment of a malignant fever which prevailed at Naples. He gave the patient no other drink than water cooled by the addition of snow, a pint or two every two hours, for several days—seven, eight, or ten. During this time no kind of aliment was taken, and when it was finally allowed it was of the lightest kind, such as panada. If hiccup supervened, it was met by the free ingestion of cold water, and it was found to be relieved by such a drink. So soon as sweat supervened the beverage was omitted.

Cirillo did not counsel cold bathing ; but he directed snow to be locally applied to the most sensitive parts, and where there was great determination to a particular organ. In cases of delirium during the progress of the fever, he directed snow to be rubbed over the head.†

The Italian practice with the watery regimen, *diæta aquosa*, is traceable to the Spaniards, by whom it was introduced into Naples. Fra Berpardo was the pupil of Rovida, an Arragonese.

Samoilowitz, in his history of the plague at Moscow

* Marquart, *op. cit.* Also, Giannini, *Della Natura delle Febbri e dei Metodi di Curarle*. Tome Due.

† Giannini, *op. cit.*, in which he refers to the account of Cirillo's practice, in the Transactions of the Royal Society, vol. 36.

(1771), used with signal success the watery regimen, in some of the most desperate cases of this disease, and when death seemed imminent. His treatment consisted in friction of the body with pounded ice, and in the use of cold acidulated drinks.

CHAPTER XVII.

WATERY REGIMEN (*continued*)—ENGLISH WRITERS—FLOYER AND BAYNARD—FLOYER'S EMPHATIC APPROVAL OF THE WATERY REGIMEN—IMMERSION AND DRYING IN SHIRTS—ERUPTIONS—THE SEAT BATH—CURATIVE POWERS OF WATER AS A DRINK—REV. MR. HANCOCK'S *Febrifugum Magnum*.

English Writers on the Watery Regimen.—Reverting now to the work of Sir John Floyer, quoted already more than once in these pages, and to the large contributions in the same volume by Baynard, his friend and associate, which sound the praises of cold bathing, we shall find some curious examples of the extent to which the watery regimen has been carried. I say, advisedly, watery regimen; for, although Floyer's name is almost universally associated with the use and fame of the cold bath, it ought, in addition, to be remembered that he says, expressly, "I am very well convinced, by many trials about cold bathing, that they succeeded best who not only drank of the cold water before they bathed in it, but also continued the water-drinking long after." And again, in reference to the cold bath in gout, he tells us: "But in these and other defluxions, without water-drinking, and a cool purge of salt and a temperate diet, no great good can be expected." Still farther, in the same letter, we read: "I cannot believe that cold bathing can help any defluxions, such as the asthma, without water-drinking; and in a recent disease, neither can cold baths do any good where the *viscera* are decayed." Dr. Baynard, with equal emphasis, remarks: "And here not only cold bathing externally, but inwardly also (I mean drinking of cold water moderately) is of the greatest use and moment to human life, if the water be good, and well chosen."

In the announcement of these elementary propositions for the proper use of the watery regimen, we see a not indistinct basis of the modern practice, I wish we could say systematic doctrine, of hydropathy. As we proceed we shall meet with cases, in this same volume, of which the cold bath and wet sheets and sweating, and even eruptions on the skin, of hydropathic record, are the direct counterparts.

Immersion and Drying in Shirts.—I begin with the experience of gentlemen of the turf who are desirous to diminish the weight of their jockey by sweating. "Dip the rider's shirt in cold water; and after it is put on very wet, lay the person in warm blankets to sweat him violently, and he will after lose a considerable weight, a pound or two." In another page Sir John remarks: "Immediately after cold baths the sweats are produced, if we commit the patient to a warm bed, but a longer use of cold baths stops all evacuations."

The next cases cited are in a letter from a clergyman (a Dr. Nath. Ellison) to the author, in which he describes the process of cold bathing pursued for the cure of rickets in children. The course lasts for a fortnight or longer (in the months of June and July), intermitting a day or two, or more, in the whole, if the child be very weak. The course consists in quick immersions, in the evening, of the little patients "with their shifts and night-caps on." "All which immersions are to be despatched as quickly as may be, that so the child may not continue any longer in the water than is necessary; that is, till his body, and shift, and night-cap, be thoroughly wet." The next stage of the treatment is thus described: "As soon as the children are dipped, they, with their wet clothes on, are wrapt up in warm blankets, over their head and whole body, and put immediately to bed, which instantly puts them into a violent sweat. In this condition they lie all night, till towards morning the clothes are taken off by degrees, that so they may cool gradually, and in the morning they have dry shirts and head-clothes put on; the same shift and night-cap in which they are dipped are used all the time of their dipping, and are only dried." The writer adds, that although for a while they may be weaker after this treatment, yet that they recover gradually their strength by the help of nutritive jellies, &c., "inasmuch that about the fall

of the leaf they are either perfectly recovered or sensibly better. If one year's dipping proves not successful, it is repeated the next year, which generally answers expectation."

In his dedication to the College of Surgeons, London, Sir John, after adverting to the Roman practice of bathing in winter, narrates the following observation: "In Staffordshire at Willowbridge, they have a more bold practice than either the Greeks or Romans used; they go into the water in their shirts, and when they come out, they dress themselves in their wet linen, which they wear all day, and much commend that for closing the pores, and keeping themselves cool; and that they do not commonly receive any injury, or catch any cold thereby, I am fully convinced from the experiments I have seen made of it."

At St. Mongah's, the cold spring in Yorkshire, it was the custom of the country people, as we learn from Dr. Baynard, especially those that were superstitious, to carry as much of the saint away with them as they could; and hence they not only bathed, but when they came out put on a wet shirt or smock, and then walked or rode home, and let their shirts dry upon their backs. An unexpected inconvenience was said to result from this practice,—in an exuberance of animal feeling and spirits, the very reverse of the penance which the bathers meant to impose on themselves.

In connection with these water practices I may mention here, for fear it should escape from my memory at another time, the usage of an English nobleman, the Earl of Panmure, who died in January, 1782, aged 82. He was accustomed till a short time before he died, every morning previous to dressing, to raise himself naked from his warm bed, and instantaneously to wrap himself in a sheet just dipped in cold water. It is well authenticated, continues the narrator, that by adopting the same method, a person recovered strength from a long-continued state of debility, and relaxation of constitution.*

Eruptions.—An eruption following the use of the cold bath is mentioned more than once by Floyer, who says:

* Dr. Molleson's Remarks on Longevity. Quoted by Sir John Sinclair. Code of Health and Longevity.

"I observed that some hot tempers had a rash produced by bathing, and they were eased of pains thereby." So also a patient, Sir Henry Coningsby, tells, that the first time he went into the cold spring it blotched him in one place, and so every day more and more by pimples rising and then drying away.

The Seat Bath.—The seat, *sitz* or hip bath has of late acquired vogue, as part of the water cure, and by some superficial readers it is looked upon as a novelty. Professional men need not be told of the error of such a belief. Perhaps, however, the case related by Dr. Baynard, in one of his letters to Sir John Floyer, may not be known to many of them. It was of a person in the prime of life, "not above 29 or 30 years of age," who had suffered for a long time from seminal weakness, the result of great venereal excesses. Were I addressing myself to the profession exclusively I should be tempted to give the introductory part of Dr. Baynard's letter, with its amusing quaintness and figurative, yet quite expressive language and allusions. The patient was directed "to go into the country out of the sight of any women and find out some very cold spring or river, where he should first plunge over head, then put on his shirt, coat, and hat, to prevent catching cold from the wind and air, and sit up to the waist, night and morning, and for a month drink nothing but new milk twice a-day sweetened with sugar of roses; at noon eat well-roasted mutton with cold salads, as cucumbers, lettuce, purslain, &c., and drink nothing but spring water with a little claret wine." Some topical application of vinegar and claret wine was also made at night—"which directions he punctually observed, and in less than fourteen days he was so well as ever he was in his life."

An improvement on this semicupium, in which the bather wears his coat and hat, is that other fashion related by Dr. Baynard, on the faith of his friend, Dr. Savery, viz., to fish up to the chin in water for an hour or two. "A few days since," writes Dr. Savery, "talking with a country fellow of tolerable Sense, about what would procure a stomach to eat, one proposed *taking the Air*; another *Riding*; a third *Old Hoc*. Cume, cume! says my Fellow, I have tried all these *ways* you talk of, but nothing is like going a Fishing up to the Chin in Water for an hour or

two, that will get you a *Stomach* I'll warrant you, nor am *I dry, &c.*” * I do not know whether my eloquent friend, the “American Editor” of Walton and Cotton’s Complete Angler, who has written so well and so learnedly on the “gentle art” in his “Bibliographical Preface” to a recent edition of that work, will deem the Countryman’s fashion an improvement. Certain it is, however, that it is entitled to much of the praise given to angling by Sir Henry Wotton, as recorded by Walton himself, and repeated in the Preface; “a rest to his mind, a cheerer of his spirits, a diverter of sadness, a calmer of unquiet thoughts, a moderator of the passions, a procurer of contentedness, and that it begat habits of peace and patience in those that practised it.”

Curative Powers of Water as a Drink.—Of the curative powers of simple water as a beverage the proofs on record are numerous, and happily continue to be a matter of continued experience. To the instances already adduced I will add a few more—at the risk, it may be, of wearying some of my readers; but with, I hope, the effect of enforcing a practice of the highest importance on the minds of many more.

Baynard, in the volume so often referred to, gives “The Case of a young Gentleman, from the Injuries of Tobacco and Strong Drink recovered by drinking of Water, &c.” This person “from a vivid and florid state of health became pale and wan, and had strange cold sweats,” with loss of appetite, and great depression of spirits. His physician “advised him to forbear strong drink, and to drink a little spring water night and morning, and eat a raw apple or two, and take the air in a coach or on horseback, all which he punctually observed, and was as well in a month as he ever was in his life.” One may leave to commentators to determine, how far abstinence from strong drink, or the taking to water as the beverage, and fresh air and exercise, contributed to the restoration of this young gentleman’s health. In any view of the case, the cause of sound hygiene will be the gainer.

The reference made to tobacco by Baynard probably suggested his introduction of the remarks of “the learned

* I give this extract, with the setting off of capitals and italics, as in the original.

Kerkringius," entitled "*Nimius Tabaci usus noxius*." They are fit company for King James's counterblast against Tobacco: and certainly are any thing but encouraging to the smoker, if he have regard for his tongue, which becomes blackened and almost poisoned, his wind-pipe which is converted into a chimney choked with soot, his lungs dried up and almost friable, his liver inflamed and gall-bladder obstructed, his bowels clogged with black carbonaceous matter. Behold, says the pitiless Kerkringius, the medical fruits of this frequent suction. I have not given the entire picture, in which Vulcan and Charon, and Pluto, and the Plutonian domain are introduced, with their lurid hues and gloomy attributes.

The following case, of the efficacy of free water drinking in dropsy, is thus quaintly related by Baynard. I give his introductory remarks:

"Sir Thomas Witherly, when he was President of the College of Physicians, London, was pleased to entertain some of the Fellows at the Board with this following most surprising story of an hydropical cure. That water should expel water, and that a drowned man should be brought to life by being more drowned, is a miracle beyond any of St. Winifred's.

"A certain wine-cooper, that had been a free liver, fell into a jaundice, thence, as the usual stage is, into a dropsy, the ascites; he applied for help to Sir Thomas Witherly, then Physician to King Charles II, who, as he said, treated him in all the usual methods practicable in such cases, but nothing would do: he made little urine, grew drowsy and asthmatical, insomuch that he grew weary of his patient, foreseeing he would soon die. He desired some near friend to pronounce sentence, for a physician should never do it himself; for those who are *adjutores vitæ* should not be *nuncii mortis*. In short, this man was prodigiously swelled, belly, back, sides, thighs, and legs. Thus, being passed all hopes, and forsaken by his physician, and given over by his friends, he desired his wife to let him die at Sadler's Wells, at Islington, to which she consented; and when there he told her, in that he had always been a kind and loving husband to her, that she would grant him one request, which was, that having on him an inextinguishable thirst, she would let him drink

his fill of those waters, and then, that he should go out of this world well satisfied that she truly loved him ; and if she denied him, he should die a miserable man, both in mind and body. She seeing him so resolved and bent upon it, and considering all other means failed, consented : and to the best of my remembrance, Sir Thomas told us, that from between 4 in the afternoon and 9 or 10 at night, he drank 14 quarts of water, and all that time made not one drop of urine ; he sank down in the chair wherein he sate, dead, as they all thought, in a cold clammy sweat ; thence being laid on the bed, in half an hour's time they heard something make a small rattling noise like a coach on a distant gravel-way ; and soon after he began to pass his water, and passed in an hour's time about 7 or 8 quarts, and had also, from the weight of the water, two or three stools : he began to speak, and desired a little warm sack, which they gave him. He fell into a profound sleep, in which he both sweat and dribbled his urine all that night. The next day he drank, by degrees, about 4 or 5 quarts of water more, and had two stools more, thin and waterish, but still discharged his water, and drank on, more or less, for five or six days together, taking all that while nothing for food but thin mutton broth, and sometimes a little sack, and so recovered. Now no man upon earth, in his senses, would have prescribed such a water-course to cure a dropsy ; which shows how little we know of nature, and the great uncertainty of our art."*

The first part of the eighteenth century was prolific in clinical trials and written essays, showing the virtues of the watery regimen. We have seen this to be the case in the Spanish and Italian practice, and in the work of Floyer and Baynard. I have next to advert to additional testimony during this same period, derived from other English, and also some French writers, so that the water cure would seem to have been almost as much in vogue in different parts of Europe at that time, as it is now under a different name and from apparently a novel source. The intelligent reader can readily see, now, how small are the grounds for the pretensions of the hydropathic or any other school of the day to originality, either in hydrological theory or practice.

* In two or three instances, I have substituted a periphrase, in place of the genuine Saxon, in the above extract.

John Hancock, a clergyman, published in 1722, a little tract called *Febrifugum Magnum, or Common Water the best Cure of Fevers and probably the Plague*. His attention had been directed to the subject by his own sufferings from violent fever with cough and jaundice. The recommendation of a friend, for him to drink water, into which pulverised amber had been put, made him suspect, after he had followed the advice, that the water was the active agent. Accordingly, he took this fluid alone, in the evening on going to bed, and after his first sleep; and he continued to drink several times for some days; and he found himself each morning afterwards in a gentle sweat. On the fourth morning he was well. This worthy rector of St. Margaret's, Lothbury, and also Prebendary of Canterbury, and Chaplain to his Grace the Duke of Bedford, next tried the remedy on his son, who was suddenly seized with violent fever, and on whom it induced a copious sweat followed by a remission. A return of the disease from exposure to a current of air, was met by the same treatment with a similar effect, and, this time, entire cure. Cases of the cure of ague by drinking cold water are introduced by Mr. Hancock. He treated successfully by the water drinking, cases of scarlet fever, small-pox, and measles, occurring in his own children. In the measles, the eruption had struck in, as the common expression is; and the little patient seemed to be at the point of death. In this state the father administered water, by wine-glassfuls every few minutes; until the fourth, when the measles came out again and looked very red; the patient fell into a quiet, easy sleep of four hours' duration, and awoke entirely relieved.

Mr. Hancock believed the water to act chiefly as a sudorific in the cure of fevers. Agues he cured by sweating with cold water. When the patient began to sweat he advised a discontinuance of the water. Toast and water, in his own case, he found to take off any fatigue or weariness sooner than any strong wines, strong ale, small beer warmed, coffee or tea, or any other liquor that he knew of.

CHAPTER XVIII.

WATERY REGIMEN (*continued*)—EMPIRICISM—MIDDLE GROUND OF MEETING FOR THE CLERICAL AND MEDICAL PROFESSIONS—PHYSIOLOGY AND HYGIENE—ATTENTION OF LEGISLATORS TO HYGIENE—MOSES AND SOLOMON—HYGIENIC INFLUENCE OF CHRISTIANITY—ST. PAUL'S TEACHING—THE CHRISTIAN FATHERS—THE HYGIENIC PRECEPTS OF MOHAMMED—SMITH'S CURIOSITIES OF COMMON WATER.

Empiricism.—The effects of water are the more wonderful, in the Reverend Mr. Hancock's experience, as the quantity imbibed was not large; certainly not more than nearly every person drinks daily. Thus, for instance, he cured bleeding of the nose by drinking a glass of water every day. It is unnecessary to follow this volunteer in the train of Esculapius, in an enumeration of all the diseases in which he directed the use of water as a beverage, with, he tells us, entire success. Even were we to infer that the author of the *Febrifugum Magnum* was addicted to empiricism, we should be obliged to add that he chose the safest kind, and that in this particular he might be followed with great advantage, both to the health of the community and to their own reputation, by those clerical gentlemen who have such an itch for dabbling in medicine, either by volunteering their own services, or by avouching to all kinds of remedies, by all kinds of quacks. These avouchers, in entire ignorance of the genuineness and composition of the remedy, and of the nature of the disease said to have been cured, certify with equal readiness in favour of the dreamy extravagance of homœopathy with its impossible doses, or the last cough candy. Does it not occur to them that excessive credulity in such important matters as the health and lives of their fellow-creatures, is anything but a favourable commentary on their own religious creed? The skeptic may ask, with a sneer, whether they have taken no more

pains to ascertain the strength of their theological, than they have done to test the accuracy of their medical doctrines? Empiricism in one direction induces violent suspicion that its possessor has an inkling for its exhibition in other directions, germane to his own calling or pursuits. The laws of evidence and the rules of logic are alike overlooked on such occasions. Neither the divine nor the jurist, neither the merchant nor the mechanic, and, least of all, the man of science, or even the pretender to science, would, in their several studies or business, build their faith and shape their course on such slight grounds as are offered to them for their signature to the wonder-working powers of quack medicines. Nor can we forget that, in this case, as in that of any drug or medicinal compound whatever, when it is used indiscriminately, either professedly as a panacea to cure all diseases, or even as a remedy in any single disease, without reference to its nature, and to its stage and complications, the probabilities are that it will do a great deal more harm than good.

Meeting on Middle Ground.—But while we, as physicians, deprecate the meddling of the members of another profession, in a matter for the understanding of which they are necessarily incompetent, both by want of preliminary knowledge and requisite personal experience, we would, at the same time, point out subjects of study in which we all might meet as on middle ground, and interchange views and suggestions profitable alike to both parties, and to the public at large. My reference is to physiology, or a knowledge of the healthy functions of the human body, and to hygiene, or an acquaintance with the nature and operation of the agents by which, in succession or alternation, these functions are maintained and variously modified in their manifestations. These studies involve a consideration of man's mixed nature—the physical, the moral, and the intellectual—and suggest important hints, even if they do not indicate absolute guides for an improved education, and more fruitful didactic instruction, whether the teachers be professors in a college or clergymen in a pulpit. The physician whose views do not extend beyond the mere materialism of man and his functions, and the divine or theologian who directs his

advice to a purely spiritual being, are equally wide of the mark, equally removed from an appreciation of human nature, and equally ignorant of the manner in which it has pleased the Creator to fashion man. Even when both the physician and the divine admit the double or compound nature of man, the former is perhaps too prone to lay undue stress on the purely physical causes modifying this nature, as the latter is, most likely, too ready to attribute an undue share to spiritual control. If in place of being thrown as they now and then are into antagonistic positions, owing to a hasty assumption by each of the dogmatic ethics of the other, they were to start from common and mutually admitted postulates, the result of their discussions would be more creditable to medical science on the one hand, and to Christian charity on the other, than we are wont to see under existing circumstances. The works of Hippocrates, Celsus, and Galen, of Mercurialis, Haller, Zimmerman, the two Cheynes, Fuller, and Parise in the medical, as well as those of Tertullian, Lactantius, and St. Augustine, Jeremy Taylor, Paley and Butler in the theologian's library, might be text books in common, for furnishing abundantly apposite knowledge to both parties. This could be done without the clerical student deeming it necessary to learn the practice of physic from the first class of these writers, or the student of medicine puzzling himself with questions of controversial divinity, that he may meet with in the second class.

All the great teachers of antiquity, they especially who legislated for their fellow men, were well imbued with the principles of hygiene, the practice of which was made a religious duty. With the hygienic institutions of Moses, in *Deuteronomy*, and *Leviticus* especially, we are all familiar. Those taught in the books of Solomon, though with less solemnity of inculcation than the Mosaic, indicate a nice appreciation of the influence of hygienic agents, as in the contrasted pictures of the pleasures of plain and simple living, and of the penalties incurred by luxurious and debasing indulgences! What admirable lessons of temperance and chastity are contained in the twenty-third and thirty-first chapters of *Proverbs*. Can there be finer and more impressive images of the sorrow and ruin, and yet apathy of the sufferer from indulgence in wine, than in the last seven

verses of the twenty-third chapter, beginning "Who hath wo? who hath sorrow?" &c. More could not be said in favour of regular exercise procuring sound sleep, and of indolence being punished by wakefulness, than in this single verse: "The sleep of a labouring man is sweet, whether he eat little or much: but the abundance of the rich will not suffer him to sleep." *Ecclesiasties*, chap. v., v. 12. These few words are equal to a long homily for inculcating contentedness with one's lot, be it ever so humble. The influence of the passions on the health is well pictured in the following verses: "A merry heart doeth good like a medicine: but a broken spirit drieth the bones." *Proverbs*, chap. xvii., v. 22. "A sound heart is the life of the flesh: but envy the rottenness of the bones," xiv-30. "As cold water to a thirsty soul, so is good news from a far country," 25. "A merry heart maketh a cheerful countenance: but by sorrow of the heart the spirit is broken," xv., 13. "All the days of the afflicted are evil: but he that is of a merry heart hath a continual feast," 15.

The purifying influence of Christianity in a hygienic point of view, merits not only the careful study of the physician but more emphatic and frequent mention than it customarily receives in pulpit teachings and written sermons. How well does St. Paul describe man's double nature, the animal and the spiritual; and the struggle between the flesh and the spirit. He teaches in a few words, how direct retribution in their bodily suffering is measured out to those who yield to sinful indulgences, when he describes the wrong doer as one who "sinneth against his own body." Much more instructive than any doctrine of abstract spiritualism, is that physiological and noble view which the apostle takes of the human body, when he calls it the "temple" of the Holy spirit which is in us: and which as of God and not our own, we are left clearly to infer that we have no right to abuse (*Corinth.*, vi., 18, 19). And, again, by another figure, he speaks of the body as a vessel to be possessed in sanctification and honour.

Tertullian, in denouncing the vices of paganism, and the vanities of personal decoration, the abuse of perfumes, &c., and visiting the theatre, showed that not only the morals but the health suffered by these practices; and in his advo-

cacy of monogamy, he argued that this state was the natural one, and most in conformity with the laws of physiology.

Still more celebrated for his extensive knowledge of medicine, was the platonist Clement of Alexandria. He used to cite frequently Hippocrates and Galen in terms of great admiration, in the second part of his *Pedagogue*, which is purely hygienic. To the names already mentioned, we might add those of Origen, St. Ambrose, St. Cyprian, St. Basil, St. Gregory, and other fathers of the church, who came soon after the Apostles, and who were noted for their extensive acquaintance with the human body in its physiological and hygienic relations. The "*Pedagogue*" of Clement is a vast repertory of hygiene, and in it are revealed, probably more than in any other work, the luxurious indulgencies and atrocious vices of the higher classes of the heathen in the period in which he lived.* The introduction of Christianity, even with all the perversions and abuses to which it was subjected by intemperate zeal, ignorance, and unworthy concessions to pagan superstitions, was the millenium itself, compared to the idolatry and vices which it superseded.

The best features in Islamism are the hygienic precepts inculcated by Mohammed in the Koran, and chiefly those relating to abstinence from intoxicating drinks, gross meats, and the regular use of personal ablutions.

The causes and workings of fanaticism and superstition, spurious religious excitements, and the sudden lapses of the faithful cannot be properly understood, nor the means of prevention and removal attained without a knowledge and appreciation of physiology and hygiene. An example of the high utility of such knowledge is just now before me, in Mr. Newnham's "*Essay on Superstition*,"† in which the author points out some of the numerous evidences of disordered circulation in the brain, or its sympathetic irritation from other organs, giving rise to a great many extremes, inconsistencies, and extravagancies

* *Hygiène des Familles où du Perfectionnement Physique et Moral de l'Homme*. Par le Docteur Francis Devay. 2 vols.

† Being an Inquiry into the Effects of Physical Influence on the Mind, in the Production of Dreams, Ghosts and other Supernatural Appearances. London, 1830.

of creed and conduct, which, if attributed to any other cause, would lead to injustice and unkindness on the part of the companions and spiritual directors of the afflicted in these ways. How often are the impressions made by an evening sermon modified, not only by the different temperaments and states of bodily health of the individuals comprising the congregation, but also by the state of the air of the church, which, by oppressing the lungs and preventing free respiration, also oppresses the brain, and renders the perceptions sluggish and the emotions vague and irregular.

But I find that I have lengthened my first digression from the merits of the watery regimen, in my desire that the members of the two professions, which have, respectively, the charge of watching over the bodies and souls of their fellow creatures should meet on common ground for mutual instruction and pleasure, and for the greater good of all. The last advocate I quoted was the Rev. John Hancock, with his *Febrifugum Magnum*.

Next I bring into court John Smith, C.M., the fifth edition of whose small tract, "*The Curiosities of Common Water*,"* is on my table. Its epigraph is:

"That's the best Physick which doth cure our ills,
Without the Charge of 'Pothecaries bills,"

the sentiment of which is certainly better than the poetry. The author's personal experience "during a time that hath intervened from that of thirty to seventy-four years of Age," with which he opens his plea, must bespeak attention in favour of "this excellent remedy, which will perform cures with very little trouble, and without any charge, and is, also, to be had wherever there are any habitations, which is what can hardly be said of any other thing: so that, in some sense, water may be truly styled, *An universal remedy*, since the diseases it either prevents or cures may have this remedy applied to all persons, and in all places where men do inhabit."

¶ * Or The Advantages thereof in Preventing and Curing Many Distempers. Gathered from the Writings of several Eminent Physicians, and also from more than Forty Years' Experience. To Which are added Some Rules for preserving Health by Diet.

T

The benevolent Mr. John Smith, to strengthen his asseverations, enlists the opinions of a host of learned doctors, among whom I may mention Dr. *Manwaring*, in his *Method and Means of Enjoying Health*; Keill, in his *Arrangement of the Anatomy of Human Bodies*; Prat, in his *Treatise of Mineral Waters*; Duncan, in his *Treatise of Hot Liquors*; Sir Thomas Elliot, in his *Castle of Health*; Allen, in his recommendation of water as a cure for gout and "hypochondriac melancholy," *Sennertus*; Harris, in his *Anti-Empiric*; *Van Heyden*, in his *Help for the Rich and Poor*, &c., &c.

The nutritive properties of water are set forth in the case of a man pressed for the sea-service, who determined to starve himself rather than go, and who accordingly abstained from food for twenty days, taking nothing but water, of which he drank about three pints or two quarts daily. At the end of this time, finding that this course produced no effect on the authorities, and that in two days they would all march for London, he ate some food, "beginning with a little, and in the march he was observed to travel as well as the best of them." Another case, still more extraordinary, is related by Dr. Cox, in his "Letters" of a certain crack-brained man, who, at Leyden, when the Doctor resided in that University, *pretended* he would fast as long as *Christ did*, and it was found that he held out the time of forty days, without eating any food, *only he drank water, and smoked Tobacco*.

Mr. Smith adds his testimony to that of Mr. Hancock, in favour of the curative effects of water freely drank in small-pox. The cases were two of his own children. He refers to the opinion of Dr. Betts, who being consulted in a case where the eruption did not come out kindly, did order two quarts of cold water to be drank as soon as could be; upon which they came out according to expectation, and the party did well.

Water is styled by Sennertus the balsam of children, "the drinking of it by the mother being one of those things whereby children may be strengthened in the womb, and will prevent those injuries that are done by drinking strong liquors; which Sampson's mother was not allowed to do, for she was commanded *not to drink wine or strong drink*; Judges xii., 4."

Mr. Smith lays down a pathological dictum, which has been the basis of more than one popular system since his day, viz., "the stomach being the place in which all distempers do first begin;" and from it he deduces his favourite mode of treatment for all surfeits or disorders that follow after much eating, under which he includes apoplexies. It is, to bring on vomiting by large and repeated draughts of hot (it ought to be warm) water, aided by tickling the throat with a feather or the end of a small stick covered with some folds of a linen or muslin rag. He adds a piece of advice, similar to that given by Galen and practised by Baynard, as we have just now seen, viz., to dilute the peccant matters, and carry them off along the first passages, by the sufferers from indigestion "taking a pint of water when they find themselves ill from eating, and do so every three or four hours, eating no more till they are hungry." Cheyne is next referred to, as recommending in his *Treatise of the Gout*, "gouty persons, after excess either in meat or drink, to *swill down as much fair water as their stomach will bear*, before they go to bed, whereby they will reap these advantages—*either the contents of the stomach will be thrown up*, or both meat and drink will be much diluted, and the labour and expense of spirits in digestion much saved."*

Large potations of water in fevers, including those of a low grade in which diffusible stimulants are usually administered, are recommended by Mr. Smith, on the strength of a number of medical authorities enumerated by him. The first sensible effect of these draughts is a profuse sweat, which is soon followed by a remission and often a complete solution of the fever.

Grief and melancholy, so great as to suggest self-destruction, were entirely dispelled in Mr. Smith's own case, by his *drinking a pint or more of cold water*. This leads the author to advance another well-founded piece of gastric pathology—"that the stomach sympathizeth with the mind." Though the like success may not attend a continuance of this practice by others, who are victims to dark melancholy, yet certain it is that their prospect of restoration will be much more favourable by the use of

* The italicised passages in all the extracts are so in the originals.

water than by that of vinous or distilled liquors. Theden's personal experience in favour of water drinking for the cure of melancholy will soon be placed before the reader.

The author of "The Curiosities of Common Water" is equally liberal in his praises of its external as of its internal use. He quotes Dr. Brown, author of a *Treatise of Cures performed by Cold Baths*, to show "that *Madness and Melancholy* with all their retinue, may find better effects from the use of bathing in cold water, than from other violent methods with which people so afflicted are now treated ; for, says he, *that which will make a drunken man sober in a minute, will certainly go a great way towards the Cure of a Madman in a month.* Now 'tis most certain, to my own knowledge, *that if a drunken man be plunged over head and ears in cold water, he will come out of it perfectly sober.*" Dr. Brown, in a letter to Dr. Baynard, relates the case of "a man *raving mad*," who was bound in a cart, stripped, and blindfolded, "that the surprise might be the greater," and then received from the height of twenty feet "a great Fall of Water" on his naked body. He continued under this "*so long as his strength would permit* ; and after he returned home he fell into a sleep, and slept twenty-nine hours, and awakened in as quiet a state of mind as ever, and so had continued to the time of writing that letter, which was twelve months."

I shall not follow Mr. Smith in his enumeration of all the forms of disease in which the external use of cold water, either by a general bath or topically applied, has been found serviceable. When the vulnerary properties of water are described I shall revert to this writer's cases. He terminates his tract by introducing "Some Rules for preserving Health by Diet, collected from Physical Authors." One of these, though possessing no claims to novelty, merits repetition in this place. It comes in the shape of an opinion by Dr. Pitt, who was formerly physician to St. Bartholomew's Hospital ; "*that Fasting, Rest, and drinking Water* would cure most Diseases." If the first feelings of uneasiness precursory to an attack of any of the forms of fever that most commonly prevail in our country, take the Congestive for example, were made

a signal for obeying the above precept, there is no doubt that very often the disease would be entirely prevented, or if it were to come on, that it would be comparatively mild and easily treated.

CHAPTER XIX.

WATERY REGIMEN (*continued*)—THE FRENCH WRITERS—POMME'S DECIDED PREFERENCE FOR WATER DRINKING AND BATHING—THE GERMAN WRITERS—DE HAHN—THIEDEN—HOFFMAN—EFFECTS OF HOT AND WARM WATER INTERNALLY—GALEN—BAGLIVI—UTILITY OF THIS DRINK IN VARIOUS DISEASES—IN GOUT.

French Writers.—In the period in which the writings of the English authors, and also those of Italy, whom I have introduced to my readers, appeared, viz., the first quarter of the last century, the attention of the French physicians was particularly directed to the subject of the remedial value of water. Their fears and sympathies were enlisted on account of the ravages of the plague at Marseilles; and we find Geoffrey (Stephen Francos) defending a Thesis before the Medical Faculty of Paris, in which he lays down the problem "*Whether Water be an excellent Preservative in Time of Plague.*" After rejecting all other means as useless, he concludes in the affirmative. I do not know whether he cited in his essay the favourable example of Socrates, who escaped during the plague at Athens by his simple mode of life. About the same time in which Geoffrey wrote, Hecquet examined the question, whether the sick ought to be debarred the use of drinks, and concludes by regarding water as an universal specific.

At a later period we find Pomme recommending cold water as a beverage, in connection with the use of the warm bath, in various affections of an hysterical and hypochondriacal character.* In prescribing the regimen

* *Traité des Affections Vaporeuses des deux Sexes.*

suitable for the "vaporous" temperament, that predisposing to hypochondriasis and to hysteria, this author says, on the subject of drinks: "If we were to consult the greater number, wine would be preferred; but if we listen to experience alone, the oracle of truth, we learn that this liquor, which is the product of fermentation, and which is full of ardent spirit, is in general adverse to those afflicted with the vapours. Wine, in place of diluting and dissolving the food, hardens it, and renders it more compact; imparts its heat to the coats of the stomach, greatly dries and constricts them; and in this way quite destroys the appetite. It is necessary, therefore, rigidly to prohibit, and, *à fortiori*, ought the invalid to abstain from, spirituous liquors, or rather from those agreeable poisons which have brandy for their basis; liquors, those of modern date, which by their caustic nature, crisp, contract, thicken, and burn, even more powerfully than wine, the fluid and solid parts of the body.

"Water is then the only true drink; it is the one which dilutes adequately and quietly all that we eat; which cleans out the stomach; and which, according to Hippocrates, excites the appetite, and is hence called by him *voracious*. It is the drink which preserves the fluidity of the humours of the body, and which, while giving flexibility and pliancy to the vessels, preserves also the health."

Tolerably decided language this from a Frenchman of the old regime, who dedicated his work to the King (Louis XVI), and who, judging from his portrait with its double chin, was neither dyspeptic nor hypochondriacal. In fine, he could not be supposed to write under the feelings which might influence a temperance ascetic of the *teetotal* school.

Pomme cites Avicenna, whose opinion is already before the reader; also Rondeletius and Martianus, each of whom adduces cases of gout coming under their notice, which were cured by drinking cold water alone. Riverius asserts that he has succeeded in restoring regular menstruation by the use of water alone, better than by any recognised emmenagogue.

German Writers.—De Hahn, in the epidemic fever at Breslau in 1737, directed the free use of cold water externally. He himself recovered by this means, which

was, we are told, very successful when compared with the practice of the other physicians who would not make use of the remedy.

The genial influence of the free drinking of water is attested by Theden, who cites his own case in proof. This writer, in his "New Observations," attributes his then advanced age of eighty years, principally to the use of twenty to twenty-four pints of water daily, a practice which he had persevered in for forty years. When between thirty and forty years of age, he was hypochondriac in the extreme, and a prey to the darkest melancholy: he suffered from palpitations of the heart, and indigestion, and thought he could not survive six months. But from the time when he began to drink water, all these symptoms vanished, and he was healthier at an advanced period of life than he had been at an early age, and entirely free from hypochondriasis. He was himself a proof also of the efficacy of cold water applied externally, in a violent inflammation and tumefaction of the forearm, extending to the elbow-joint and arm; with acute pain and fever, in consequence of a wound of the finger in opening a fistulous deposit. The symptoms were so alarming as to determine him to submit to amputation, when, remembering the good effects of cold water, he had recourse to the use of it and was cured.

Theden, acting on the advice of his friend De Hahn, of whose practice in the Silesian epidemic in 1737 I have just now spoken, applied cold water and ice with success to strangulated hernia, and in a case of violent inflammations of the foot. "Emboldened by such trials," continues this writer, "I employed the remedy externally in small-pox and malignant fevers. I employed it on occasions when there was absolutely no longer any hope, when every person despaired of any resource: sometimes it was useless; often it accomplished miracles." A reflection naturally occurs on reading such passages as these, and it is one which I made when introducing the subject to my professional brethren many years ago.* It is, that these, like many other miracles, must serve rather as beacons to warn us against dangers than as guides to direct

* In a review of Grannini's work on Fevers. In Dr Chapman's Medical and Physical Journal, vol. vii.

our course. I employed water externally, by free ablution, in small-pox during its epidemic prevalence in Philadelphia in 1823-4, but without any of the miraculous results recorded by Theden. I can say, however, that the cases (occurring in hospital practice) were not aggravated by the cold water. —*North Am. Med. and Surg. Journ.*, vol. ii.

Hoffmann's opinion of the dietetic value of water was adduced in a preceding chapter. He believes that it approaches nearer to an universal remedy than any other substance with which we are acquainted. Of its curative powers he is equally sanguine. In inflammatory fever "experience shows," he assures us, "that if water be not the only thing, yet there is no better remedy yet found for this kind of fever than a free and plentiful use thereof. Whence Hippocrates and others highly recommend an aqueous ptisan for this purpose, and accordingly, by this alone, with the assistance of rest and temperate warmth, the most violent fevers have frequently been cured without any other medicine." The most favourable time, we are told, for giving the water is when there is a disposition to sweat. But oftentimes, it must be added, this secretion is brought on by the free drinking of water. In chronic diseases which "generally arise from an obstruction of the viscera and glandular parts, or a surcharge and foulness of the juices, with a stagnation thereof in the larger vessels," there is not a more serviceable remedy than pure water. Although expressed in periphrase, the author's pathology is, in the main, sound: viz., of chronic disease depending on slow inflammation of the viscera, and on vascular congestion. The efficacy of mineral waters under these circumstances, he thinks, is mainly referable to the quantity of pure elementary water they contain. He cites, in support of his praise of water in fever, the names of Celsus, Avicenna, Riverius, Ballonius, Sylvaticus, Martianus, and Rondeletius.

Effects of Hot and Warm Water Internally.—Hoffmann, like Cullen after him, was inclined to attribute much of the effects of tea-drinking to the quantity of the pure hot water employed on the occasion. He admits, however, that "the herb by its astringency prevents the fibres of the body from being too much relaxed and weakened." After enumerating a variety of herbs which might,

he thinks, advantageously replace the China tea, he adds a caution; that "the water designed for the infusion be not too long boiled; but immediately poured upon the plant as soon as it simmers, in order to prevent the loss of its more subtle part."

Galen's advice respecting the use of tepid and warm water in various diseases, was repeated in a former chapter. Succeeding writers have confirmed and enlarged on this important but neglected part of therapeutics. Warm water drank before dinner was held by Baglivi (*Prax. Med.*) to be a remedy against the stone. I have prescribed it, with advantage, to allay the pain during a calculous paroxysm. Baynard says, that it "has been esteemed as a great secret to prevent bilious colicks, and to further both the first and second digestion, if a glass be taken at the close of our meals, and no wine nor strong drinks taken after it." Smith's personal experience and opinion have quite recently been placed before the reader.

In gastralgia and colic I have found the free drinking of hot water to give surprising relief; and have learned from other quarters that it has succeeded after opiates had failed. In the wakefulness which afflicts many persons of a nervous temperament, who do not take the requisite exercise during the day, there is no hypnotic so generally successful in its operation, and so exempt from subsequently unpleasant effects, as hot water drank just before retiring to bed. I had read of the great relief procured by John Hunter, in some of his paroxysms, from the use of this remedy, and was induced afterwards to have recourse to it myself, and recommend it to my patients and friends. One who had been on the list of the former, and who honoured me with her friendship, used to sound the praises of hot water beverage, calling it my remedy—a proof of the readiness to attribute novelty or discovery to the last adviser, even when he himself makes no pretensions on the subject.

No better and safer remedy, looking not only to present effect but to the formation of a future habit, can be offered to the wakeful hypochondriac, or the drunkard still struggling against his infirmity, than this hot water beverage, to the extent of half a pint or a pint in the evening, and at intervals also during the day, if there be much nervous-

ness and restlessness. The immediate effects are a feeling of fulness of the head, and some vascular excitement, simulating in these respects the first stage of the symptoms following the use of vinous or distilled liquor; but with this material difference, that, whereas the water-drinker awakes in the morning refreshed, and with appetite for his morning meal, the imbiber of strong drink will be apt at this time to complain of a foul stomach, and disinclination to eat. Another good effect of the evening draught of hot water is to preserve an open state of the bowels.

The effects which follow the drinking of thermal waters with mineral impregnations, have been by some writers attributed more to the temperature than to their chemical ingredients. Thus Saunders* adduces, as evidence of the similarity of operation in very different thermal waters, and which may in a good measure be ascribed to the mere liquid, that transient determination to the head following their first exhibition. In confirmation of this view, he gives the testimonies of different writers, to show that the waters of Malvern, Bristol, Lauchstadt, and the hot Caroline baths in Germany, all cause a certain drowsiness with vertigo, and occasionally a dull pain in the head—though these several springs differ much from each other in their chemical composition,—that of Malvern containing no mineral substance. To the same purport is the language of the celebrated Vacca Berlinghieri of Pisa: “The fact is, that warm mineral waters, although according to chemical analysis they may differ in the nature or quantity of their ingredients, all coincide in curing the same diseases, with the sole variation of being, in different cases, one less efficacious than the other.”†

Without going to this extent, still we cannot doubt that free dilution causes much of the benefits which follow the drinking of mineral waters, both thermal and cold. In gout we have seen that drinking of cold water has acted both as prevention and cure. Warm water has been extolled with the like intent. For a while the treatment laid down by Cadet de Vaux acquired some vogue. It consisted in the

* A Treatise on the Chemical History and Medical Powers of Some of the Most Celebrated Mineral Waters, &c., together with Observations on the Use of Warm and Cold Bathing.

† Saggio intorno alle Principali Malattie del Corpo Umano.

patient drinking six ounces of water, of 124° F., every quarter of an hour, until forty-eight glasses had been thus imbibed—making, in twelve hours, eighteen pints of fluid. Krugger relates the details of this treatment in two cases. Violent effects ensued. In the first case, after the ingestion of the forty-eight glasses, the body was swelled enormously; there were cerebral congestion, delirium, and such copious discharges from the skin and kidneys as to produce entire exhaustion, threatening to terminate life. The digestive functions were also affected, and the gout still retained its hold. In the second case, the patient, aged forty-seven years, could only swallow thirty-eight glasses of the hot water. The first of these caused sweat, and an abatement of the gouty pains. After the thirtieth glass, watery vomiting came on; and on the thirty-eighth being swallowed, there supervened a loss of consciousness, epileptic convulsions, and general paralysis; stertorous respiration, and a soft and undulatory pulse, &c. Active means of restoration were employed, and on the following day consciousness was restored, but the memory was weakened; the patient looked as if he had just come out of a long sickness. The gouty symptoms disappeared, however; but some of them were renewed by aromatic baths given to calm the convulsions.

These cases are full of instruction, not as examples for our imitation, but as evincing the great activity of water in a medicinal point of view—a fact which might otherwise be disputed by those who had not given their attention to the subject. In smaller quantities or at longer intervals than recommended by Cadet de Vaux, hot water will be found to display a laxative, sudorific, and diuretic operation, and to act with considerable power on the nervous system; to be, in fine, adequate to the relief and cure of large and diversified classes of disease.

In intermittent fevers, hot water, drank to the extent of four to eight pints in the twenty-four hours, was found to cure numerous cases of great obstinacy, and complicated with visceral obstructions.

Favourable testimony has been borne to the good effects of warm water in the treatment of epidemic cholera. "It consists in nothing else," writes Dr. Sturm, a surgeon in the Polish army, "than giving to the patient as much

warm, nearly hot, water as he is able to drink, in the quantity of a glassful every fifteen or twenty minutes. By the time he has taken fourteen glasses the cure is complete, with the exception of a slight diarrhœa, which it is not proper to suspend."* Large deductions must be made from the estimates of the curative value of the different articles used in cholera, and we cannot suppose that hot water will furnish an exception; the more especially when we know that cold water and ice have, each, had their eulogists in the same disease.

CHAPTER XX.

WATERY REGIMEN (*continued*)—THE TOPICAL APPLICATION OF WATER — RECOMMENDATIONS OF HIPPOCRATES — OF MODERN WRITERS—IN INFLAMMATIONS OF THE JOINTS—IN HEMORRHAGES—THE AUTHOR'S CASE—IN AMENORRHŒA—PUERPERAL PERITONITIS—INFLAMMATION OF THE BRAIN—WATER DRESSING IN SURGERY—EARLY RECOURSE TO THIS PRACTICE—IN MODERN TIMES, INTRODUCED INTO GENERAL USE BY FRENCH MILITARY SURGEONS—SKETCH OF ITS HISTORY—OF GREATEST EFFICACY IN LACERATED WOUNDS—DR. MACARTNEY'S VIEWS OF THE REPARATIVE PROCESSES—HIS DIRECTIONS FOR THE USE OF WATER DRESSING—CONDITIONS AND CAUTIONS—STEAM DRESSING.

The Topical Application of Water.—I forbear from engaging in farther details of the efficacy of water in the form of a general bath, as they will find their appropriate place under the heads of the several divisions of baths. Just now, I would invite the attention of the reader to the topical application of water, as a part of the watery regimen.

Hippocrates (Sect. V., Aphor. 25) recommends an abundant flow of cold water on painful and swelled joints when they are not ulcerated, also in gout and convulsions, as a means of relieving pain. He advised a similar application in cases of spasms, luxations, and fractures, in

* Bell and Stokes, *op. cit.*, vol. i., p. 420. Fourth Edition.

order to prevent the swelling consequent upon these accidents. Consonant with the Hippocratic practice was the course pursued by a victim to the gout, who, as Percy tells us, used to assuage the violence of pain by filling his boots with water after he had put them on. He occasionally even walked so far as to be able to look for and procure the books in his library to which he might wish to refer in his studies. Cocchi, Sanctorius, Marziano, and Barthez, give their approval to the treatment of applying cold to a gouty limb during the paroxysm of pain and swelling. Louret, the celebrated Harvey, and a great many others, have practised it on themselves. Strains and sprains, our "Curiosities of Common Water" friend, Mr. Smith, found to be entirely freed from all swelling and pain, by putting the part into a vessel of cold water for about two hours. "And if it should be the shoulder or any other part, which is so hurt that it cannot be well immersed in water after this manner, water may be applied by dipping towels, folded up into it, and laying them on the part, as is done in effect to the wrenched joints of horses, about which, if you wind sometimes a thick rope made of hay and then cast upon it at divers times a pail of cold water, the wrench will be cured."

In *inflammations of the joints*, especially when produced by external violence or sprain, cold affusions or cold ablution, according to the intensity of the injury or the facility of applying the water, have been at all times freely used. The recency of the accident, and the heat and pain of the part, are the chief indications for our employing cold water in a full stream. Mere stiffness and tumefaction, constituting the second or more advanced stage of the affection, will demand a recourse to the warm or even hot bath. Of the farther extension of the practice of using cold affusion in inflammations of the joints from sympathy with other parts, as in gout and rheumatism, I shall have occasion to speak when treating of the value of the different kinds of douches. But it is not necessary that we should have external signs of inflammation to induce us to have recourse to the use of local cold bathing in sprains of the joints, or rather of their fibro-ligamentous bands. When, after a violent effort of pulling or pushing, a person is suddenly seized with acute pain in

the small of the back, at the sacrum and sacro-iliac junctions, soon followed by heat of the corresponding region of the skin, frequent sponging of this part with cold water is a very soothing and salutary application. Pain in the same joints, or such weakness produced by fluor albus, or piles as makes any common effort at pushing, pulling or lifting, a cause of sprain, ought to be treated in a similar manner. Cold ablution, by sponging the small of the back, not only relieves the pain in this region, but also materially helps to allay the irritation of the piles, and also of the whites and other uterine disorders.

In the various forms of ophthalmia, the continued application of tepid water to the eye is peculiarly soothing. The cold douche to the eyes and on the head is highly extolled in granular ophthalmia.

Burns are treated by continued immersion of the part in cold water with signal advantage, especially if the skin have not been abraded, or its integrity otherwise destroyed.

Warm water, topically applied has the recommendation of Hippocrates, Galen, and a number of their successors in its favour, to relieve the pain of joints as well as of internal organs.

Ice and iced water, on the other hand, applied to the pained part, have relieved and even carried off the atrocious pains of neuralgia; and also of violent colics and nephritis, after general remedies had been used.

In every variety of hemorrhage from a mucous surface—as from the nose, throat, lungs, stomach, bowels, uterine and urinary passages—cold by means of ice and cold water, applied both externally and internally, have given the promptest relief. It is now many years ago when, taking a hint suggested by a lecture of Dr. Chapman, I directed cloths dipped in cold well water, of 52° F., to be applied to the chest of a patient with hemoptysis. The relief was immediate, and to his mind more satisfactory than after any other remedy or course of treatment. This person subsequently, as I learned, died of phthisis. In uterine hemorrhage, especially that which sometimes follows child-birth, there is not I think any other kind of relief comparable to the use of ice, freely packed on the abdomen and groins of the patient, and otherwise applied in the manner which is recommended in the use of cold in uterine hemorrhages.

Nearly a century ago two cases were recorded, one of a male subject, to whom iced water was applied for excessive heat of the intestines; and the other of a female, with hemorrhage following delivery. To the latter her physician, M. Olivier, directed the application of a sheet wet with vinegar and water, in which she was enveloped from the pubes up to the epigastric region. So soon as the sheet became warm it was wet afresh with the fluid.

In hematemesis or vomiting of blood, and in hemorrhage from the bowels, and hemorrhoids or piles, and uterine hemorrhage, although cold affusion or even a short immersion in cold water will be serviceable, where the circulation is much increased in frequency and the augmentation of animal heat considerable, yet, generally speaking, we are content with local ablution or cold compresses over the region affected. Floyer speaks of the successful employment of cold pediluvium in hemorrhages from the womb; illustrating the truth of my opinion on the mode in which cold to every part of the skin acts on the internal organs; viz., by a direct reduction of their capillary excitement. In hematemesis, cold, by frequent sponging or wet cloths, is applied to the epigastrium—in intestinal hemorrhage, over the abdomen generally—in vesical hemorrhage and in piles, to the sacrum, perineum, and groins, and to the rectum by means of injections of pure cold water. The farther addition of cold cloths to the pubes is proper in bleeding from the bladder. In uterine hemorrhage, a cold hip bath—that in which the patient is seated in the water, while the lower limbs are out of the bathing vessel—is very serviceable; or in place of this, recourse should be had to cold applications by means of ice or cloths wet with cold spring water to the loins and sacrum, or small of the back—also to the perineum and groins, and to injections of cold water into the rectum and vagina.

Cloths wet with water, or sponges containing ice, have been applied with success to the abdomen of females who suffered from obstruction of the menses—care being taken to renew the cloths as soon as they lose their coldness. Pounded ice placed on the abdomen has been praised in the treatment of puerperal peritonitis. Of late years we have become familiar with its use in epidemic cholera—by rubbing the skin freely with ice. This practice, it will

be remembered by the reader, was pursued by Samoilowitz, in the plague at Moscow. In inflammation of the brain, cold water and ice to the head have long been favourite applications.

Enemata or Clysters.—Among the uses of water, topically, the introduction of this fluid into the lower bowels, is entitled to separate and commendatory notice. According to its quantity and temperature, water alone, when used by injections, will in a great variety of cases procure all the good effects attributed to the medicinal substances, of which it is the vehicle. Costiveness is readily relieved by an injection of a pint of lukewarm water, which may be repeated in an hour or two, if the first fail to produce the desired evacuation. In torpid states of the bowel, without any local irritation, a table-spoonful of common salt dissolved in the water, renders it more stimulating and likely to exert a laxative operation. Often the stomach and upper bowels may be saved from the irritation of drastic purgatives by the use of enemata, both in cases of habitual costiveness and in acute disease. More especially should we have recourse to this remedy where the stomach is irritable, and the patient unable to retain anything in his stomach.

When fever rages, and the sick man tosses about from side to side, hot and panting, and unable to assuage the intensity of his thirst by all the drinks which he swallows, no means of refreshment and refrigeration are so efficacious as the cold bath and cold enemata. The raging fire which seemed to be consuming the viscera is soon extinguished by the ingestions of cold, or even iced water. The same general indications will govern us in the temperature and repetition of this remedy, as in the case of drinking cold water and the use of the cold bath; viz., a high and sustained heat of the organ, and general excitement of the bloodvessel system. Sometimes, there is, however, great coldness of the skin, associated with a sensation of acrid heat internally, and when this occurs in the beginning of fevers, or in cholera, the observing physician—I do not mean the amateur doctor or doctress—will judge of the propriety even here of directing cold water injections, which, like cold water drinks, while they allay the internal heat, tend to develop the external, and thus to

equalize its diffusion through the body at large. In the decline of a disease, or in very nervous habits, subject to alternate heats and chills, the injections ought to be tepid or even warm.

Where, on the other hand, the system is depressed, and the indication is to rouse it, injections of quite warm or even hot water will be among the measures contributing to this end. In cases of hemorrhage from the uterus or bladder, cold water thrown upon the bowels often gives speedy relief. Among the variety of remedies used in irritable bladders (*catarrhus vesicæ*), I have not found any which were so frequently soothing to the tortured patient as enemata of cold water. Injections of this fluid into the bladder itself, often allay pain in this disease.

I ought not to dismiss the subject without expressing a wish that a proper apparatus for administering injections were in every house, and that it should be had recourse to in many minor yet troublesome ailments, for the relief of which the stomach is too often drugged and irritated, and permanently disordered. At the same time, I must add a caution against the too frequent use of this means (such as is made by large numbers, on the continent of Europe), which gives rise to a loss of healthy tone of the lower bowel, and inability to procure common defecation without its aid. Hemorrhoids and uterine irritation, also, are sometimes caused by the injudicious use of injections or lavements, as, borrowing a word from the French, they are of late years often called.

Water Dressing in Surgery.—The teachings of John Hunter, by his pointing out the recuperative processes pursued by nature in the healing of wounds, contributed not a little to simplify their treatment. An improvement in this respect had been, it is true, begun by his predecessor, Pott; but, still, surgeons were, until late years, indeed we may say many of them are even now, backward in having recourse to simple water dressing in place of poultices, unguents, and plasters, in the treatment of wounds. A brief outline of the history of water dressing in surgery will not, it is hoped, be unacceptable at this time.

The lover of classical lore will refer to the example of Patroclus, at the siege of Troy, who, on the occasion of the wound received by his friend Eurypilus, dressed it

with water, after he had withdrawn the javelin. In subsequent ages, the Greeks were in the habit of using cold water by affusion on the head, for insolation or sun-stroke, troublesome ophthalmia, and *gutta rosea*.

In modern times the use of water, as a vulnerary, first obtained some vogue in Italy; but it was first freely adopted by French military surgeons, who formally acknowledged the great utility of this remedy, and showed its superiority over the farrago of applications with which vain learning had at different times tortured the wounded soldier. Ambrose Paré thought himself abundantly rich when he became possessed of the secret of preparing a wonderful Italian balsam (*oleum catellorum*), which was to heal all kinds of wounds. But when, afterwards, he saw simple water, in the hands of a quack, named Doublet, at the siege of Metz, in 1553, produce equally wonderful cures with those which he obtained from the use of his balsam, he could neither conceal his disappointment nor his mortification. He thought that there must be something supernatural in such surgery as this, which he at first refrained, on account of religious scruples, from adopting. In an age of superstition such prejudices need not surprise us, the more especially when we learn that it was common to attribute the success of the water practice to peculiar sympathies or magical incantations, which could only be wrought by a privileged few. Paré's good sense soon enabled him, however, to discover and to declare that the true vulnerary was the water and not the mummery.

The Latin essay of Michel Angelo Blondi on water as a newly discovered remedy in gun-shot wounds (1542), served only to fix attention for a moment on the subject. The view taken of it by this author was too natural—he spoke merely of simple water, which could not be supposed to interest the people, nor produce on them the same wonderment and confidence in its curative powers, as conjured or magical water. In this respect we do not find that mankind have been much altered in their credulity and love of the marvellous. Tell them of the salutary and sanative properties of pure water, and they smile incredulously, or perhaps scornfully. Render it impure by some impregnation, either mineral or vegetable—or vinous or alcoholic—then call it *aqua mirabilis* or balm of Gilead, or any un-

meaning but yet sounding title, and it is eagerly sought after, purchased with much silver or fine gold, and swallowed with a faith which works prodigies in the way of cures, or averments of cures, which are just as useful to the not over-conscientious compounders and venders.

Gabriel Fallopius of Venice, and after him Felix Palattus of Trebia, more properly called by his Italian name Palazzo, endeavoured to do away with the mummerly of quacks and conjurers, and to exhibit simple water as a vulnerary, meriting the attention of the regular surgeon, and to be employed of varying temperature according to the nature of the wound. Joubert and Martel in France, exerted themselves in the same spirit, and with such success as to obtain for the practice the formal sanction of the University of Montpellier. But nature and common sense were not long allowed to bear sway. Van Helmont with his sympathetic dressings—Giclenius with his magnetic cures—the devotees with their plaster from the *hand of God*, gradually cast the aqueous practice into oblivion; or if it were had recourse to, some wonderful mixture was introduced into the water, such as the powder of Sir Kennelm Digby, which had all the credit of success, due in fact alone to the simple fluid. In Italy, indeed, owing to the warmth of the climate, and the instinctive necessity of frequent recourse to water for the purposes of ablution and drink, the aqueous regimen in diseases and wounds was less corrupted by the jargon of the schools and the tricks of mountebanks.

Lamorier, in France, attempted once more to direct the attention of his countrymen to the subject, in an essay "On the Use of Common Water in Surgery," 1752. By a fortunate coincidence this publication appeared at the time when all France, and even Europe, was made acquainted with the wonderful success of the practice in the case of the Duke of Orleans, who was cured of a wound of one of his hands (which at first seemed to threaten the most serious consequences, and even to require the amputation of the arm) by the sole and free use of water, by immersion and affusion of the part affected. Were the remedy less simple and natural, and to be obtained with less facility, I should not think it necessary thus to show the revolutions of favour which it has undergone in the

professional world—nor to cite in its support the names of Sancassani in 1753; Caldani in 1767, and Bonneken, whose sage efforts were, however, insufficient to preserve it a place in clinical surgery. It fell into neglect, if not into disrepute, for nearly a period of thirty years. Dantier, in 1780, published a valuable essay on this subject, which abounds in sound precepts and erudition. But it is doubtful whether his labours would not have been as unsuccessful as those of his predecessors, had not a fortuitous circumstance restored water to its former high rank among surgical remedies.

Percy, the distinguished military surgeon, from whom I have borrowed the preceding details,* tells the story as follows. On the 4th of June, 1785, whilst trials were being made of the comparative merits of the cannon of two rival founders, several artillerymen, among whom was Pichegru, then a common soldier, were wounded in different parts of the body. The chief surgeon, Lombard, a man of great merit, dressed these contused and lacerated wounds in the usual manner. A miller of Alsace, having heard of the accident, went to the governor of the province, and succeeded so well in persuading him of his ability to render water an infallible cure for all sorts of wounds, that the worthy magnate gave orders to have the soldiers placed under the charge of the miller, and to be dressed exclusively by him. This surgeon by intuition immediately set about washing their wounds with river water, to which he added a pinch of powder, at the same time making divers signs, sometimes with one hand and sometimes with the other, and muttering some unintelligible words. The powder was nothing but common alum. The additional virtues imparted to the water by such mummery may be readily appreciated. After the wounds had been well washed and bathed, the miller covered them with linen and lint, which were readily furnished by the ladies of the city, and which he dipped in the water, still gesticulating and uttering the magical words. For fear that the charm should be broken, we, says Percy, who was himself one of the surgeons of the garrison at the time, were not allowed to be present at the dressings, except at the twelfth, twen-

* *Dictionnaire des Sciences Medicales.* Art. Eau.

tieth and thirty-first day, in order to assure ourselves of the state of the wounds. These progressively amended, and were, without much pain, or any other dressing than the *prepared* water, all cicatrised in six weeks—although immediately after the accident the surgeons hesitated about the propriety of amputating the hands of six of the artillerymen, which were most lacerated. The wounds were only exposed once a-day; but every three hours they were wet with the water, moderately cold, which the miller called his *holy water*. Percy makes a remark, and it is an instructive one; that, as may naturally be supposed, there was some deformity of the hands and fingers of the wounded, for want of suitable support by splints and graduated bandages.

This lesson was not lost on the French surgeons, who found simple water as serviceable in their hands as in those of the miller with all his charms and secret powder—while their entire treatment was more successful than his, on account of their using water either cold or tepid, according to the condition of the wound, and of their calling in the aid of posture and splints, to prevent pain and deformity. It is in this way that true science ever shows itself superior to empiricism. Percy, thus early acquainted with the vulnerary properties of water, did not fail to make liberal use of the remedy in the campaigns of the French armies, during the wars of the revolution. The waters of the chief rivers of Europe, from the Moselle to the Guadalquivir, have often alone formed the dressing of the numerous wounded soldiers of these armies. In Egypt itself, Larrey found the river Nile to furnish a vulnerary to the most terrible wounds. Professor Kern of Austria, while praising the use of water in the treatment of wounds, has erred in claiming for himself the honour of discovery.

Percy regards water as especially efficacious in lacerated wounds of the membranous and aponeurotic expansions, and also of the tendons; he tells us, that he has often succeeded by the external use of this fluid in saving limbs which were so dreadfully lacerated that it seemed imprudent to defer their immediate amputation. Immersion of the part in cold or tepid water, according to the season and present convenience; or the application of sponges or linen dipped in water; or, in fine, this fluid, used in every

fashion, prevented, or moderated when they occurred, sinister symptoms ; restrained within proper limits irritation and inflammation ; and favoured as good a suppuration as the nature of the parts would allow of. By such means, continues this eminent surgeon, "I obtained cures, the credit of which no other remedies could dispute with water, since it was the sole application to which I had recourse." He thinks that we obtain by the use of water all the best effects without the inconveniences of poultices—and save large sums to the public treasury.

The mode of using water to a limb or other part, by applying round or on it, as the case may be, pieces of sponge moistened from time to time with this fluid, is very advantageous—since it is sufficient to pour the water on the sponge without removing it ; so that disturbance and pain are thereby prevented. Attention must be paid to the nature of the stuff which is employed as the vehicle and recipient of the water applied to the part ; since, if it be of linen, the evaporation will be great and rapid, and the part soon becomes dry.—Cotton is a better retainer, flannel superior to this again, and swansdown the best of all. If the part be very sensible or irritable, we may apply moistened linen immediately on the skin, and flannel or lint saturated with water above it again. In tropical latitudes, a favourite and successful remedy for wounds, is the plantain leaf applied to the part, and frequently wet with water. *Trismus*, or locked jaw, would, in the opinion of Percy, be a much less common occurrence after wounds, if water were used to moisten the dressings and to refresh the part. Sometimes in indolent wounds, where the borders become soft or spongy, it may be well to add to the water a little common salt, or an alcoholic liquid. This remark applies to all wounds with contusions ; and most gun-shot wounds are of this character. Percy cites the success attending the employment of water, with the chill barely taken off, in several cases of gun-shot wounds of the feet ; and in which there was a terrible laceration of the tendons, aponeuroses, and ligaments, and fractures of the bones. Except four deaths—two from fever, one from lock-jaw, and one from colliquative diarrhœa—all the other wounded who were subjected to the watery treatment recovered, and most of them without ankylosis. Were it pos-

sible, says the French surgeon, for a person wounded by a bullet, or by any other violent means, in the elbow, knee, or foot, to keep the part immersed in water, during the first ten or fifteen days, we should have much fewer amputations to perform, and a greater saving of lives

Sanson* thinks that the water dressings are best adapted to lacerated wounds involving the tendons and aponeuroses.

One of the most methodical and complete treatises on the use of cold water by affusion in the treatment of wounds, of late years, is that by M. Josse, of Amiens.† The forms of inflammation in which this writer states, from experience, that cold water may be employed with success, are, in addition to contused wounds, erysipelas, phlegmon, burns, and gangrene.

M. Josse recommends cold water to be applied directly after the injury, before reaction has taken place; and where it can be maintained with energy proportional to the occasion, the phenomena of reaction will, he assures us, be prevented, the heat, pain, and swelling will be subdued, and consequently the sympathetic fever will not take place. He goes still farther, and asserts that even after the inflammatory symptoms have been developed, these will be conquered by its efficient use; and that reorganization takes place more favourably under its application.—*Brit. and For. Med. Rev.*, vol. iii.

A more modified view is probably the correct one, viz., that cold water is beneficial in the forming, and probably in the first stage of inflammation, but that after this, tepid or warm applications or steam, as recommended by Dr. Macartney of Dublin, are preferable.

To the gentleman just named is British surgery more indebted than to any other, for the free and methodical use of the water dressing in wounds. In his work on Inflammation,‡ Dr. Macartney points out the important fact of the reparation of parts, after wounds, being brought about by processes more approaching to physiological growth than to the pathological state of inflammation; which last,

* *Dictionn. de Med. et de Chirurg. Pratique.*

† *Emploi de l'Eau par la Methode des Affusions*, in *Melanges de Chirurgie Pratique*, 1837.

‡ Republished in Bell's *Select Medical Library*.

so far from being necessary to such reparation, retards and may prevent it entirely. The process of reunion and reorganization, without any medium of lymph or granulations, he terms the *approximating* or *modelling* process of reparation, or that by a *natural growth*. In another process, or that in which there is effusion of lymph, the mode of reparation is also non-inflammatory. The mode of reparation by granulations, so commonly regarded as a consequence of inflammation, is shown by the Dublin professor to be a non-inflammatory process. The same remark applies to ulceration itself, although the language of Hunter, "ulcerative inflammation" would designate a different state of things.

The practice of water dressing by Dr. Macartney is deduced from the principles just laid down. It assists the reparative process by producing a moderate degree of cold in the affected parts, which diminishes but does not extinguish sensibility and vascular action; in fact allows the reparative process to be carried out as in the inferior tribes of animals. The cold, "a direct sedative to all vital actions," should, therefore, be in such a moderate degree as to prevent inflammation, but without suspending the process of reparation. For this purpose the mode by irrigation is preferable. In cases of severe injury alone, where the inflammation cannot be otherwise restrained, intense cold is admissible. "A very simple rule," Dr. Macartney tells us, may be safely followed with regard to the use of cold applications: which is, to consult the feelings of the patient. Wherever they alleviate the pain they do good; and wherever they have not this effect they are improper."

Dr. Macartney's mode of employing irrigation for water dressing is equally simple and efficacious—in wounds or other injuries of the extremities:

"The most easy and manageable way of employing irrigation is to place the limb of the patient in a trough, and having laid some lint on the inflamed part, to let the water be conducted by means of a strip of woollen cloth, from a vessel holding the water or other fluid, which may be placed on a chair or table standing beside the bed. One end of the strip is to be inserted into this vessel; the other, which should be cut into a pointed shape, laid on the lint.

The water will then proceed in the manner of a syphon continually from the vessel, not by drops falling from a height, the sensation of which is disagreeable. The water is carried off by a tube proceeding from the end of the trough into a vessel placed at the end of the bed. I have found that a strip of cloth of some breadth where it is inserted into the water, and ending in a point where it touches the lint, answers the purpose of a syphon much better than the filaments of candle-wick which some surgeons have employed. The patient with this apparatus is able to vary his position, which is a great comfort to him. It is obvious that irrigation can only be used with convenience to the extremities. The water may have any degree of temperature that is desired ; and if it should be wished to employ iced water, the vessel holding it may be placed at a distance from the patient's bed, or even outside the room, and conveyed by an elastic tube on which there is a cock, to regulate its admission into a smaller vessel, situate near the bed."

The prime conditions for aiding the reparative process of nature, by preventing or subduing inflammation, so liable to occur in wounds, consist, principally, according to Dr. Macartney's views, in the careful regulation of temperature and the constant application of moisture. For the purpose of abating the immediate effects of injuries, he has recourse to steam at a high but comfortable temperature, which is gently stimulant and yet extremely soothing to the feelings of the patient. After the pain and sensations from the injury have passed away, the steam may be continued at a lower temperature ; and Dr. Macartney thinks that no local application is comparable to this when the inflammation is of an active character. He admits, however that for assisting the reparative process, water-dressing will generally answer sufficiently well.

Mr. Miller* judiciously advises that the application of cold should be continuous where we wish to prevent the occurrence of inflammation. If interrupted there will be periods of reaction after the sedation from cold, which cannot but prove injurious, by its tendency to bring on the

* Principles of Surgery.

already impending inflammation. If the mode of irrigation be not employed, the part, covered with a layer of loose lint, should be kept constantly moist, and of a low temperature by means of cold water frequently and gently dropped on it out of a sponge, in the hands of a faithful nurse or other attendant. It is also important that when the cold applications are discontinued and others substituted, the change should be gradually made.

Interesting information on this head will be found by reference to a paper of Dr. Tillet, of Lancaster, Pa.* The cases related by Dr. Tillet are chiefly illustrative of the beneficial effects of cold water in violent inflammations of the extremities, following fractures, wounds, and other injuries. He directs in the more violent grades of inflammation, that the coldest spring or well water should be procured, or, if necessary, it may be cooled artificially, and the limb kept constantly bathed in it, until the morbid excitement be reduced. Dr. Tillet thinks that copious affusions of cold water would be preferable to the common practice, in lacerated wounds.

On equally good authority as the foregoing, we should be free to use cold water affusions and ablutions in ulcers. I have myself adopted this treatment in such cases with marked benefit.

Smith, in his "Curiosities," &c., lays down a sound surgical axiom, viz., that all wounds without loss of substance will heal of themselves, if inflammation be prevented, and the lips of the wound be kept close together. He recommends, accordingly, a linen rag doubled round a cut finger five or six times, after being dipped in water. We may doubt whether such sound views of pathology and cure were entertained at the time (1723), by the leading surgeons. This, be it remembered, was a generation at least before Hunter taught and wrote. Smith relates cases of ulcers cured by prolonged immersion of the parts in cold water, as where a man, while angling, has stood, with bare legs and feet, two hours at a time in water.

* North American Medical and Surgical Journal, vol. v.

CHAPTER XXI.

WATERY REGIMEN (*continued*)—THE VALUE OF PRECEDING STATEMENTS—CONNECTED VIEW OF THE INTERNAL AND EXTERNAL USE OF WATER—SUMMARY OF THE PHYSIOLOGICAL EFFECTS OF WATER AS A DRINK—MEDICAL TESTIMONY—PAINS TAKEN IN ANCIENT TIMES TO PROCURE GOOD WATER—DIRECTIONS OF HIPPOCRATES—OF CELSUS—THE DIFFERENT KINDS OF WATER—RAIN AND SNOW WATER—RIVER WATER—ITS ORIGIN—ITS COMPOSITION—MEANS OF PURIFYING WATER—REST AND FILTRATION—RESERVOIRS OR CASTELLA OF THE ROMANS—PROCESSES AT THE PRESENT TIME—BOILING—DISTILLATION—CALCARIOUS SALTS SALUTARY IN WATER—CHEMICAL COMPOSITION OF THE WATER OF DIFFERENT RIVERS.

THE reader will have found in what has been said of the watery regimen in preceding chapters, the main outlines with illustrative details of the subject, which must be deemed at once curious and instructive. Some of these have a historical, others a suggestive value, in their showing what has been done and what may be done by both the dietetic and medical use of water. We must not, however, be deceived into a belief that the various practices recorded are, all of them, safe precedents for our future guidance. In many instances they are wanting in precision of detail, and do not rest on a sufficiently clear diagnosis of the disease, nor of the bodily circumstances of the patient, as regards age, constitution, prior infirmity, and his impressibility under physiological, pathological, and therapeutical agents. Unfortunately, our experience in medical hydrology has not been regularly accumulative; but has come in fits and odd fashions and at irregular intervals. The first quarter of the nineteenth century found the medical world not much more enlightened on the diversified applications of the watery regimen, than it had become by the end of the corresponding quarter of the eigh-

teenth century; if we except an approach to a better method in the use of cold bathing in fevers, established by Currie of Liverpool, in his *Medical Reports on the Effects of Water*. The title is continued—*Cold and Warm, &c.*,—but of his views and practice in what relates to warm bathing we find little in itself, and nothing to lead us to discoveries in this path. The work of Marcard more worthily closes the balneatory literature of the eighteenth century, in the department of warm bathing.

But it is not my design to exhibit a continuous and connected view of the successive writers on bathing, or on the watery regimen in general. My wish now is to direct attention more particularly, though still not exclusively, to the internal use of water; reserving to myself the opportunity of treating of its effects externally, when the several divisions of the bath come up, in order, for consideration. The connected view which ought to be taken of the internal and external use of water, at the same time, or in the same disease, has too frequently been lost sight of. It is on this connection, in imitation of Floyer, I laid some emphasis, and shall yet prosecute the theme in a few more chapters on the same subject.

Water we have seen to be a prime constituent of all organized bodies, both solid and fluid: itself alimentary, it enters into the composition of all aliments, whether animal or vegetable. It is the necessary diluent, and the chief solvent of nutritive substances, which by its medium find entrance in and give support to living bodies,—whether these substances are absorbed from the earth by the roots, and from the air by the leaves of plants, to be elaborated with it into sap; or from the stomach and intestines by lacteal vessels, to be converted with it into chyle and blood.

Water is the appropriate drink and, with the exception of the human race, it is the only one for animated beings. To man it is adequate, with solid food, to all the necessary wants of growth, renovation, and strength; and even when it is most adulterated by poisonous additions, as in alcoholic liquors, it still constitutes one-half of the entire fluid. It is the basis and the most salutary part of most of the drinks of the sapid kind—those in which additions have been made to water for the purpose of pleasing the palate, and of more promptly abating the cravings of thirst.

Of this kind are saccharine and acidulated drinks, and slight vegetable infusions, teas, &c.

They who drink nothing but water have been found to be more enduring of fatigue and great labour, and of hardships and exposures in every extreme of climate and season, than they who use alcoholic beverages. The comparisons have been made in almost every conceivable manner (seldom it is true designedly) and with the result just announced. Men who have to carry on laborious occupations at a high temperature, as in iron-foundries, gas-works, sugar-houses, &c., find that the use of alcoholic liquors, while they are so employed, is decidedly prejudicial to them. Of twelve workmen, smiths in the dock-yard at Portsmouth, England, who tried the experiment for a week, six drank nothing but water, the other six took the usual allowance of beer. After the first day the water drinkers complained less of fatigue than the others, and after each successive day the advantage was on the side of the abstainers, until the conclusion of the week, when the water-drinkers declared that they never felt so fresh in their lives as they had done during this period.* The advantage which these latter might be supposed to have over their beer-drinking companions, in the reward promised them by Dr. Beddoes, who urged the trial, was counterbalanced by the suddenness of their change of drink, and of the withdrawal of a habitual stimulus. Theoretically considered, more would have been expected from the new water drinkers in the second or the third week than the first.

At no time, as we learn from Sir James, then Mr. McGregor, was the Anglo-Indian Army, so healthy as when it was in Upper Egypt, and when from difficulty in procuring carriage, no ardent spirits was issued to the troops. And yet at this time there was great *duty of fatigue*: the soldiers were frequently exercised, and much in the sun; which shone with such an intensity of heat, that the mercury in the thermometer stood, in the middle of the day in the soldiers tents, at 114° or 118° F.

The case of Benjamin Franklin, the water-drinker and

* British and Foreign Quarterly Review, vol. xxiv. *The Physiological Effects of Alcoholic Drinks.*

the swimmer, the American Aquatic, as he was called by his associate printers in London, must be familiar to most readers, and ought to serve as an example to all.

Well might some hundreds, including the most eminent, of the physicians and surgeons of Great Britain, give their opinion, that the most perfect health is compatible with total abstinence from all intoxicating beverages, whether in the form of ardent spirits, or of wine, beer, ale, porter, cider, &c. ; and, also, that such abstinence may be practised at once with perfect safety, and that it would greatly contribute to the health, the prosperity, the morality, and the happiness of the human race. Equally emphatic and clear has been the testimony of hundreds of physicians in the United States.

Reference has been made, in these pages, to the great pains which the ancients took to procure an abundance of potable water. Farther evidence on this head will soon be adduced. One of the means consisted in boiling the water and then cooling it. The *aqua cocta et dein refrigerata*, water boiled and then cooled, was much recommended by Galen. The reader has seen some of the directions of Hippocrates in making the choice of water for drink. Rain waters he affirms to be "the lightest, the sweetest, the thinnest, and the clearest;" but he adds, "that of all kinds of water these spoil the soonest; and rain water has a bad smell, because its particles are collected and mixed together from most objects, so as to spoil the soonest." A little farther on, he tells us: "such to all appearance are the best of waters, but they require to be boiled and strained, for otherwise they have a bad smell, and occasion hoarseness and thickness of the voice to those who drink them." Hippocrates speaks disparagingly of water from melted snow and ice. Celsus gives the character of the different kinds of water in a few words, and with considerable accuracy. "Rain water is the lightest; then spring water; then river; then well; afterwards from snow or ice; lake water is heavier; the heaviest of all that of marshes." Galen agrees with Hippocrates in his judgment of the different varieties of water.

Rain water has been well described by Hippocrates, in its chief features, viz., its purity and lightness, and its tendency to putrify, owing to the mixture of organic matters

suspended in the air and precipitated with the first fall of rain, which, on this account, ought to be allowed to run to waste,—when it is designed to collect the water for drink and culinary purposes. We can readily understand, after what has just been said, why rain water should be less pure in towns and cities than in the country. It is still freer of foreign matters when procured at sea. Air is a constant constituent of rain water, in the proportion, by measure, of a twenty-fifth part, which consists of azote 60, and oxygen 40, per cent. Distilled water exposed to air, and agitated for the purpose of causing absorption of the latter, contains only 33 per cent. of oxygen. The gaseous proportions in rain water are diminished by increase of temperature and diminished pressure. Carbonic acid is found, but in varying proportions, in this water. So, also, is carbonate of ammonia, derived from the putrefaction of nitrogenous substances.*

River water, as we shall notice presently, is, on account of its purity, by its containing less saline impregnation, more apt to become contaminated with lead from roofs, gutters, cisterns, and water pipes.

Snow water is destitute of air and other gases. Its reputed character, of causing goitre in those who drink it habitually, is not sustained by observation. Water from melted ice is very pure, but not so easy of digestion as rain or river water made cold by the addition of ice. It offers, however, a great resource to those engaged in maritime expeditions in the polar regions, by some of whom, as by Captain Parry, it has been exclusively used for a length of time. The hardest ice, and that elevated above the level of the sea, should be selected. After being broken up and dissolved in hot water, it should be well shaken and stirred up, and exposed at the same time to the air.

River water is that which alone can furnish an adequate supply for drink to the congregated masses in towns and cities, or wherever the population is dense. Rivers de-

* "It is worthy of observation," says Liebig (*Organ. Chem. in its Applic. to Agricul. and Physiol.*), "that the ammonia contained in rain and snow water possesses an offensive smell of perspiration and animal excrements, a fact which leaves no doubt respecting its origin." It is owing to the presence of ammonia that rain water owes its *softer* feel than pure distilled water.

rive their origin either from melted ice and snow, or from rain water, which percolates through the mould or upper stratum of earth until it falls into crevices of rocks, from between which it emerges in the form of spring water and feeders of rivers. All the chief rivers of Europe and Asia have their rise in the deposits of the mountain glaciers. Wells, indeed, must receive their supply from rain water, which reaches them by a slower process than that by which springs are fed; or, as it were, drop by drop. River waters, so far as regards their chemical constituents, will derive their character from the different earthy or mineral strata through and over which they may flow, and in part from the occasional sudden augmentation which they receive in torrents of minor streams, the melting of snow, or after heavy rains. These streams have saline or mineral matters in solution, but vegetable still more, which are swept away from the surface of the ground or from their overflowed banks. The carbonic acid in river water is diminished as the river opens out an expanded surface and traverses a great extent of country, and at the same time the lime which was held in solution by an excess of this acid is precipitated.

Means of Purifying Water.—Water by being allowed to rest becomes after a while limpid. The period for this purpose is, however, inconveniently long. Ten days are said to be required to clarify the waters of the Garonne and the Rhone. In warm weather there would be a risk of water thus at rest being converted into an unwholesome stagnant water, to which, owing to innumerable insects falling in it from the atmosphere and the products of spontaneous vegetation, a disagreeable taste would be imparted.

The ancient Romans obviated this inconvenience by having reservoirs at certain intervals along the line of their aqueducts, so that while the grosser impurities were deposited in the first, the supernatant fluid would still pass on to its destination in the city—through successive reservoirs. These, called *castella*, allowed both of the deposit of sediment, and also of a more easy superintendence and repair; a defect between any two of them being readily detected. The *castella* were serviceable, also, by furnishing water for the irrigation of fields and gardens. The principal castellum or reservoir was that in which the aqueduct terminated, and whence the water was conveyed by

different branches and pipes to various parts of the city. This far exceeded the others, not only in magnitude but in solidity of construction and grandeur of architecture. The remains of a work of this kind still exist in what are called the *Nove Sale*, in the Esquiline Hill at Rome; while the *Piscina Mirabilis* (*Cente Camerelle*), near Cuma, on the bay of Naples, is still more interesting and remarkable; being a stupendous construction, about 200 feet in length by 130 in breadth, whose vaulted roof rests upon forty-eight immense pillars, disposed in four rows, so as to form five aisles within the edifice, and sixty arches. Some antiquaries have supposed that this immense reservoir was built for holding water to supply the Roman fleet at Misenum, one of the chief naval depots of the empire.*

* The number of castella in the different regions of Rome was computed to be 247, under various denominations, and for various uses. There were three principal divisions, into public, private, and domestic. Under the first were included those which supplied the fountains and pools of the city, the prætorian camps, the places where the public spectacles were given, such as the circus, amphitheatres, naumachia, &c., the baths, and the service of certain trades necessary to the wants and comforts of the whole community, irregular distributions for particular purposes, extraordinary grants to private individuals.

The private reservoirs (*castella privata*) were made by a number of individuals who lived in the same neighbourhood clubbing together and building a *castellum*, into which the whole quantity allowed to them collectively was transmitted from the *castellum publicum*. Although called private they were under the care of the *curatores aquarum*, or officers appointed to superintend the aqueducts, and to regulate the distribution of water to the city. In the time of Nerva and Trajan about seven hundred architects and others were constantly employed under the orders of the *curatores aquarum* in attending to the aqueducts. Their object was to facilitate the distribution of the proper quantity of water to each person, and to avoid puncturing the main pipe in too many places; for when a supply of water was not granted for private uses, each person obtained his quantum by inserting a branch pipe, as we do, into the main.

The *castella domestica*, or domestic reservoirs, were leaden cisterns, which each person had in his own house to receive the water laid in from the *castellum privatum*. These were of course private property—*Smith's Dictionary of Greek and Roman Antiquities*.

Reservoirs on a scale of uncommon magnitude were con-

But, although by rest the earthy matters, which were merely suspended in the water, will mostly subside, and leave it comparatively clear, yet a still more efficient mode of clarifying it is by filtering. This is chiefly performed through gravel and sand, and when procurable by charcoal, in a great variety of processes; but all are founded on the same principle, viz., the interposition of bodies, in the passage of the water through which it parts with the foreign matters that are merely suspended in or imperfectly mixed with it. The separation, therefore, is mechanical. A common instrument for the purpose is a filtering stone, sufficiently porous to allow of the percolation of water through it, but retentive of the grosser particles and impurities. Of the like nature, but in some respects better, because allowing of a complete removal of the impurities which obstruct the passage of water through the filter, when it has been some time in use, is the following simple contrivance. A large earthen funnel, or stone bottle with the bottom beaten out, may have its neck loosely stopped with small stones, over which smaller ones may be placed, supporting layers of gravel increasing in fineness, and, lastly, covered to the depth of a few inches with fine sand, all thoroughly cleaned by washing. This apparatus may always be renewed, by taking out and washing the upper stratum of sand. A better method, again, is to filtrate by ascension:—this is done by having two jars, communicating together at the bottom; one contains the gravel, sand, &c.; in the other, the turbid water is poured, which finds its way into the second, and, rising through the filtering matters, comes up quite clear. By means analogous to these, but on a large scale, river water is purified for the use of the inhabitants of Paris, Glasgow, Paisley, Chelsea, Philadelphia, and other places. An improved apparatus consists of a small box, lined with lead, and having at its lower part charcoal

constructed in Constantinople, the extent of which, even at the present day, excites the astonishment of every traveller. One of these extends several leagues beneath the city, and constitutes a labyrinth the limits of which are unknown. Formerly there used to be a boat on the waters, to allow of the traveller gratifying his curiosity by an inspection of a part of this vast labyrinth, in which some have been bewildered and paid the penalty of their lives for the gratification of their curiosity.

between two layers of sand. The passage of the water through this filter, is accelerated by artificial pressure, by which, from an equal body and surface of water, seventeen times the quantity can be passed as through a common filter in the same time. (*Ann. d'Hygiene, &c.*, t. xxi., p. 230-1.) The nauseous odour and disagreeable taste imparted to water by vegetable or decayed substances, or animalculæ, are removed by filtration, through animal charcoal, or by common filtration and subsequent boiling.

"In many places where both spring and river water are deficient, rain water is saved by the inhabitants in large cisterns for the purpose. At sea, when the regular supply of water runs out, recourse may be had, if favouring showers fall, to catch the rain, as it descends, on a sail spread horizontally midship; the centre of the sail being pressed downwards by a weight of any kind, so as to give it a conical shape. From this dependent and projecting part, the water drops through the canvass and is received in a proper vessel beneath. Recourse has been had also to distillation of sea-water, with more or less success, and by apparatus of more or less simplicity. Its empyreumatic taste is prevented by the passage of the vapour from the still through animal charcoal.

"The Egyptians clarify the water of the Nile, by putting almonds into it. Into an earthen jar filled with river water, a person introduces his arm and rubs the inside of the vessel with an almond paste in all directions, until a prescribed portion has been rubbed away: the inside of the jar being rough facilitates this operation. In this process the almond forms a kind of emulsion by its oil uniting with the earth of the water, and thus causes an imperfect precipitate. In Sennaar, Dongola, and in Nubia, beans and even castor oil seeds are used instead of the almond. M. D'Arcet, after describing the above, and the common method of filtration by filtering stones, next details a plan which he found more successful in clarifying Nile water. It consists in the introduction of a solution of alum or of the powder itself, in the proportion of a quarter or even half a grain to a quart of water. (*Ann. d'Hygiene, &c.*, t. iv., p. 377-81.) This means had already been used with success by the father of M. D'Arcet, in purifying the water of the Seine, at Paris. The Chinese had long

been in the practice of clarifying the turbid water of their rivers, by stirring the fluid which has been drawn, with a bamboo cane, into the hollow joint at the end of which a piece of alum had been introduced."

"Various methods were recommended and practised for purifying the water on board ship, which after a time becomes offensive to both smell and taste. One of the simplest and easiest is to expose the water to the air, by increasing its surface or by agitating and dividing it in the air by the aid of machinery. Charring the inside of the water casks was another approved method. But that which is now general in vessels of war, and in many merchantmen, is to put the water for the voyage in large iron tanks. The only recognisable change is an oxidation of the inside of the tank, and sometimes a slight ferruginous taste imparted to the water. The presence of iron seems to be necessary to the preservation of the purity of the water. When a water cask was coated with matter impermeable to moisture, the contained fluid still underwent the changes of decomposition, and became offensive, but when in a vessel similarly coated some pieces of iron were put, the water remained as pure as if it was in iron vessels. (*Keraudren. Ann. d'Hygiene, &c.*, t. iv.)

"It has been ascertained by M. Boutigny, who instituted a number of experimental observations on the subject, that the rain water flowing from zinc roofs is sufficiently impregnated with the oxide of this metal to be unfitted for a drink or being used in cookery. (*Ann. d'Hygiene, &c.* t. xvii.)"*

Charcoal is said, as a filtering body, not to possess properties superior to sand. Its disinfecting power consists in its absorbing the products of organic decomposition, which are dissolved in the water.

Boiling precipitates some of the earths which were united with carbonic acid, and destroys vegetable and animalcular impurities as far as regards taste; but the neutral saline constituents of the water still remain, and hence it retains the peculiar flavour derived from this cause. Professor Clark, of Aberdeen, has taken out a patent for

* Bell on Regimen and Longevity, p. 321-5. See also Dun-
glison on Human Health, p. 286-294.

the purification of waters. "The patent consists in the addition of lime held previously in solution in the water. The effect of this process is similar to that of ebullition. It has no effect on the gypsum of common water; and, therefore, can have little or no influence in rendering hard water soft. Alkaline carbonates soften water, decompose all the earthy salts (calcareous and magnesian carbonates, sulphates, and chlorides), and precipitate the earthy matters. They leave, however, in solution, an alkaline salt, but which does not communicate to water the property of hardness."*

Distillation has been recommended as the most effectual means of purifying water, and a wish has been expressed, at different times, that all the water required for drink could be subjected to this process. Distilled water for drink and vegetable substances for food, would, in the minds of some of the more sanguine dietists, come near the perfection of regimen, for the prolongation of life to its utmost limits, and an almost entire avoidance of disease. Foremost, in later times, among these enthusiasts is Dr. William Lambe,† to whom a friend and admirer, Mr. John Frank Newton, has dedicated an essay, entitled "A Return to Nature, or a Defence of the Vegetable Regimen." Among other instances aiding to enforce the use of distilled water is that related by Tournesfort, of one Francis Secardi Hugo, who made distilled water his only drink, without the addition of wine or any strong liquor, and who lived in remarkably good health to the age of one hundred and fifteen years. Heberden, who repeats this fact, is of opinion, that a course of distilled water might be as beneficial in many chronic pains of the stomach as the most celebrated mineral waters are in other disorders; and hence that it might prove no inconsiderable addition to the *Materia Medica*.

Observation and actual experiment of the effects of different kinds of waters do not bear out these somewhat theoretical views, based as they are on the assumption that every substance held in solution by water is foreign, and that, if not actually deleterious, still it interferes with its best nutri-

* A Treatise on Food and Diet, &c. By Jonathan Pereira, M.D., &c., &c. Edited by Charles M. Lee, M.D., &c., &c.

† See his works, on Constitutional Diseases, and on Cancer.

tive and dietetic properties. It must be remembered, however, that water, deprived of its atmospheric air and carbonic acid by boiling or distillation, is vapid, and does not sit so lightly on the stomach as common spring or filtered river water. One of the means of purifying water which has been long kept in casks is to agitate it, so as to expose it to the air.

But we are authorised to go a step farther, and to claim for wholesome potable water, not only its impregnation with a certain portion of atmospheric air, but also of saline substances, at least carbonated earths. This position is broadly laid down in a valuable work now before me, written by two gentlemen of Lyons, who have enjoyed large opportunities, and who have made all the questions connected with the health of great towns their particular study.*

M. Bousingault had pointed out the interesting fact, that pigs find in calcarious waters the material for completing the ossification of their bones, which they are unable to procure from their common food. A few years ago M. Dupasquier followed up the inquiry, and was led to regard the impregnation of water with certain foreign substances, as a providential provision. He specifies, of these, atmospheric air, carbonic acid, chloride of sodium (common salt), and especially bi-carbonate of lime (common chalk is a carbonate of lime). The calcarious matter in water is made up in the proportion of four-fifths of the carbonate of lime, which is the most assimilable of all the salts, and that which facilitates digestion. The other substances which are sometimes contained in water, and which are hurtful, are animal or organized matters in a putrid state, sulphate of lime constituting a selenitous or hard water, chloride of lime, and nitrate of lime. Carbonate of lime, it is well known, forms about a fifth of the osseous matter of bone, and phosphate of lime the other four-fifths. On these data it has been recommended to introduce a certain quantity of bi-carbonate of lime into distilled sea-water, in order to render it potable. The presence of this calcarious salt is easily indicated, as we learn from M. Dupasquier, by dropping 3 or 4 drops of the alcoholic tincture

* *Traité de la Salubrité dans les Grandes Villes. Suivi de l'Hygiène de Lyon. Par les Docteurs J. B. Monfalcon et A. P. L. de Polinière*

of logwood into a glass of the water to be tested. If there be the least trace of the bi-carbonate of lime, the water will exhibit a fine violet colour, owing to the action of this salt on the hematine.*

In many districts it is well known that calcarious or hard waters are used as the habitual drink of the inhabitants, without their being able to refer diseases specially to this practice. The inhabitants of the fauxbourg St. Germain, in Paris, drink the waters of Arcueil, which are calcarious, but which are generally considered to be very wholesome.

The water of the river Schuylkill, which supplies Philadelphia, contains, according to the analysis of Professor Boyé (in 1842), about $4\frac{1}{2}$ grains or 4.480; and according to Professor B. Silliman, jr. (in 1847), $5\frac{1}{2}$ grains of foreign matters, in a gallon. Of these, the carbonate of lime enters to the amount of $2\frac{1}{2}$ grs. according to the first, and rather more than $1\frac{1}{2}$ according to the second of these analyses. There are, besides, minute proportions of carbonates of magnesia, and soda, and chloride of sodium, with slight traces of silica and iron. Mr. Silliman found more than a grain and a half of the carbonate of soda.†

The following table exhibits the proportions of the common saline constituents, in some of the rivers the waters of which supply drink to the inhabitants of large cities:

	Paris, Canal of Orecq.	Seine.	Schuylkill.	Croton.	Thames, purest state.	Cochituate.
Carbonic acid, cubic inches			3.879	17.48		10.719
Solid matter	27.898	10.622	4.080	4.998	10.925	1.220
Carbonates, chiefly lime	10.213	6.229	2.850	4.060	.8668	.301
Sulphates, chiefly lime	8.930	2.451	.560	.000	0.440	.102
Chlorides	2.33 (m.)	0.466 (m.)	.153	.193	1.130	0.177
Organic matter	traces	traces	.036	.276	0.392	0.500†

The following is an estimate of the average consumption of water per head, in some of the chief cities—including not only what is drank, but what is consumed for domestic and manufacturing purposes, and for baths, stables, gar-

* Des Eaux de Source et de Riviere, &c.

† There are fluctuations in the amount of foreign matter dissolved in the Schuylkill water depending on previous rains, freshets, &c. Thus Professor Horford, in the early part of the year 1848, found only 3.508 grains in a gallon.

‡ The Cochituate supplies Boston.

dens, washing the streets, fires, &c. By an inhabitant of Paris, $2\frac{1}{2}$ gallons; of London, 20; of Philadelphia, 30; of Edinburgh, 19; of Glasgow, 37; of Vienne, Grenoble, and Montpellier, in France, 15. All France, 5 gallons.

CHAPTER XXII.

WATERY REGIMEN (*continued*)—DELETERIOUS EFFECTS OF BAD WATER—CONTAMINATION OF WELL WATER—EXAMPLE—DIFFERENCE BETWEEN WELL AND RIVER WATER IN TOWNS—HARD WATERS—PREFERENCE OF ANIMALS FOR SOFT WATER—IMPREGNATION OF WATER WITH LEAD—DR. LAMBE—PURE WATER AN ACTIVE SOLVENT OF LEAD—THIS EFFECT DIMINISHED BY SULPHATE AND CARBONATE OF LIME—DR. CHRISTISON'S OBSERVATIONS—PROTECTION BY A COATING OF CARBONATE OF LEAD—BY A SOLUTION OF PHOSPHATE OF SODA—CONCLUSIONS—DR. TAYLOR'S AND DR. DANA'S OBSERVATIONS—GALVANIC ACTION—MEANS OF TESTING THE PRESENCE OF LEAD.

As good water is known to be indispensable for both animal and vegetable growth and vigour, and to be curative as well as sanative in its effects on living organized bodies, so, on the other hand, it is an equally ascertained fact that bad or impure water is prejudicial to health, and in many cases decidedly deleterious. All succeeding experience confirms the observations of Hippocrates in this respect. Stagnant water of ponds or marshes, that are largely impregnated with vegetable or animal substances, especially if these have been decomposed, or in a state of decay, is productive of various disorders,—indigestion, diarrhœa, dysentery, enlarged spleen and liver, cutaneous diseases, &c.*

By some writers the bad water of marshy regions is believed to be quite as potent a cause of fevers, as bad air is generally admitted to be. "Even under the adverse circumstances of unhealthy situation, the substitution of good

* See Hippocrates on *Air, Water, and Places*, p. 66. Adams's Edition.

spring water for that of the impure water of the river Lee, which passes through Cork, has sufficed to exempt the soldiers in barracks from dysentery, to which previously they had been very subject."* By greater attention to procure good water for the British naval service in place of the impure and putrid supply of former times, the dysentery once so fatal is now comparatively infrequent. Drinking of water contaminated with the putrescent vegetable matter produced by the refuse of a starch manufactory, has given rise to dysentery in the human subject, and to fatal disease of an analogous nature in animals.†

Well and pump water, in towns particularly, is sometimes contaminated with animal matters in a fluid state, percolating through the soil from grave yards, privies, &c. I remember the laugh to which, at a gentleman's dinner party several years ago, the remark of an English singer gave rise, on his saying that he had drank from a certain pump in one of our streets water which had a strong mineral taste. Dr. Thomson, of the Glasgow University, by an analysis of the different wells of that city (12 in number) detected, on an average, 55 grains of solid matter in a gallon of water—the highest being $99\frac{1}{2}$ grs., the lowest 15 grs. The solid contents of the river water from different sources, for the supply of Glasgow, average eight grains. The solid matters of the wells consisted of sulphate of lime, carbonate of lime, chloride of calcium, nitrates, chloride of magnesium, chloride of sodium, and probably alkaline sulphate, and phosphate, with some silica, and traces of inorganic matter. Nitric acid found in these wells comes from the ammonia, which is the result of animal decomposition, and its percolation through the soil.‡

* Bell and Stokes, *op. cit.*, Vol. I. p. 216. The fact in detail is mentioned by Cheyne, on *Dysentery*, in *Dub. Hosp. Reports*.

† Pereira, *op. cit.*

‡ POISONED WELLS.—Any one passing Richmond terrace, Clifton, during the last week or ten days, must have remarked the long string of doctor's carriages drawn up in the neighbourhood. The reason for this formidable display was the existence of illness in almost every second house, the inhabitants of which were afflicted with gastric fever. Nearly a whole school of young ladies were lying down ill at the same time, and there was scarcely a family which had not some of its members sick. It

Hard waters, even though limpid and destitute of unpleasant taste, sometimes disagree with the animal economy more than those holding organic matter in solution. Of this kind is well and pump water, and also that of many springs, in which there is a predominance of saline substances, and especially of the sulphate, and not unfrequently of the carbonate of lime; more especially the former which by its alkali precipitates the lime on the water. It decomposes and curdles soap, whereas river and rain waters are readily miscible with soap, and are termed *soft waters*. The hardness of water may be estimated by the quantity of soap which it wastes. Hard water does not answer well for boiling certain vegetables, nor for the preparation of infusions and decoctions,—as we find in the familiar examples of tea-making and brewing.

The instinct of animals, as of horses for example, makes them often refuse to drink of hard water even though it be limpid, and to prefer slaking their thirst in a turbid stream of soft water. It must be recollected, however, that the difficulty in the case of hard waters, is owing to the predominance of the sulphate rather than the carbonate of lime.

Impregnation with Lead.—A quite common cause of contamination of the purity of water grows out of the modes of transmitting it for distribution from the reservoirs and main pipes to dwelling houses. My reference of course

was not, however, until one death took place, and several were in imminent danger, that the cause of this extensive illness was discovered, when it turned out to be produced by the use of a spring which supplied the place, and whose waters had been imperceptibly poisoned by a sewer breaking into it, and so greatly vitiating their character, as to cause gastric fever in every family using it! On being found out, of course the evil was remedied, but not before much mischief had been done, and the necessity both for a pure supply of water and an improved system of drainage shown. Indeed, we have before, we believe, compared Clifton, with all its apparent splendour, as standing on little better than a subterraneous cesspool, which poisons at once its springs and its atmosphere. It is to no purpose that they erect stately rows and squares, while “rank corruption, mining all below, infects unseen;” and until a better system is adopted, they are but raising in their best residences nothing better than whitened sepulchres.—*Bristol Times*.

is to the leaden pipes through which the water is brought for purposes of domestic economy. It sounds paradoxical to be told, and yet the assertion is quite true, that the purer the water the greater is the danger of its acting on the lead, and converting a portion of it into a salt which it holds in solution. Among the earliest to sound the alarm on this subject was Dr. Wm. Lambe,* who pointed out the corrosive property of spring water on the pipes and cisterns of lead in which it had been confined. He mentions one of his neighbours, in Warwick, who "sagaciously ordered his plumber to make the lead of a pump, for one of his own tenements, of double the usual thickness, to save the charge of repairs, because according to his own remark, 'the Warwick water is so hard that it eats the lead away very soon.'" This writer collected a number of cases to prove the deleterious effects—diseases from lead poisoning—of drinking water exposed to a lead surface, in pipes and cisterns.

The solvent power of water is in proportion to its purity; that is, to its containing atmospheric air and carbonic acid, and its freedom from saline substances. Hence, rain water readily acquires an impregnation of lead from roofs, gutters, cisterns, or pipes, made of this metal. Distilled water has, however, no action on lead provided the air be excluded; but otherwise a crust of the carbonate and hydrate of the oxide of lead is soon formed. The saline substances, on the other hand, found in spring and river water, impair the corrosive action of water and air, and thus exert a protecting power. Of these the carbonates and sulphates are the most potential, the chlorides or muriates the least so.

Dr. Christison has made a very valuable communication on the action of water on lead, to the Royal Society of Edinburgh (*Transact.*, vol. xv., part 2). He remarked that although water, introduced into a certain dwelling by a lead pipe from a distance of three-quarters of a mile, when fresh drawn was perfectly transparent, yet on exposure to air it quickly presented a white film. This was afterwards ascertained to be carbonate of lead. In this case pieces of fresh cut lead retained their lustre when

* *Researches into the Properties of Spring Water with Medical cautions (Illustrated by Cases) against the use of Lead, in the construction of Pumps, Water-pipes, Cisterns, &c.*

immersed in the water for a period of fourteen days. On analysis the water was found to contain but a very small portion of saline matter (the 21,400th part), and the salts were chiefly chlorides, the least protective of all. The remedy adopted was to leave the spring water at complete repose in the pipe for a period of four months, so as to allow the carbonate to crystallize slowly and firmly in its interior. "This experiment was attended with complete success. The water was then found to flow without any impregnation of lead, and has done so ever since."

In another case the water gave rise to the effect of slow poisoning by lead, although the proportion of saline matter was considerable (4460th part); but they were chiefly chlorides. Polished lead was tarnished by it in a few hours. The remedy adopted in this case was to keep the pipes constantly full of a solution containing a 27,000th part of phosphate of soda. After the lapse of about three months it was found that the water contained no traces of lead; but subsequently to this it reappeared.

The most simple method of preventing water from acquiring a poisonous impregnation of lead, available under all circumstances, is that of allowing it to remain for some months before use in the pipe or cistern. This gives time for a firm crystalline deposit of carbonate to attach itself to the surface of the metal, whereby all farther action is prevented. This deposit, sometimes regarded as taking place from the waters owing to their hardness, is scraped off by those ignorant of its nature; and thus the water of a cistern, which may have been innocuous for a long time, suddenly, as it were, manifests poisonous properties.

Dr. Christison's conclusions are so valuable, both in a hygienic and a medical view, that I subjoin them. "1. Lead pipes ought not to be used for the purpose of conveying water, at least where the distance is considerable, without a careful chemical examination of the water to be transmitted. 2. The risk of a dangerous impregnation of lead is greatest in the instance of the *purest* waters. 3. Water which tarnishes polished lead when left at rest upon it in a glass vessel for a few hours, cannot be safely transmitted through lead-pipes without certain precautions. Conversely, it is probable, though not yet proved, that if polished lead remain untarnished, or nearly so, for twenty-

four hours in a glass of water, the water may be safely conducted through lead-pipes. 4. Water which contains less than about an 8000th of salts in solution, cannot be safely conducted in lead pipes, without certain precautions. 5. Even this proportion will prove insufficient to prevent corrosion, unless a considerable part of the saline matter consist of carbonates and sulphates, especially the former. 6. So large a proportion as a 4000th, probably even a considerably larger proportion, will be insufficient, if the salts in solution be in a great measure muriates. 7. It is right to add, that in all cases, even though the composition of the water seems to bring it within the conditions of safety now stated, a chemical examination should be made of it after it has been running for a few days through the pipes. For it is not improbable that other circumstances, besides those hitherto ascertained, may regulate the preventive influence of the neutral salts. (It may be here suggested whether organic matter in water, which has a strong tendency to combine with oxide of lead, may not have some influence.) 8. When the water is judged to be of a kind which is likely to attack lead pipes, or when it actually flows through them, impregnated with lead, a remedy may be found either in leaving the pipes full of the water and at rest for three or four months, or by substituting temporarily for the water a weak solution of phosphate of soda, in the proportion of about a 25,000th part."

Even in cases in which water may be kept in leaden cisterns, it would be very wrong to use covers of this metal, because the water which condenses on them must be considered as pure as distilled water. It has been found that white lead forms in much larger quantities on the inside of the covers of cisterns than on the cisterns themselves, where both are combined with lead.*

The water purified by the process of Dr. Clark, before described, notwithstanding the loss of so much saline matter, decomposed by the caustic lime added to it, was not affected by contact with lead. The inference is, that the sulphate of lime, more than the carbonate which is removed by the addition of lime, is mainly concerned in

* Christison. A Treatise on Poisons.—Am. Edit., 1846.

counteracting the chemical action between water and lead.*

The conclusions at which Dr. Taylor has arrived coincide nearly with those of Dr. Christison. The experiments of Dr. T. have led him to the conclusion that sulphate of lime is the salt which by its presence in most kinds of hard water, prevents this action on lead. "When this salt forms only the 5000th part of the weight of water, no carbonate of lead is formed;—and the sulphate of lime, dissolved in this or in a larger proportion in distilled water, will confer on it the properties possessed by river water. Sulphate of lead appears to be slowly formed; this closely invests the metal, and prevents the production of any loose crystalline carbonate. Thus then a water, which is abundantly precipitated by a salt of barytes, and by oxalate of ammonia, is, *cæteris paribus*, not very likely to give rise to lead colic by passing through lead pipes, or being preserved in leaden cisterns."† This opinion is that also of Dr. Christison, as it had been forty years before of Vauquelin.

Doctor Dana, of Lowell, Massachusetts, who has examined this subject with a good deal of care, is disposed to restrict very greatly the protecting power of the salts of lime against the erosion of lead by water. He says: "That this corroding action of all natural water has ever ceased in aqueducts transmitting water, which originally

* The most convenient plan, in Dr. Christison's opinion, for detecting lead in water, a duty which may occasionally fall on a general practitioner, is,—1. To examine what separates on exposure to the air, by dissolving it in warm acetic acid, and testing the solution with sulphuretted hydrogen, iodide of potassium, and bichromate of potash. 2. If this process fail,—To concentrate the water to an eighth part, and again test any insoluble matter which separates; and lastly, failing by this procedure also, to evaporate the water to dryness, subject the residue along with charcoal to a red heat, act on what remains with warm diluted nitric acid, and test the solution when filtered and neutralized by an alkali. It may admit of question, whether in the event of lead being indicated in the last way only, the very minute quantity which would then be present, can prove detrimental.

† Guy's Hospital Reports, No. 6, and Medical Jurisprudence.

acted energetically on lead, is not proved by experience, though experiment in the laboratory may appear to warrant the contrary opinion. No well-attested instances have been adduced where neutral salts or other agents have had such a protecting effect in pipes in actual use. It has been shown how very cautious are the remarks of Christison on this subject, to prevent a practical inference from being drawn from his experiments, sanctioning the idea that the action ceases." Some experiments by Professor Horsford, of Cambridge (Mass.), are cited, in which it appears that of the waters of five wells of that place analyzed, the only one which dissolved lead after standing several hours in lead pipes, was that containing sulphate of lime, or "gypsum in solution in large quantity." The saline ingredients of the other four wells were mostly carbonate of lime. Excess of carbonic acid neutralizes the protecting power of the salts of lime, as does, also, galvanic action.*

Owing to galvanic action, when iron and lead are brought into contact the lead is exposed to the agency of electro-positive elements, among which are alkalies and alkaline earths, which exert considerable solvent power over it.

The peroxide of iron formed by the action of water on this metal, also hastens the corroding action of water on lead, which last become oxidated, by deoxidating the iron. The carbonic acid has also been withdrawn by the iron, and the naked oxide of the lead is at once presented to the solvent power of the water and its acids. Iron rust diffused in water "acts like a stream of oxygen, and thus it acts to hasten corrosion and solution of lead pipe."†

In proof of the effect produced by the contact of lead and iron, the following case is narrated by Dr. Dana. It was reported to the British Association:

"Spring water had been running, for a period of many years, through lead pipes, and without any perceptible action on the lead tank into which it was received; but when the water was afterwards conveyed through iron

* Dr. Dana, in Appendix to his Translation of Tanquerel des Planches on Lead Diseases.

† Letter of Dr. Dana on the subject of distributing Cochituate water through Lead-pipes. In Appendix, &c.

pipes, the tanks were rapidly corroded, lasting only one tenth of the time they formerly were preserved. In this case, the water had flowed from and into a leaden reservoir, through lead pipes, without known metallic impregnation, for sixty years. Yet when conveyed farther, a long distance in iron pipes, it contained lead in solution, and destroyed the *bottoms* of the tanks in five or six years. The lead was found in the water of the delivering and receiving tanks, and of the iron pipe."

A very slight difference in the metals will suffice to develop galvanic action. It seems enough that the joinings of pipes should be soldered with the usual mixtures of lead, and the more fusible metals. Even inequalities in the composition of the lead may have the same effect.

As substitutes for leaden pipes for transmitting water, Dr. Dana recommends: "1. Wood wherever it can be used; 2. Cast iron, or wrought iron tubes; 3. Copper, protected by pure tin. The use of all other metals, or alloys of these, in the present state of our knowledge and experience on these subjects, ought forthwith to be abandoned."

Dr. Christison speaks of an "effectual remedy," which "has been lately introduced by a patent invention for covering lead pipes, both externally and internally, with a thin coating of tin."

CHAPTER XXIII.

WATERY REGIMEN (*continued*)—QUALITY OF WATER MODIFIED BY TEMPERATURE—EFFECTS OF COLD AND ICED WATER FOR DRINK—ITS HYGIENIC PROPERTIES—UTILITY IN DISEASES—AS A GARGLE—COMBINED USE OF COLD DRINKS, LAVEMENTS, AND BATHS—OBJECTIONS TO THE WATERY REGIMEN—MR. SEDGWICK'S TREATISE—EVILS FROM THE ABUSE OF WATER DRINKING—AND OF ICED DRINKS.

THE quality of water, as a beverage, is modified, independently of its constitution, by temperature. On the effects of warm and hot water, for internal use, I have already

made some remarks. For the most part, however, cold water is that which is everywhere employed for drinking.

Water of a reduced temperature, even below that of the springs of a country, as when it is made colder by ice, is both grateful to the palate and salutary. In warm countries it is deemed by all classes to be of indispensable requirement. In southern Europe, as in Italy and Spain, when ice or snow is deficient in quantity for cooling their drinks,—water and its infusions, and mixtures with vegetable acids,—the public health suffers, and it is alleged that fevers of a low grade and obstinate character are more prevalent than in other years.

The inhabitants of all the chief cities of the United States have become regular drinkers of iced water during the summer months; and, thanks to New England enterprise, ice is now transported to the Southern States, and even to South America and the East Indies. From being a luxury it is now regarded as a necessary article in domestic economy, and not without good reason, both as respects its use in cooling water, and in preserving the contents of the larder and the pantry.

In its moral aspects, the use of ice water, as a drink, assumes peculiar significance and value. It is a powerful aid to the cause of temperance, by imparting an agreeable impression to the palate, and a feeling of refreshment and renovation of strength, which are indeed claimed for alcoholic drinks of various kinds, but the secondary effects of which are often so sinister and dangerous. The known sympathy between the stomach and brain makes it certain, that the soothing influence of simple cold drinks on the former organ, during a state of general excitement of the system, will be beneficially felt in its allaying cerebral irritation and its equivalent—strong, or worse still, irregular and excessive mental emotion and passion,—extravagances of manner and action—at a time when stimulating drinks would, as they often do when used under these circumstances, drive to phrenzy and the enactment of the greatest crimes.

“The *temperature* at which water should be drunk, at or between meals, is partly a matter of habit, and partly of temperament and original constitution. In general, that is best which represents the mean temperature of the

place, at least in temperate latitudes, in which one lives Cold water may be more safely indulged in during the earlier part of the day, when the body is in its greatest diurnal vigour, than towards evening, when it is less able to resist strong impressions of any kind. In summer, when the skin is hot and dry, and the mouth and throat also dry, cold and even iced water, in moderate quantity, will be an agreeable and, at the same time, a salutary drink, by abating the excessive and almost morbid heat, which is apt to become, by the excitement it produces, a cause of indirect debility. Water of this coldness is better just before than during and after a meal, and if taken in the latter periods, it ought to be in smaller quantities."*

Iced water is applicable to all the diseases in which common cold water has been used—the quantity of the former drunk being in general less than that of the latter. Long ago, in southern Europe, iced water was given with advantage in cases of remittent, bilious, and eruptive fevers; bilious colic, and dysentery; also in weakness or loss of tone of the digestive apparatus, accompanied with some febrile excitement, and in hypochondriasis. We now allow our patients in all diseases of excitement where the thirst is considerable, either to take cold drinks or to let pellets of ice dissolve slowly in the mouth. In later times, Dr. Chapman has been one of the most strenuous advocates for the use of cold water as a drink in fevers: he recommends the conjoint use of cold lavements. This gentleman has checked profuse hemoptysis by the administration of a cup of iced water every fifteen minutes. In cholera infantum, cold or iced water taken as a drink in small quantities, often repeated and applied by means of cloths, or by sponging the abdomen, are among the most efficient remedies in the first or more active stage. The same remark will apply to cold enemata.

Feverish thirst, says Heberden, is best allayed by pure water, which may be drunk either warm or cold, at the option of the sick person, and he may drink as much as he pleases; but Dr. H. adds, judiciously, "I see no advantage in persuading him to gorge himself with liquids, as is often done, against his inclination and stomach. He

* Regimen and Longevity, p. 326.

enumerates various substances that may be added to water if it is deemed too insipid.*

Fordyce also "conceives that the patient should be allowed to drink as much as he desires." In another place he remarks: "Cold water was exhibited by Greek physicians, in fever; often evidently with a view of immediately putting an end to the fever. From the best information the author has been able to make out from perusing their writings, they exhibited it reduced nearly to the freezing temperature; in the quantity of from one to two quarts at once; so as to produce great evacuation by vomiting, purging, and sweating."† After adverting to the practice of the ancient Greek physicians (among whom, in this particular, we must not include Galen), to withhold drink during the beginning and the paroxysm of fever, he tells of their then giving cold water in large quantity at once "perhaps with a view of drowning the heat, which they considered as the essence of the disease. It was to be drunk, as Celsus says, *citra satietatem*. It is described, however, as bringing on those appearances which take place in the ordinary crisis of fever; and in certain cases, as carrying off the disease." This author admits that he has had no personal experience of this mode of treatment, it "not having been practised for the last forty years." Another indirect evidence this of the vogue which the cold water regimen enjoyed in the early part of the century. Dr. Fordyce gave lectures on *Materia Medica* and the *Practice of Physic* in 1764, and continued to teach these branches for nearly a period of thirty years.

"Dr. Macartney has met with 'remarkable success' in the treatment of cynanche tonsillaris by the frequent use of a gargle of iced water. (He has also found ice to be effectual in 'stopping obstinate hiccup, when all other remedies had failed.') The same means appeared successful, a few years ago, in the case of a young man named Babcock, of Rhode Island, with 'putrid sore throat.' It had recurred at intervals for many years, in each case going on to suppuration, in spite of a variety of medical

* Commentaries on the History and Cure of Diseases.

† Five Dissertations on Fever. Second American Edition. With an Introduction by John Bell, M.D.

treatment, and, among other things, having his tonsils extirpated. At last, Dr. Jackson, of Boston, advised him to bathe his neck, throat, and chest every morning with cold water, and use it also as a gargle frequently. He recovered entirely."*

"In the posthumous works of M. Pouteau, of Lyons, the drinking of 'frozen' or cold water is recommended as a cure for scirrhus and cancerous tumours, no other aliment or medicine being allowed for some weeks; a case being also related, where Madame Girard obtained a cure of the scirrhus uterus particularly by this means, after all other resources had failed. He advises the extirpation of any external cancer, although attended with a cancerous disposition of the viscera, believing that the internal malady will yield to this treatment. This, of course, is extravagant."†

It must be obvious to the reader, that in the continued use of cold water, internally by drink and lavement, and externally by a general bath or by topical applications, the physician has at his control a powerful means of diminishing and removing inflammations, both of the internal organs and of the external surface, and the joints, as, also, fevers, hemorrhages, and all diseases associated with much vascular action and nervous excitement. In this agent we have, in a very large number of diseases, a safe and efficient substitute for bloodletting, purgatives, common diaphoretics, and diuretics; and a means of procuring ease and repose, which are often denied to us by the use of opium and other narcotics. "It should never be forgotten," says Dr. Conelly, in one of his Reports on the Asylum at Hanwell, "in a lunatic asylum, when a patient is noisy at night, that a copious draught of cold water is often a better sedative than any medicine." If, enlarging our circle, we choose to avail ourselves to the full extent of the watery regimen, by the employment of warm and

* *Water versus Hydropathy: or an Essay on Water and its True Relations to Medicine.* By Henry Hartshorne, M.D. This essay manifests very commendable research and reading on the part of its youthful author; and is a creditable example to his professional brethren, of the manner in which they might occupy a portion of their time, during the early period of medical life.

† *Ibid.*

hot water internally and externally, sometimes alone, sometimes in alternation with cold water, we can meet most of the indications presented for the cure of disease.

Let us not, however, erroneously suppose that, from the simplicity and universality of water, it can be used as a remedy indiscriminately by all persons, and under all circumstances. Its very power to cure, to heal, and gradually to alter the functions of the living body, compels the inference, that, if misapplied or abused, it must have corresponding power to do harm. It is true that experiments with it, in certain limits, are less perilous than with the received articles of the *Materia Medica*; and that the patient, once put in the way of its judicious use by his medical adviser, can continue it with less danger of injury to his digestive and nervous systems, and of his forming bad habits, than from a continuance in the use of any drug whatsoever. Nor would we even except a simple bitter, such as chamomile or gentian—to say nothing of the insidious wine or brandy, or tinctures, cordials, &c., by one or other of which a man has often been made a drunkard, while following, as he believed, the advice of his physician, given without due thought of consequences, perhaps months before.

It could hardly be expected that the cause of the vintners and the brewers should fail to find advocates, to enforce the arguments in favour of their liquors, amid the flood of works on the watery regimen, in the early part of the last century. Accordingly, a champion appeared in the person of Mr. James Sedgwick, Apothecary, at *Stratford-le-Bow*, who sent forth a goodly sized volume of more than four hundred pages* chiefly in reply to the pamphlets of the Rev. Mr. Hancock, and of Mr. Smith; the former, it will be remem-

* *A New Treatise on Liquors, wherein the use and abuse of Wine, Malt-drinks, Water, &c., are particularly considered, in many Diseases, Constitutions, and Ages, with the proper manner of using them, Hot or Cold, either as Physick, Diet or Bath; containing plain and easy Rules for the Preservation of Health, and the attainment of long life, the whole being a full determination of all that hath lately been published on those subjects: Though chiefly contrary to the opinions of Drs. Cheyne, Rouse, Short, Lommius, Vander Heyden, Hancock, and Mr. Smith, and others.* London, 1725.

bered, the author of "*Febrifugum Magnum*," the latter of "The Curiosities of Common Water."

Mr. Sedgwick dedicates his treatise to "the Most ingenious Sir Hans Sloane, Bt., M.D., President of the College of Physicians." The preface opens in the following strain. "It would have been thought, some months ago, very absurd, to have offered any arguments prejudicial to the almighty force of cold water, in the cure of diseases, even of the most inflexible nature or distant circumstances." And a little farther on, he says: "A most extraordinary call for some essays have been the emblem of this infatuation, although subjects so imperfect and weak, conclusions so monstrous, matters of fact so preposterous, that nothing but such a condition, could ever give credit to." After assigning probable reasons for the "extraordinary demands" for the cold water literature, our apothecary critic gives a hit at Dr. Hancock (our reverend friend) for his avowedly limited knowledge of medicine, and the shortness of the period of preparation. "A six months review is a sad foundation for proposing to the world," although he "had read previously, as much of physical authors, as ever any did, that used it as a speculative study." This sounds odd in connection with an acknowledgment in the same sentence, where he says, "I (Dr. H.) know so little of physic as not to understand the common simples and compositions, I am fit to talk more like a fool than a physician." On this Mr. Sedgwick remarks, with a not over good-natured leniency: "He best knows his capacity in general; but in this his whole scheme bespeaks him a novice; and that which was designed as a modest ceremony, smells too much of a matter of fact." Authors may take a hint from this, not to be too frank in declaring their own infirmities or the lapses of composition in their works. They will find that critics are far more ready to echo the acknowledgement as proof of the infirmity and the lapses, than as evidences of a genial and modest disposition. A Montaigne, or a Burton, or even a Byron, may be privileged to anatomise themselves, and be sure to find a willing and pleased auditory; but other men will scarcely elicit more sympathy for the like operations, than a man would who idly maimed himself, or another who enacted the part of a Mahometan Santon.

Mr. Sedgwick cannot understand how "broken lungs

and constitutions, clots of black blood, and obstinate asthmas, by his (Mr. Hancock's) directions yield to such slight and unactive powers as stewed prunes and cold water." I must confess that the story of the miraculous powers of stewed prunes, as detailed by the worthy prebendary, singularly weakens my faith in his laudations of cold water as a drink and medicine. Most naturally does the apothecary speak out in disparagement of the stewed prunes, which he thinks are "a jest and trifling," and not comparable to "lenitive electuary."

Dr. Hancock and Mr. Smith are accused by our author of making the older writers, whom they cite, "to justify not only falsities, but blunders of the highest nature; to effect which they have clipt words, and left out sentences, which were the reasons for such expressions, taking that half which suited with their ends, and omitting the other which enlightened or destroyed the argument." A severe censure and accusation this; but they remain without the desired proofs and specifications. Special pleading is attempted by Mr. Sedgwick to nullify the opinions and advise of Hippocrates, Galen, and the ancient writers in general. Lommius, as an advocate for the use of cold water drinking, in fever after a concoction of the disease, is criticised both in the preface and in the body of the work. So also is Vander Heyden. Sir John Floyer is let off lightly. Not so Dr. Rouse, who in his treatise on Tunbridge wells, added a lofty eulogy on the value of plain water—as for example, in his saying that "water is the best specific for the cure of all diseases," or according to his distich,

"The grand preservative of life is water,
All liquors to mankind besides are slaughter."

Taylor, the water poet, has better verses than these.

Among the strictures on Mr. Smith, the author of "The Curiosities of Common Water," we read the following. "Many of Mr. Smith's examples are so interwoven in their account, that there is no possibility of sifting or getting at the truth of the expression, and we have little reason to think better usage than those citations to where their authorities are fixt."*

* Reference is made by Sedgwick to a satire, entitled the *Flagellum*, on the water-drinking advocates, which I have not seen.

The author of the "New Treatise on Liquors" &c., treats largely of water. Without denying its efficacy he takes care to point out the evils from its abuse or its bad quality, and lays due stress on the advantages of its mixture with something stronger, in the shape of wine, ardent spirits, &c.*

M. Sedgwick, in his advocacy of strong drinks in preference to water, sometimes involves himself in contradictions, as where, in page one he shows, "Why laborious and temperate people require stronger liquors than water;" and in another, "Why working and poor people can dispense easier with strong liquors than others." To do him justice, however, we must admit that he felt the difficulty of his position, and either out of love of truth or a desire to stand well with his readers, he makes concessions in favour of water drinking, and qualifies his recommendations in favour of wine and spirit drinking more than an advocate on the same side would have done a century later, or in the year 1825. In the quarter of a century that has almost elapsed since this last date, public opinion has, however, undergone a great change for the better, and we are allowed to fall back with a proper feeling of complacency and

* A curious argument in favor of the superiority of certain liquors over water, for thinning the blood, is derived from the supposition that, as the particles of water are spherical as well as infinitely small, they cannot perform the same good service for breaking up and dividing, hewing and infracting, as are performed by pickaxes and spades, which fluids of a pointed figure resemble. "To this speculious figure is owing the mighty power of vinegar in dissolving crudities; for its points, like many knives and daggers, rush into and divide the congelative matter, with a mighty force and easy impression; and though its parts are much larger than those of water, yet from the difference of globular and pointed figures, does it become so particularly enforced, as to become recommended in the worst of times."

Of a piece with this physical view of the different fluids was the chemical one taught by Von Homberg, of the manner in which acids and alkalies are united. This writer holds that acids are shaped like daggers, and alkalies like sheaths; and that moving in the same liquor, the daggers run into the sheaths fitted to receive them, with such violence as to raise that effervescence observed in the mixture of acids and alkalies.

increased instruction in the aqueous literature of the century preceding.

Mr. Sedgwick's partiality for strong drinks did not make him deny the restorative power of water after a debauch, nor induce him to advocate what was afterwards the popular doctrine of the Brunonians, and the popular practice of the multitude in still later times, that the remedy for the drunkenness of the eve was to take a glass of liquor of some kind, bitters, juleps, &c., in the early morn! The protection from sin is, to put one's self in the path of sinning! In giving Mr. Sedgwick's language we must own our obligations to be greater for the fact than the physiology by which it is attempted to be enforced.

"In some relaxed stomachs, from intemperance, a glass or two of water in a morning serves to cord up the fibres, to gird up the membranes to a necessary posture, to wash off a great deal of filth, and fætor, the marks of a debauch, necessary for the stomach to get rid of." And again:—"When the stomach is enervated and weakened, by indigestion and crudities, from many petty causes; relaxation, and incapacity of griping our food follows, the furrows of the muscular coats are rendered so distant, that they cannot collimate, and grind, dissolve, and soften, for a just and due comminution. Under such circumstances, very often a glass of cold water becomes a good and sovereign antidote."

On the other hand, Mr. Sedgwick asserts, that "old age, tender constitutions, and weak nerves, will be most certainly shocked and pall'd by perpetual uses of water." So also he tells us, "People of a cold phlegmatic habit of body, of flatulent constitutions, of an inactive and sedentary state of life, will find mischief by drinking cold water." I introduce these remarks here, not to imply agreement with them, to the extent of prohibiting water as a drink under any of the circumstances specified; but under a belief that the use of this fluid demands limitations in all of them more than are necessary generally, during the greater part of life, and in most constitutions and habits of body.

Rousseau describes the bad effects of the extreme trials of water drinking in his own case; and similar instances might be readily adduced. There is certainly no philosophical theory nor sound practice, which can require

an individual to subject himself to a torture similar to that which used to be inflicted on criminals, or on those accused of crimes. One of the means of extorting confession in the times when it was deemed legal to put a man to the ordinary question, was by making him drink at once four pints, and in the extraordinary question, eight pints of water.

Water drunk to excess distends the stomach, dilutes to extreme tenuity the gastric juice, diminishes the vital energy of the gastric mucous membrane, and prevents the requisite contraction of the muscular coat of the stomach on the contained aliment. Nausea, flatulence, oppression at the pit of the stomach, colics, diarrhœa, aqueous plethora of the vascular system, weakness of the nervous centres, pallor, and aversion to locomotion, may all follow in the train of excessive potations of water. Sometimes enormous quantities are drunk in certain diseases, in which the thirst may be taken as an indication of the wants of the organs and of the bloodvessel system, which are to be replenished in this way. There are other cases, again, such as diabetes, in which there is continued polydipsy ; without this latter being quenched by any quantity of fluid, or without the relief to the suffering organs which the ingestion might be hoped to procure. For the most part, however, there is little danger of excess in the use of aqueous drinks. Instinctive appetite for water is a guide which may be received with a confidence that the acquired one for intoxicating drinks can never inspire.

Cold water, or iced water, refreshing and salutary as I have represented it to be, may on occasions prove a cause of serious and even fatal disorder to the functions, when used under particular circumstances. Thus, for example, after the system has been exhausted by fatigue, either from labour or sport, cold drinks are improper, and in delicate frames dangerous. It is not, as some writers allege, prior increase of heat and violent exercise, so much as the condition of fatigue and exhaustion, and diminished calorification produced, that forbid cold drinks. In the midst of exercise of any kind, before exhaustion has come on, and when animal heat is still greater than common and continues to be developed, we may, without danger, take iced water or an ice cream, or bathe our hands and temples in cold water.

It is precisely under analogous conditions of the blood-vessel and nervous systems, that is to say of general excitement with thirst, in fevers, that cold is not only tolerated but beneficial.

When the stomach is entirely empty, and languid in consequence, as just before breakfast, for instance, cold drinks, are, commonly, improper, unless exercise be taken at the same time, or there be heat and excitement of the stomach or general system. So, also, before dinner, the more especially if the individual be weakened by fatiguing and prolonged exercise, cold drinks are less admissible. But if he merely suffer from heat, felt through his whole system, in his extremities as well as in his chest and throat, a small glass of iced water just before sitting down to dinner gives great refreshment, and serves as a gentle fillip to the appetite for solid food. During dinner cold drink may be taken into a stomach then adequately excited enough to resist undue sedation. Immediately after a meal, drink of any kind, and particularly cold, is prejudicial; but, a few hours later, when the slight fever of digestion is being undergone, and the blood is beginning to be replenished with fresh chyle, and the kidneys have eliminated some of the fluid taken at the previous repast, cold water may again be drank with freedom. From this time, as the day declines into evening, and this again leads to the hour of sleep, the system becomes less tolerant of cold, either internally as in drinks, or externally as by bathing. It happens unfortunately for health, that the time selected for the convivial meetings at the supper table, is that in which the stomach is least able to perform any extra duty, whether it be the ingestion of solid meat or the more refined indulgence in ices and fruits. Injustice to the stomach and a solecism in true epicurianism are committed, also, in adding ice creams to a dessert—itself superfluous, if not injurious after a hearty dinner.

The Italians understand better than we how to combine enjoyment with health in this matter. They take their ices and iced water at suitable intervals through the day, and between meals. The last visits to the coffee houses for this purpose are at an early hour in the evening. The traveller will call to mind his having seen the ladies of Florence, Rome, and Naples, regularly call

at this hour with gentlemen escorts, or drive up in their open carriages, with merely their servants, and take their ices. Whether it was from adopting this fashion, or from other causes, it may not be easy to say; but in my own case, although dyspeptic at the time to an extreme degree, I was able to use ices and iced water with more freedom and less drawback during a summer in Italy than in any subsequent period of my life, in other parts of Europe or in the United States.

Among the sinister results of cold drinks taken inopportunistly, are violent gastralgia and cramps of the abdominal muscles, painful constriction of the chest, general coldness of the body, cramps of the voluntary muscles, sometimes convulsions and insensibility — sometimes symptoms resembling cholera morbus, with a small, frequent and irregular pulse, and cold sweat. At the Havannah, we are told that trismus not unfrequently follows the swallowing of ices, and ice cream. In 1825, during a time of intense summer heat in Paris, so numerous were the cases of a disease resembling cholera, that a judicial commission, consisting of MM. Vauquelin, Marc, Marjolin, and Orfila, was appointed to investigate the subject. The result of its investigations was a rejection of the popular suspicion that the ices were poisoned, and an opinion that the irritation of the intestinal canal was caused by the sudden action of cold during a season of extreme heat and dryness.

Diseases of the respiratory organs, and particularly pleurisies, have been recorded as resulting from the use of cold drinks by persons over heated and greatly fatigued, after labour or a long march.

General observation sanctions the belief that the greatest number of sufferers from drinking cold or iced water in our climate, are they who have been the most free in the use of ardent spirits; and that rarely are the mere water drinkers victims to the freest use of their favourite beverage.

Warm applications to the pit of the stomach, a full dose of laudanum, and water of ammonia or spirits of hartshorne and ingestions of warm water, and warm lavements, are the chief and foremost remedies for restoration, in extreme cases of depression and cramps, from the untimely use of cold drinks or a cold bath. Friction of the skin, and

sinapisms to the latter, and especially to that of the extremities, will prove a useful auxiliary in this disorder, as it is in all the forms of cholera.

CHAPTER XXIV.

WATERY REGIMEN (*continued*)—INFUSIONS OF VEGETABLE SUBSTANCES, &c.—THE PTISAN OF HIPPOCRATES—GALEN'S DIRECTIONS TO FLAVOUR WATER WITH WINE—BISHOP BERKELEY'S TAR WATER—ITS SUBSTITUTION FOR INTOXICATING DRINKS—DILUTION—DR. HOLLAND'S SUGGESTIONS.

BUT it is not necessary, for the successful carrying out of the watery regimen, that the drink should consist of pure water without any addition, or the bath of the same fluid divested of any mineral impregnation. Physicians, in directing various infusions of simple substances in water for the drink of their patients, are really keeping them on the aqueous regimen. The water is, in these cases, the active principle for dilution, and for operating through the blood, on the various secretions. What was said of the real curative agent in various mineral waters, applies to these infusions. Floyer relates that "a certain man," who used the Tunbridge Wells for his health, was prevented, one season, from going there. He had, however "a good spring or pump in his yard," the water of which he drank in the usual quantity, and with the same regularity as he used to do at Tunbridge; and he derived so much service from this substitution "by cooling his blood, and diluting and washing off the heterogeneous and tartarous particles which his claret had left," that he wrote this distich over his pump:—

"The Steel is the Cheat
'Tis the Water does the Feat."

On the subject of the various simple drinks used to quench thirst and to gratify the palate, without disturbing the nervous system, or laying the foundation of habits

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of intemperance, I may be allowed to repeat here what I said in another work.

“For all the proper wants of the animal economy, simple water of the desired temperature is generally sufficient. It often happens, however, that there is thirst dependent on the state of the mouth and fauces, without any proportionate excitement or craving of the stomach and internal organs : this is most liable to occur in fevers, and after great labour and exercise in a hot sun, or being in a hot air : sometimes it depends upon a morbid state of the stomach, and hence almost constant thirst is an accompaniment of some of the varieties of dyspepsia. Whether we admit this distinction or not, it is still certain, that, even after the stomach has received copious potations of water in amount necessary to allay its heat and excitement, in a very short time afterwards thirst is complained of.— On such an occasion, the addition of some sapid substance to the water produces a change in the organ of taste and the entire mucous membrane of the palate and fauces, and the thirst is either greatly abated or removed.

“An interminable list of articles has been employed with the view of adding them to water, and of agreeably affecting the palate whilst they remove thirst. I shall only mention the chief of these ; and first in importance, the acids, which, as abundant in the fruits of hot climates, and as readily developed by their fermentation, would seem to be destined by Providence to serve as quenchers of thirst and as refrigerants to the overheated frame. The chief ones are the citric, the acetic, and the tartaric ; but as I have already spoken of their use in this way in a former chapter, I shall not return to the subject here. Lemonade ranks foremost of all the acid drinks ; infusion of apples (apple water) is also a pleasant beverage ; the same may be said of the infusion of tamarinds. Acetic acid, with water and sugar or molasses, makes a drink much used, and the quantity and time of taking which are soon safely ascertained after a few trials. Mineral acids, such as the hydrochloric or muriatic, the sulphuric and the nitric, in a state of extreme dilution with water, impart to it a refreshing acidity ; and in the absence of the vegetable acids, may, in cases of feverish thirst, and in serious disease, be had recourse to with advantage.

“The juices of most of the mature fruits of our climate, containing as they do saccharo-acid matters, make, when mixed with water, a pleasant beverage. The jellies of some of them, as of currants and cranberries, are much and deservedly used in this way. I may mention, however, in this place, that a rising in the stomach, or feelings analogous to those of heartburn, acidity of stomach, as the disease is called, is more apt to follow the use of the compound juices of many fruits, in which the acid is in small proportion, than where it abounds, or exists alone. Hence, the juice of the orange will often disagree with a dyspeptic or febrile patient, when lemon-juice, or even lemonade with a small quantity of sugar, would be attended with no inconvenience. Cider or wine will cause heartburn and acid eructations, — whereas vinegar and water, so far from giving rise to such disorders, will sometimes alleviate them.

“Simple saccharine drinks, such as sugar and water and molasses and water, will often assuage thirst, and be relished by the persons using them. The *eau sucrée* is a common drink among the French, as molasses and water is among many of our own people. Sugar candy has, on occasions, served both for nourishment and to allay thirst, where neither common aliment nor water was procurable.

“Infusions of different herbs which have a slight aromatic and bitter taste conjoined, are often used as beverages, — such are, among others, balm and sage teas. Even a decidedly bitter flavour, imparted by different vegetable substances to water, sometimes affects both the sense of taste and the stomach in such a manner as greatly to abate tormenting thirst in fever. Substances, again, of quite a different nature, as the pure gums, destitute almost of taste and of any stimulating property whatever, will soothe the irritation which causes violent thirst, and prevent its return for a longer time than simple water or even water mixed with the vegetable acids. Gummy or mucilaginous drinks, and the best is that prepared with gum arabic, seem to act in two ways, — first, by soothing the nervous and capillary excitement of the mucous surfaces which gives rise to thirst; and secondly, by a portion remaining adherent to these surfaces, evaporation and consequent dryness of the tongue

and mouth are prevented,—and consequently the call for fluid to moisten the mouth and throat is less urgent.

“One remark is applicable to all the drinks hitherto enumerated; the craving for them ceases with the removal of thirst for which they were first taken, and they are never continued on account of any pleasurable effects on the nervous system, whether of a stimulating or narcotic nature. Their occasional seldom becomes a continual use and habit, unless they are found, as in the case of saccharine or gummy drinks, to be in harmonious relation with the nutritive wants of the system; that is to say, of being beneficial to digestion, while they at the same time contribute somewhat to the nourishment of the frame. These are the only safe conditions on which any drink can be continued; they are complied with in the case of water and of infusions or mixtures of sugar, of saccharo-acids, of gum, of farinaceous matters,—such as toast and water, rice-water, and barley-water, &c., of which I have already treated. But these conditions are not complied with in the case of the infusion of any vegetable bitter, and still less of any alcoholic drink.”*

The necessity and importance of free dilution in acute diseases, were fully acknowledged by Hippocrates, in his treatise on Regimen in Acute Diseases, one of the principal objects of which would seem to be to describe the mode of preparing his ptisan (or the decoction of barley), and its use in acute diseases. So full is it on this subject, that Athenæus calls it the work on the Ptisan. This drink “was prepared from pearl-barley, roughly pounded and boiled for a time in water. As will be seen by the text it was given to the sick either strained or entire, according to circumstances.”† Hippocrates directs its use without intermitting a day, to “allow their vessels to be empty of it, if I may say so, but should use it, and not intermit, unless it be necessary to administer medicine or a clyster.” It must be confessed, however, that this great teacher was no advocate for the free use of water alone in fevers and inflammations.

Galen, though liberal in the use of water, preferred giving

* Regimen and Longevity, p. 327–30.

† In a note by Dr. Adams, to his edition of Hippocrates.

it somewhat flavoured with wine. That the proportion of this latter was very small is obvious from an anecdote which he relates. He says that a certain physician, who saw this insignificant amount of wine which was put into the water, said, bantering him, "Your patients will have the pleasure of seeing the wine indeed, but will not be able to taste it." Galen contends, however, that although the quantity thus added is small, it is sufficient to act as a stomachic, and obviate the bad effects which the water would otherwise produce.* The stomachic effects here referred to can be more conveniently and safely procured by a slight infusion of a vegetable bitter, or even aromatic—the more especially as the light wines of southern Europe are obtained with difficulty in this country, and the other kinds are either strongly brandied, or primarily charged with alcohol, and sometimes both.

We may receive as well founded much of the praise lavished by Bishop Berkely on the internal administration of Tar Water,† with the understanding that, when drank in the large quantities which he recommends, the aqueous was the really medicinal part. It operated by free dilution, aided, it may be, somewhat by the mild stimulus of the tar, which, in this instance, served as a stomachic, like the wine added to the water by Galen.

The ingenious and benevolent bishop, in a brief introduction, adverts to the transition, in his volume, from the part "that seemeth so surely calculated to do good to the body," to "the reasoning or notional part," which is also the concluding part, and which consists of disquisitions and speculations on first causes, the nature of deity, operations of the mind, &c. He proceeds at once to describe the mode of preparing tar water in America, and its reputed efficacy in the then colonies "as a preservative or preparative against the small-pox." Having himself used it in his own neighbourhood, he found its virtues in this way not overrated. Thence he was induced to recommend it in foulnesses of the blood, and in the foulest distempers,

* Adams, *op. cit.*

† Siris: A Chain of Philosophical Reflexions and Inquiries concerning the virtues of Tar Water, and divers other subjects connected together, and arising one from another. By G. L. B. O. C. Dublin 1774.

"wherein it proved much more successful than salivations and wood drinks had done." Ulceration of the bowels, consumptive cough, and an ulcer in the lungs, pleurisy and peripneumony were cured, and an attack of erysipelatous fever prevented by the use of tar water. The author assures us that he "never knew anything so good for the stomach as tar water: it cures indigestion and gives a good appetite." He says, it is an excellent medicine in asthma, and "a powerful and safe deobstruent in cachectic and hysteric cases," and "is very good for gravel;" and he believes it "to be of great use in dropsy." He contends that it is safe and useful in inflammatory complaints. Tar water "possesses the most valuable qualities ascribed to the several balsams of Peru, of Tolu, of Capivi, and even to the Balm of Gilead." Tar water, while it possesseth the stomachic and cardiac qualities of elixir proprietatis, Stoughton's elixir, and many such tinctures and extracts, "has nothing of that spirit of wine which however mixed and disguised may yet be well accounted a poison in degree."

Tar water is proclaimed, in "Siris," to be superior to opium and mercury. Like the bath as described by Galen, this water both warms and cools, and in this way cures opposite disorders. A large draught of it, taken milk-warm in the paroxysm of a fever, soothes "even when plain water or herb teas shall be found to have little or no effect." Twenty-five cases of fever (in the year 1741) occurring in the author's own family, were "cured by this medicinal water drunk freely." Equal success attended its use among his poor neighbours, whom every glass seemed to refresh while it infused into them life and spirit. The quantity used was a glass every hour, taken in bed. In these cases the convalescence was said to be short. From what he observed in five or six instances, the author "does verily believe it the best and safest medicine, either to prevent gout, or so to strengthen nature against the fit as to drive it from the vitals."

The good bishop remarks very naturally: "From my representing tar water as good for so many things, some people may conclude it is good for nothing." To this he replies by an appeal to time and experience. The verdict is not, however, such a one as was anticipated by our

sanguine philanthropist. A something like circuitous deduction is offered in this sentence : "Some think an Erysipelas and the plague differ only in degree. If so, tar water should be useful in the plague, for I have known it to cure an erysipelas."

Scurvy was supposed, at the time in which "Siris" appeared, to be the root of all diseases ; and as it was believed to be the result of putrefaction, the author ingeniously suggests, as a means of eradicating the evil in all its parts, "to embalm (if one may say so) the living body with tar water copiously drunk." The disease may be cured, as he thinks, "by the sole, regular constant copious use of tar water."

Extravagant as must seem to be this eulogy of tar water, it does not go beyond the records of the sanative and curative powers of common water, which must find free entrance into the system when united with a modicum of tar, and drank in the free manner just recommended. But, although we may be slow to adopt the views of Bishop Berkeley on the positive effects of tar water, we cannot but agree with him in his comparative estimate of its virtues, when he proposes it as a substitute for intoxicating drinks.

We would ask those friends of the temperance reformation who think that people cannot pass from drunkenness to sobriety, from stultifying and poisoning themselves with distilled spirits to the use of water as their beverage, without some intermediate stimulus, to meditate on the efficacy of tar water for this purpose. Observation has taught me that, if men are made to feel and to know the evils of drunkenness and of drinking strong liquors, they will take water as their beverage, without indulging in any speculative refinements about substitutes which contain alcohol. Neither the health nor the morality of beer shops can be adduced in favourable contrast with the undoubted disease and profligacy which hover around the gin palaces in London and other large cities of England. Berkeley saw, a century ago, the ravages which intemperance was then making ; and it is no forced construction of his intentions for us now to believe, that he was the more willing to exalt the reputation of tar water, in order to win people to its use, and to wean them thereby from the popular and deleterious

practices of dram and liquor drinking. The entire scope of his remarks on this subject, and the manner in which he expresses himself on the auxiliaries of temperance and early hours to his favourite beverage, have an abiding value, and so far a continued application to our wants and deficiencies here at home. As my readers generally have not, I am sure, access to "Siris," they will, doubtless, be gratified at my repeating these remarks—and first on distilled spirits.

"107. The public virtue and spirit of the British legislature, never showed itself more conspicuous in any act, than in that for suppressing the moderate use of spirituous liquors among the people, whose strength and numbers constitute the true wealth of a nation: though evasive arts will, it is feared, prevail so long as distilled spirits of any kind are allowed, the character of Englishmen in general, being that of Brutus *Quicquid vult valde vult*. But why should such a canker be tolerated in the vitals of a State, under any pretence or in any shape whatsoever? Better by far, the whole present set of distillers were pensioners of the public, and their trade abolished by law; since all the benefit thereof put together would not balance the hundredth part of its mischief.

"108. To prove the destructive effects of such spirits with regard both to the human species and individuals, we need not go so far as our colonies, or the savage natives of America. Plain proof may be had nearer home. For, albeit there is in every town or district throughout England, some tough dram-drinker, set up as the devil's decoy, to draw in proselytes; yet the ruined health and morals, and the beggary of such numbers evidently show that we need no other enemy to complete our destruction, than this cheap luxury at the lower end of the State, and that a nation lighted up at both ends must soon be consumed."

The bishop's commendation of early hours and temperance is conveyed in the following happy strain:

"109. It is much to be lamented that our Insulars, who act and think so much for themselves, should yet, from grossness of air and diet, grow stupid or doat sooner than other people, who by virtue of elastic air, water-drinking, and light food, preserve their faculties to extreme old age; an advantage which may perhaps be approached, if not

equalled, even in these regions, by tar water, temperance, and early hours; the last is a sure addition to life, not only in regard of time, which, being taken from sleep, the image of death, is added to the waking hours, but also in regard of longevity and duration in the vulgar sense. I may say too, in regard of spirit and vivacity, which, within the same compass of duration, may, truly and properly be affirmed to add to man's life: it being manifest, that one man, by a brisker motion of his spirits and succession of his ideas, shall live more in one hour than another in two: and that the quantity of Life is to be estimated, not merely from the duration, but also from the intenseness of living. Which intense living, or, if I may so say, lively life, is not more promoted by early hours as a regimen, than by tar water as a cordial; which acts, not only as a slow medicine, but hath also an immediate and cheerful effect on the spirits."

There are three sorts of people to whom the author would particularly recommend his drink, viz., "sea-faring persons, ladies, and men of studious and sedentary lives." After speaking of its probably beneficial effects on the first of these three classes, he speaks thus of the wants of the Ladies :

"118. This same water will also give charitable relief to the Ladies, who often want it more than the parish poor; being, many of them, never able to make a good meal, and sitting pale, puny, and forbidden like ghosts, at their own table, victims of vapours and indigestion."

In a previous section he had contrasted the benign effects of his favourite remedy with the mischievous operation of intoxicating drinks, on the health of the sex. I cannot forbear from giving the entire passage :

"108. This safe and cheap medicine suits all circumstances and all constitutions, operating easily, curing without disturbing, raising the spirits without depressing them, a circumstance that deserves repeated attention, especially in these climates, where strong liquors so fatally and so frequently produce those very distresses they are designed to remedy; and, if I am not misinformed, even among the Ladies themselves, who are truly much to be pitied. Their condition of life makes them a prey to imaginary woes, which never fail to grow up in minds unexercised and un-

employed. To get rid of these, it is said, there are, who betake themselves to distilled spirits. And it is not improbable, they are led gradually to the use of those poisons by a certain complaisant pharmacy, too much used in the modern practice, palsy drops, poppy cordial, plague water, and such like, which being in truth nothing but drams disguised, yet coming from the apothecaries, are considered only as medicines."

In connection with advise to "studious persons," the author gives his own personal experience of the therapeutical value of tar water, as follows :

"119. Studious persons also pent up in narrow holes, breathing bad air, and stooping over their books, are much to be pitied. As they are debarred the free use of air and exercise, this I will venture to recommend as the best succedaneum to both. Though it were to be wished, that modern scholars would, like the ancients, meditate and converse more in walks and gardens and open air, which upon the whole, would, perhaps, be no hindrance to their learning, and a great advantage to their health. My own sedentary course of life had long since thrown me into an ill habit, attended with many ailments, particularly a nervous colic, which rendered my life a burthen, and the more so, because my pains were exasperated by exercise. But since the use of Tar water, I find, though not a perfect recovery from my old and rooted illness, yet such a gradual return of health and ease, that I esteem my having taken this medicine the greatest of all temporal blessings, and am convinced that, under Providence, I owe my life to it."

The quantity, times of use, and period of the continuance of the tar water are stated in "Siris." In very dangerous and acute diseases it may be taken without stint, or "as far as the stomach can bear." But in chronical cases, "about half a pint night and morning may suffice." "Persons more delicate than ordinary may render it palatable by mixing a drop of the chemical oil of nutmegs in each glass." Some "whose nice stomachs could not bear it in the morning take it at night going to bed without any inconvenience." In a few weeks its beneficial operation is shown on dyspeptics, "who recover a good stomach, and with it health and strength." In some instances, the many and great advantages from its use "sometimes would not,

perhaps, begin to show themselves till it had been taken two or three months."

I should be sorry to throw a deep shadow over the bright visions of Bishop Berkeley on the wonder-working powers of tar water; and although I cannot attribute to myself his triple function of theologian, metaphysician, and physician; yet I will venture to assure my readers that a safe compromise of the question may be made by their substituting the same quantity of good common water for that which he recommends after tar has been infused in it. If the intemperate, the nervous, and the wakeful require a cordial, they will find it by drinking a tumblerful of hot water on going to bed, and perhaps one or two in the course of the day, in the more troublesome cases. The simply thirsty and feverish who suffer from chronic disorder, associated with or depending on inflammation, may gratify their wishes by potations of cold water.

The Use of Diluents.—By judicious continuance in the aqueous regimen we have it in our power to cleanse the first passages (stomach and bowels) of adherent crudities and impurities, to dilute the excess of fibrin, and sometimes of saline matter in the blood, to wash away morbid formations, as of lithic acid and its combinations, and to replenish the bloodvessels when they have been suddenly deprived of a large part of their serous or watery contents, as in cholera. After a perusal of the directions for the free use of water as a drink, and a remedy in so many diseases, by successive writers, from Galen down to Theden and Hufeland, we must have anticipated the views and suggestions contained "in the paper of Dr. Holland "On the use of diluents."* It is pleasant, however, to obtain confirmation of a truth still doubted by many, from a gentleman who, like Dr. Holland, unites habits of study and reading with the opportunities furnished by a large practice. He has "often known the action of the bowels to be maintained with regularity for a long period, simply by a tumbler of water, warm or cold, on an empty stomach, in cases where medicine had almost lost its effect, or became a source only of distressing irritation." The advantages of this treatment are still more obvious where the intestinal secretions or the products of

* Medical Notes and Reflections.

digestion are vitiated in kind. Singular relief is often procured from his morbid sensations, by the dyspeptic patient taking a pint or more of water, at the temperature most agreeable to him, fasting.

Properly regarding the alimentary canal as, to all intents, a surface, with similar functions to the skin, as my readers have been already apprized in one of the early chapters of this volume, Dr. Holland believes that it is capable of being acted on in a similar manner. Just such was the view taken by Galen, and the treatment correspondingly directed by him ; so also by Baynard, and by "Curiosities of Common Water" Smith ; and so by the author of the present volume. I have acted on the experience and suggestions of a writer, whose name I do not now remember, in a volume of the *Dublin Hospital Reports*, by giving nothing, in acute gastritis with an exceedingly irritable stomach, but small quantities, at intervals, of cold water, and applying this fluid over the stomach by sponging or wet clothes. The patients were directed to be as quiet as possible, with the head very low.

"The abstraction of heat from an inflamed or irritable membrane within, is often indeed quite as salutary as the cold directly applied to a hot and dry skin without. The extent of use is from obvious causes much more limited ; but I have seen enough of the benefit from cold liquids freely given in the acute stage of gastric disorders, inflammatory and febrile, with express reference to this point of temperature, to justify the recommendation of more frequent recourse to it in practice. This is a point where the feelings and desire of the patient may fairly be taken in guidance, and we can rarely go wrong in following them. The test, in fact, is simple and immediate ; depending on sensations which cannot readily be mistaken, and the changes in which indicate the extent as well as suggest the use of the remedy."

"The second condition under which diluents may be viewed as altering certain morbid states of the blood, is one of more difficulty, and connected with questions in physiology and pathology still under active research." Dr. Holland concedes that the blood can appropriate to itself, in alteration of its quality, fluids largely received by absorption, after their ingestion into the stomach—in those

cases where the proportion of its watery parts is from any cause materially lessened. Under these circumstances, liquids may freely and without fear be given, whenever there is a demand for them from the sensations of the patients. Even in diabetes, Dr. Holland never found any continued good from opposing the inordinate thirst of the patient, nor aggravation of what are the essential symptoms of the disorder, by assenting in full to this desire. The effect of diluents upon the various functions of secretion and excretion are next noticed by Dr. H., whose views on this point have been not only sustained but more fully advanced by different writers whom I have quoted in illustration of the benefits of the watery regimen. I shall close my notice of this gentleman's paper and the present chapter at the same time, by repeating his caution respecting the dietetic use of water.

“ Without reference, however, to these extreme cases, it must be repeated, that the use of water, simply as a diluent, scarcely receives attention and discrimination enough in our English practice. This is a point wholly distinct from the question regarding the fit proportion of liquids as a part of diet. The process of digestion suffers more or less from any excess in quantity of these; and, though the natural appetite may be unduly controlled, yet some rule is often required, in dyspeptic cases especially, to obviate such excess, even where the simplest and most innocuous liquids alone are concerned. For in these cases a morbid craving for them is often created, partly by the vitiated sensations of the patient, partly from the actual state of the membrane lining the palate, œsophagus, and stomach, and from the disordered secretions and products of digestion acting on this surface.”

CHAPTER XXV.

WATERY REGIMEN (*continued*)—HYDROPATHY OR HYDROTHERAPIA—AN USEFUL AUXILIARY TO OTHER REMEDIES—ITS CONNECTION WITH OTHER HYGIENIC AGENTS—THE SEVERAL STAGES OF TREATMENT—1. SWEATING—2. THE COLD BATH—THE HALF BATH—THE TEMPERATE BATH—COLD ABLUTIONS—3. DRINKING COLD WATER—4. DOUCHING—THE SEAT BATH—THE FOOT AND OTHER LOCAL BATHS—FOMENTATIONS OR EMBROCATIONS—THE DOUBLE EFFECT OF THESE AND OF THE WET SHEET—MAY BE REDUCING OR EXCITING, ACCORDING TO THE PERIOD OF THEIR USE—DISEASES CURED BY THEM—INJECTIONS.

THE last phase of the watery regimen is that which, of late years, has attracted so much notice under the name of *hydropathy*, or, as by some more appropriately called *hydrotherapia*, and, in reference to one of its most common and beneficial features, *hydrosudotherapy* or *hydrosudopathy*. It is also called the *hydriatic method*.

The reader who has followed me in the preceding chapters of this volume will be able to appreciate the real value of hydropathy; and while he sees but little novelty in the processes by which it is carried out, he, on the other hand, will not be startled at seeming paradoxes and dangers in its details. He will find in it, under proper guidance, not a panacea, or an universal remedy, nor a method of treating diseases which can be undertaken by any person at random, but an useful and even a powerful auxiliary to other remedial means.

Connection with other Hygienic Agents.—The subject cannot be better opened, with reference to its reputed origin and its fit associations, than in the initial sentence of an eulogistic notice, in the form of a preface to one of the many treatises and essays which have appeared within the last ten years.

“At Graefenberg, on the summit of a high mountain, in the midst of an eminently vivifying atmosphere, by the

aid of a regimen, which carries us back to the times of our forefathers, and of exercise proportioned to the strength, Priessnitz performs cures which have attracted the attention of all Europe.”*

The Several Stages of Hydropathic Treatment.—These are four in number, and are gone through in the following order and fashion: 1. *Sweating.*—The patient is awoke at dawn of day (four o'clock in the morning), and after being divested of his night-clothes, he is carefully enveloped in a blanket or woollen wrapper, leaving his face and head alone uncovered: the latter has soon a napkin put round it. He then lies down on a cross bedstead, and has more clothes put over him, and sometimes a feather bed in German fashion; the air of the room being of a reduced temperature. Thus situated, the patient soon manifests increase of animal heat, redness of the face, &c., followed by sweat. On the appearance of this secretion, the windows of the room are opened, to purify the air, and an attendant hands cold water to the patient to drink, and does the same at intervals afterwards. At first the third of a glass, and afterwards a full glass of water is taken in this way, every quarter of an hour. The sweat is greatly increased by this means, and becomes so copious as not only to bathe the entire surface, but, also to percolate the bedclothes, and to flow in small streams on the floor. It is allowed to continue from an hour to three and even six hours, according to the nature of the case and the strength or vital force of the patient.

Wet Sheet Packing (Leintuch).—If there be difficulty in procuring perspiration by the dry envelopes and covering, as above, these are removed, and the patient is wrapped carefully in a wet sheet, which has just before been dipped in cold water and then wrung out with some force. Over this then come the woollen covering, and then the feather bed. Few skins, however dry and harsh they may be, resist the *sweating* operation of the wet sheet and its assistant coverings.

* Manuel d'Hydrosudotherapie, ou Traitement des Maladies par l'Eau Froide, la Sueur, l'Exercice and le Regime, &c. Par le Docteur, Bigel, Suivi d'un Memoire Physiologique sur la Chaleur Animale, par M. Peletan Professeur, &c., de la Faculté de Medicine de Paris.

2. *The Cold Bath.*—After the sweating period has been gone through, the feet are freed from the bed clothes and wrappings, and shoes or boots and stockings are put on by an attendant; the coverings are somewhat loosened, but are still kept round the body like a cloak. Thus equipt, the patient walks down to the bath which is supplied by a cold spring; and immerses himself in it, after having thrown his coverings to one side. The bath is from twenty to thirty feet in circumference, large enough to admit of the patient moving his limbs about freely, and turning himself with ease in the water, which is of a temperature from 45° to 52° F.* The mode of entering the bath is by prompt immersion, after the head and chest have been well wet with the water: the bather then either swims, or makes equivalent movements so as to give himself as much exercise as possible; he, also, washes thoroughly while rubbing his body and limbs. At the expiration of ten minutes, he leaves the bath, and is invested by an attendant with a sheet and a coverlid, and conducted to his chamber, where, on being dried, he dresses himself quickly, and then sallies out. The object now is to take exercise in the open air, and thus to favour reaction, and also to drink the water. In an hour afterwards, the patient returns to the house and takes his breakfast.

The Half Bath, or the Shallow Bath.—Feeble, delicate and irritable persons, are not subjected at once to the cold bath. They take what is called the half bath, that is, they are placed in a bathing tub, the water in which is only six inches deep, and of a temperature raised by the addition of warm water to 56° or 60° F., and sometimes, though rarely, to 63° F. The patient, as in the former case, wets his head and chest with the water, and then enters the bath, in which he remains seated and rubs his body well with the water. He continues in it five or six minutes, during which time the attendant pours over his shoulders and sometimes his head tepid (?) or even cold water.

The Temperate Bath.—The tepid bath, as it is called by courtesy, for to the feeling of most of us it would be unequivocally cold, is used by Priessnitz usually as a preparative for the cold bath—to which last patients are subjected at

* This last is, the reader has learned in a preceding page, the temperature of spring water in this part of Pennsylvania.

the end of a few days. Some pass, at once, from the tempered bath to the great cold one, and return again from this to the former.

Others, on whom it is deemed to be either useless or impracticable to produce sweating, take the tempered bath on rising from their bed, so as to become accustomed gradually to lower temperatures. Priessnitz has recourse to it in some subjects who are slow to reaction, as a means of creating fever, and thus bringing about what he believes to be symptoms of crisis. In these cases the patient remains an hour and more in the bath-tub, which has a lid with an opening to allow the head to appear above it.

Cold Ablutions.—They whose constitutional powers are so weak as to disable them from the use of the bath by immersion, are obliged to content themselves with ablutions of cold water. These should be regarded as an excellent preparative for the treatment, especially in the cases of young children and of persons whose skins have been weakened by the use of too warm clothing. We did not require any hydropathic illumination to make us aware of the utility of the practice of ablution to persons in common health, with a view of keeping up suitable activity of the cutaneous functions. It may be performed either with a sponge or with the flat of the hand; and its efficacy will be greatly increased by strong friction.*

3. *Drinking Cold Water.*—The quantity of water drank during the day by those under the care of Priessnitz is represented to be, on an average, 25, others say 12 glassfuls (a glass is about half a pint), of a temperature ranging from 46° to 53° F. It is drunk by the patient when he is yet in his bed sweating, after the bath when he is walking about, between breakfast and dinner, during this meal, and in the afternoon two or three hours after dinner, also in the evening. The times preferred are before breakfast and during exercise. The appetite of the sick is the best guide as to the quantity and frequency of their drink. Taken beyond measure, it has produced aqueous indiges-

* The preceding outlines of hydropathic practice are taken from a volume by Drs. Heidenhain and Ehrenberg, entitled—*Exposition des Methodes Hydratiques de Priessnitz dans les Diverses Especes de Maladies, &c., &c.*

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tion. Schedel* relates that a patient, who was far from being robust, and who had been weakened by a prolonged mercurial treatment, imprudently, after about ten days following the hydropathic course, drunk eight glasses of water in a short space of time, and without taking the exercise directed after each glass. This person soon felt uneasiness, and a great coldness of his extremities. On his trying to walk he found himself unable to speak, and suffered from cerebral congestion, manifested by violent headache, complete loss of voice and insensibility: at the expiration of several hours he was relieved of all the bad symptoms by copious vomiting.

4. *Douching*.—The fourth act of the hydropathic drama—sweating, cold bathing, and drinking cold water, being the other three—is the use of the douche. This is applied an hour after breakfast, and three hours after dinner. The water, brought directly from the spring by troughs, falls through tubes at heights of 10, 15, 18, and 20 feet, and with a diameter of between 3 and 4 inches. There is a lack of mechanical contrivances at Graefenberg by which the douche can be directed with ease to any part of the body. The difference of direction must be given by the changing posture of the patient, so as to allow of the water falling on the diseased region or organ, unless it be in a state of irritation, and then the douche ought to be withheld. Certain parts, such as the pit of the stomach and the chest of a delicate person, ought not to receive the douche at all; and as to the head, it must be at first protected by covering it with the two hands. The eye is douched by the rebound, as it were, of a part of the water, which falls on the arm held horizontally for the purpose.

The place for receiving the douche at Graefenberg is in the open air, surrounded by a wooden palisade, and traversed by horizontal bars of wood; of which the weaker patients take hold, in order to prevent being thrown down by the impetus of the fall of water. The bather, having been previously undressed in an adjoining apartment, is wrapped in a sheet and enters the enclosure, where he throws aside the sheet and puts on slippers. Before

* Examen Clinique de l'Hydrotherapie.

receiving the douche he wets his head and whole body with water received into the hollow of his two hands with the fingers intertwined. For the first few seconds the douche is received on the nape of the neck and along the back, and afterwards on all parts of the body; the bather in the mean time rubbing his skin, at all accessible points, with his hands; and in this way, we are told, he removes the unpleasant sensation of cold caused by the douche. After the body generally has received these watery favours, they are then, during the remainder of the douching period, to be directed specially on the diseased organ or affected region. The duration of the douche will vary from five to fifteen minutes; the last period is not to be exceeded. After its completion the body of the bather is thoroughly rubbed; he then dresses quickly and returns to the house. But the aqueous labours of the prime of the day are not yet over; for, if time is allowed, the remaining hours before dinner are to be devoted to the local application of the water in some of the fashions to be soon described.

Inclement season or stress of weather—rain or snow, or ice—does not prevent the use of the douche. Some have taken it when the thermometer in the open air was as low as 20° F., or 12 below freezing point; but, in general, trials of this kind are neither necessary nor wise.

The douche is forbidden in cases of great irritability, febrile excitement, or extreme languor. Its effects in gout and rheumatism are prompt and pleasing.

The Seat or Sitz Bath.—Of the local applications of water, no one figures so conspicuously in the Priessnitz plan of cure as the seat or hip bath. It is so constructed as to allow the patient to sit in it with the water nearly up to the navel: it rises at one end so as to support the head and back, while the lower extremities are outside, and in a state of demi-flexion. The rest of the body not immersed in the water is to be well covered. The duration of the seat bath varies according to the indications to be fulfilled. If it is intended to strengthen or even to stimulate the organs in the region exposed to the water, as in weakness of the organs of generation, nocturnal pollutions, impotence, fluor albus, &c., the patient need not remain longer than ten to fifteen minutes in the water; but if it is desired to produce a revulsive effect, as in cases of inflammation of

the head and chest, and in fevers, or to cause a powerful impression in chronic affections of the abdomen, as, for instance, in congestion of the liver and spleen, chronic diarrhœa, obstinate hemorrhoids, the patient may remain in the bath for a full hour. Chronic determination to the head requires, sometimes, that the bath shall be of two hours duration. In inflammation of the brain and organs of the chest, and in nervous fevers, the seat bath is used alternately with the wet sheets. A few mouthfuls of water are swallowed from time to time.

The time for using the seat bath at Graefenberg is in the afternoon, some hours subsequently to dinner. Sometimes it replaces the douche, and then it is taken at noon, before dinner. In certain cases, again, as where there is great irritation, its use follows immediately after the sweating stage; it is then preceded by general ablution.

During the whole period of the bath, the skin of that part of the body, and particularly of the lower part of the abdomen, immersed in water is subjected to continued and active friction. The water is to be renewed so soon as it has acquired the temperature of the body. On emerging from the bath, the hips, thighs, and lower part of the sacrum, which are almost benumbed by the cold, are also to be well rubbed; and if exercise can be taken soon afterwards, the natural heat is not long in being restored.*

I waited to repeat this last observation, of the state of the parts after emerging from the seat bath, in order to point out the special absurdity of the explanation offered of its mode of operation, viz., that it acts as a powerful revulsive, calling blood and excitement to the pelvic organs and parts immersed, and at the same time drawing both, by derivation, from the head and chest, and upper abdominal organs, especially the liver and spleen. Revulsion implies increase of innervation and vascular action, in a part remote from the organ which is suffering by an excess of these states. Now we may ask, whether a region, the skin of which is shrunk, pale and insensible, affords any evidence of revulsion. Nor, considering the abatement of irritation in the lower part of the digestive canal, as from hemorrhoids and diarrhœa, have we any good reason to sup-

* Exposition, &c. Manuel d'Hydrosudotherapie, &c.

pose that the internal pelvic organs are in any other state than that in which we observe the skin to be, viz., diminished vital action, so far, at least, as this can be measured by either the nervous or the vascular system. I have before adverted to the fallacious notions on the subject of the first constitutional or general operation of cold, when it is applied to the surface, and I shall return to it very soon, when taking up the subject of the cold bath. I do not mean to impeach the propriety of the practice of using the cold seat bath for the relief or removal of the diseases just indicated, hazardous as it seems to be, nor shall I deny that cures have been performed by its means. My objections apply to the theoretical explanation of its *modus operandi*, which under any of the received dicta of the day, whether they be advanced by regular physicians, or the followers of Priessnitz, are unsound, and contradicted by the obvious phenomena following the use of the cold bath, and the indications which for the most part we hope to fulfil by the practice. My own views of the primary constitutional operation of this agent, whether it be general or local, exhibit a harmony between its physiological and therapeutical effects. Cold water applied to the pelvis, or to the feet even, exerts a strong sedative effect on those parts, which is responded to, in the same sense, by other and remote organs; and if these have been suffering under morbid excitement, they feel the soothing and sedative influence of the cold applied to the parts specified, in a manner similar to what they would have felt if it had been applied directly to them.

But we shall be told that the reaction which follows the first sedation is an evidence of excitement, and in this way the cold bath is a stimulant. The same argument might be adduced, with equal plausibility, in proof of the stimulant effect of bloodletting and purging, and of various narcotics. No new or vital force is acquired by this means, any more than there would be augmented physical power by the rebound or recoil of an elastic body when the compressing cause is withdrawn. But more of this in a succeeding chapter.

The alleged tonic effects, from a short immersion in the seat bath, offer no contradiction to the views which I hold on the subject. The parts are in a state of mixed irritation and

debility. Cold abates the former, and, by the reaction which follows its use, it imparts a temporary fulness, and at the same time exercises the capillaries of the part; and a pleasurable feeling, compared to the prior irritability, ensues.

The Cold Foot Bath.—The foot baths, says Dr. Bigel (*Manuel, &c.*), are almost exclusively employed as a revulsive in pains of the upper parts of the body. The little faith which can be reposed in the remedy, if it acted in no other way than as a revulsive, may be inferred from my remarks on the cold seat bath, used as it is by the hydropathists with the same intention as the foot bath. Priessnitz was in earnest, however, in his theory, for he directed the cold as a substitute for the warm pediluvia, prescribed by the faculty under the same circumstances. We are told that pains of the head and teeth, whatever may be their cause, but especially those of a darting kind, pains and inflammations of the eyes, afflux of blood to the head, yield almost immediately to the cold foot bath. Compresses, wet with cold water, are applied at the same time to the parts which are the seat of pain.

The reader will see at once the inconsistency of the practice in the last-mentioned instance with the hypothetical view which governed in directing the foot bath. The latter is said to be a revulsive; it derives the blood from the head, eyes, &c. What shall we call the cold compresses to these organs? Are they not also revulsives—deriving the blood from the lower extremities, and drawing it towards the head! Admit, on the contrary, the direct sedative operation of the cold water, and the practice is harmonious and consistent in all its parts. The disease of the head and eyes are soothed secondarily by cold to the feet, and primarily by cold to themselves.

The directions for the use of the cold pediluvium as a revulsive are, that the water shall not be more than two or three inches deep in the vessel. To combat successfully a tooth-ache, the depth of a single inch will suffice. Bigel says he has seen the disease yield to this remedy in half an hour. The patient is recommended to take exercise before bathing the feet, and never to immerse them in the water so long as they are cold.* The feet during all the

* *Hydrotherapeutique, &c.* Par Charles Munde.

time of immersion are to be continually rubbed against each other, so as to resist the cold and favour reaction, and after the bath, exercise is to be taken with the same view.

When a tonic effect from the foot bath is desired, the quantity of water should be greater than before, so that it shall cover the ankles.

The duration of the pediluvium is, by some, declared to be ten minutes, by others, to last until the water acquires the same temperature as the feet, which will be from half an hour to an hour. The period will probably depend on the indications to be fulfilled, as in the case of the seat bath.

Of the directly sedative effects of a cold foot bath I gave an instance from Floyer in a preceding chapter, page 231. It was a case of uterine hemorrhage, which was promptly arrested by this means.

The Cold Head Bath.—This mode of bathing is used for headaches, diseases of the eye, &c. It is practised by the patient reclining on a table, at one end of which is a vase of water of a suitable size and depth to allow of his immersing first one side, then the other, and finally the back part of his head, giving about five minutes to each of the three regions.

Embrocations or Fomentations.—Before speaking of what the adepts call local embrocations, or fomentations (*unschlags*) in the hydropathic practice, let us inquire into the *rationale* of that which they also designate by the title of general fomentation; viz., the application of the wet sheet (*leintuch*), by carefully enveloping the body in it. The surprise that may be felt on first hearing of this fashion of medication ceases, when we reflect on the manner in which it acts. The wet sheet soon abstracts sufficient heat from the body of the patient to convert the moisture into vapour, which, in its turn, becomes a stimulant to the skin, and has its share in bringing on sweat. If the sheet be continued still longer it acts as a rubefacient. Similar effects, but on a limited surface, follow the topical application of wet cloths to any particular part or organ.

Reducing Process.—When it is desired to procure the full reducing and calming effects of the wet sheet, as in a case of fever, this is to be renewed at short intervals, so soon as it becomes warm, or every fifteen or thirty minutes. So also with local applications to the suffering organs. The object

under these circumstances is to cause a continued and somewhat prolonged abstraction of heat, and to prevent reaction. It is common to associate with these partial fomentations the use of the seat-bath, as already described.

Exciting Process.—When heating or stimulating effects are desired from local fomentations, linen in numerous folds, resting one on the other like a compress, is wet with water, and afterwards wrung out with some force, and applied closely to the prescribed part. Over this are put dry compresses, in order to prevent the access of air and consequent evaporation. Great pains must be taken to make the wet compress of linen fit closely to the skin, so as not to allow of an introduction of the least portion of air between this tegument and the wet compress. The heat which is soon generated on the skin under this application, is represented to be four or five degrees of Reaumur, or from nine to eleven of Fahrenheit, higher than the rest of the cutaneous surface. The compress is to be renewed when it becomes dry, which is nearly every hour.

The exciting effects of this remedy are manifested in what may be called a depurative sweat, which is at first clear and difficult to be procured; but as the treatment advances, it becomes more profuse, is viscid and glutinous, of a dark yellow and brown colour, sour and even fetid in its smell, and is, in fine, impregnated with the most disagreeable odours. When these morbid phenomena appear, the perspiration may be considered of a critical nature, as if it were the elimination of morbid humour. The sweating is followed often by the appearance of an eruption. Applications of this nature constitute an excellent resolute, in chronic engorgements, and a digestive in dyspepsia with languor of the functions. The invalids at Graefenberg are very partial to its use, and the *belt of Neptune* is worn by them with the same freedom and pleasure that an obese man wears a Russian belt, or a young officer sports his newly-acquired epaulette. It consists of a napkin folded into four plaits and wet, and over this is applied another with a single fold, which in its turn again is invested by a large woollen band.

These local fomentations have obtained quite a reputation in hepatic and pulmonary affections. Sometimes they serve the purpose of blisters, by their strong derivative and

counter-irritant operation—when applied at some distance from the diseased part. They are employed in this way in cases of ophthalmia, by being applied to the back of the neck. We are told, however, as might indeed be expected, that by prolonged use they lose their effect.

Dr. Gully, believes that, in the great majority of cases presented for treatment, no superior advantage is obtained by the compress, which goes all round the trunk, to that which he suggests, and which is applied to the abdomen alone. "The object of the compress is to produce and maintain over the abdominal viscera a moist warmth, which shall act as a counteracting and soothing agent to the irritation which is fixed in these viscera." "Properly applied, therefore, it is a *constant* opiate to that constant irritation within which is the ground work of all chronic diseases. Hence, in almost all these diseases it is applicable, but it must by no means be worn equally long by all patients." This compress often acts as an agreeable aperient. In many instances of nervous indigestion, it is desirable to take the compress off during, and for an hour or so after a meal, especially the heavy one of dinner,—as it seemed to increase the fulness and oppression. "In very excitable and feeble persons, it is well to wear it only when walking or on horseback." Sooner or later, says Dr. G., "the abdominal compress causes an eruption of some kind on the skin underneath it. Before, or at the same time with this, it may bring on an exudation of glutinous substance." In one case, that of a lady who had suffered from a bad nervous headache (for which she had taken enormous quantities of physic), he saw "an exudation of a brownish hue which stiffened the compress as if with starch, and gave out the unquestionable odours of colocynth and aloes."

Injectons, and especially lavements or clysters, are not forgotten in the hydropathic treatment of disease. They are prescribed at first of a tepid, afterwards of a cold, temperature.

Frequent rinsing of the mouth with cold water is more salutary than might at first appear. It acts beneficially on the mucous membrane of the mouth and throat, and stimulates the salivary glands to partial salivation. In some cases of gout of the head it diminishes the pain.

The nose is washed by snuffing up water. This process is of service in scrofulous affections of the part, as also in the snuffles and headache. In these cases fomentations to the forehead are employed at the same time.

CHAPTER XXVI.

WATERY REGIMEN (*continued*)—HYDROPATHY—PAINS TO PRODUCE REACTION AFTER BATHING—CAUTION—CRISES—MANIFESTATIONS OF THEIR EFFECTS—DIET—CONDIMENTS AND ALCOHOLIC DRINKS PROHIBITED—COLD WATER DRINKING—EXERCISE—MEDICAL KNOWLEDGE REQUIRED TO PRACTICE HYDROPATHY—DR. JOHNSON—DR. GULLY—MISTAKES BY PRIESSNITZ.

Whatever we may think of its philosophy, the method pursued by Priessnitz in his water treatment consists of very precise rules and precautions. His continued directions, in all the varieties of bathing, to have the skin subjected to active friction, cannot escape attention; and his extreme desire to prevent sedation and procure reaction is equally obvious. Of one of the best means for bringing about this result, viz., exercise, I shall soon speak, in connection with the regimen adopted at Graefenberg. At this place, where the temperature of the spring water is from 43° to 52° F., no person remains longer in the bath than six or eight minutes; and the majority of the patients are restricted to two or three minutes. Priessnitz advises them to avoid, carefully, not the first sensation of cold felt on entering the bath, but the secondary one which he regards in the light of a fever, and that they should come out before this is felt. His expectations of success in the treatment are based on the vital energy of the patient, and the powers of reaction of the system developed in its progress, even to the extent of producing a fever and critical eruptions on the skin. We have seen that, where he thought the patient was unable to bear with advantage the shock of the cold bath, he directed the use of the temperate, erroneously called tepid bath.

As a proof of the careful directions of Priessnitz in this matter, and of the danger which may follow their neglect, the following instance is related by Dr. Edward Johnson*, whose preliminary observations are also worthy of remembrance. The case was one of deafness, of ten years' duration, in a Prussian, aged twenty seven years. He was cured in twelve days' treatment:

"I will here relate an accident which befel this young man, in order to show that the water treatment is an edged tool which cannot with impunity be trifled with—and that, like every other remedy which is not mere chip in porridge, it is only safe in the hands of those who know how to adapt its use to the peculiarities and powers of individual constitutions.

"He had been packed in the blanket; but, after having lain there for three hours, did not perspire. He was ordered therefore to be taken out and put into the *tepid* bath. The bath-servant, however, either to save trouble, or from misunderstanding, put him into the *cold* bath. The moment he came out he fell down, and remained perfectly senseless for more than an hour. Constant friction, however, with the wet hands, at length restored him."

Dr. Johnson makes frequent mention of the *tepid* bath in the treatment of patients whose cases he had an opportunity of observing at Graefenberg. Among others was a case of scarlet fever occurring in a married woman, aged twenty-five. She was regularly packed in the wet sheet and blanket, and afterwards as regularly put in the *tepid* (cool or temperate) bath.

Crises.—The progress towards a cure at Graefenberg appears to the patient to be interrupted all at once by a feeling of great languor and prostration, accompanied by febrile movements, and an increase of secretions which are deemed critical. Vomiting diarrhœa, increased flow of urine, are among these signs; but, more than all, the appearance of which is hailed with joy by the patients of Priessnitz, are certain eruptions on the skin; sometimes papular, but more generally pustular, and amounting to furunculus and abscess. The term crisis is applied to these outbreaks; but under

* Hydropathy. The Theory, Principles, and Practice of the Water Cure, shown to be in accordance with Medical Science and the Teachings of Common Sense.

the same name are also ranked the reappearance of old venereal and scrofulous and mercurio-syphilitic sores, and of gonorrhœa, in the progress of the hydropathic treatment. One writer, Dr. Bigel, tells of his being "*gratifié*" by forty-five abscesses, one of them a whitlow, which deprived him of rest for ten nights. The only ease he could procure from his torments was by repeated immersion of the part in cold water. The abscess opened of itself; and the pus, on its being collected on linen and dried, exhibited a portion of the calcarious matter "which we find in the articulations of gouty persons after their death, and in their urine when they are living." Dr. Bigel succeeded in bringing out eruptions on his arm by applying to this part stimulating fomentations, while at the same time he continued the cooling ones to his pained hand. The reader knows by this time what is meant, in the vocabulary of hydropathy, by "stimulating embrocations."

Whatever may be the nature of these eruptions, they are all treated alike, viz., by the use of cloths dipped in cold water, and renewed so soon as they become dry. They are allowed to open without any surgical aid. The general treatment of the primary disease is still to be continued, but in a somewhat milder manner. Thus, for example, the general bath and douche are omitted; but the packing in sheet and blankets, and the drinking of cold water, are continued. If, from the severity of the symptoms, fear should be felt that an important organ may become the seat of crisis, revulsive applications must be put in requisition.

The papular exanthemata are represented to be the most common form of crisis in nervous diseases; and the furunculi and abscesses in those affecting nutrition. The abdomen is said, also, to be the most frequent seat of critical eruptions in old mercurio-syphilitic diseases; and the limbs in gout and rheumatism.

Great is the variety of disorders brought up from their long concealed depths by the water treatment. Gonorrhœa, which had been suppressed two years before, cicatrices, and dried up ulcers, reopened. Visceral disease is also, we learn, susceptible of renewal in this way. Priessnitz relates the case of a lady who had been salivated for inflammation of the liver, and in whom, after she had begun

the water cure, there supervened hepatitis and pytalism as before. We are not told the period that elapsed between the first and second attack of hepatic disease, in the case of this lady. I may here remark, that, to play the skeptic, when one hears of any event or phenomenon out of the usual order of sequence and exhibition, is very easy philosophy, and yet sometimes the most stolid incredulity is dignified by this term. But, on the other hand, it requires a very robust faith to be able to credit a tithe of the marvels which, almost every day, are brought to our notice.

With the appearance of the crisis there is generally an amendment of the health, and gradual restoration of strength and vivacity of thought and movement. Dr. Johnson (*op. cit.*) avers, that he has "never either seen or heard of a single case in which these eruptions did not entirely vanish again, leaving the skin perfectly healthy and clear as before."

Dict.—The food at Graefenberg is served in the German fashion, of abundance and greasy cookery. The patients are allowed, and even encouraged, to eat abundantly of roast meats, fish, green vegetables, cheese and other preparations of milk, and fruits. The want of variety, and the bad cookery, arose, in part, from the parsimony of the superintendent (Priessnitz), and in part from the circumstances connected with the place itself. Even after making all due allowances for the increased appetite in those who had put themselves on the watery regimen, and the call for repairing the expenditure of organic material by the sweating process, the transition from a regulated diet to the unmeasured repletion at Graefenberg, is not unfrequently attended with bad consequences. A vulgar error prevails among the inmates of hydropathic establishments, in which, by-the-by, they but participate with those who resort to mineral springs and the sea shore, that the more they eat the sooner will they regain their health and strength. The patients of Priessnitz, acting under his advice, may be said to devour rather than to eat, and they gradually acquire a habit in this respect which it is difficult to eradicate.* There would be less ground of regret

* Baldou, Recherches Pratiques sur l'Hydrotherapie.

if this bolting process were confined to the hydropathists ; but, unfortunately, it prevails to an alarming extent in our own country, especially at public tables, among those who are innocent of using water, except in minimum quantities.

There is at Graefenberg what is said to be a *diet* table, but the only difference between it and the public ordinary is, that the meats are somewhat lighter on the latter, though equally abundant as on the other. No attempt is made at a modification of regimen adapted to different ages, sex, habits, and morbid affections ; in which not only the quantity but the selection of aliment is important.*

Great stress is, or used to be laid by Priessnitz, on the temperature of the food. Believing that warm food was detrimental to all animals, and a great cause of disorder of the digestive organs in the human subject, he directed it to be always taken cold. The most recent writers on hydropathy are silent on this point, and it has been asked whether Priessnitz has abandoned his views respecting cold food. At any rate, the restriction is not enforced in any of the hydropathic establishments in France.†

Prohibition of Stimulants.—Priessnitz prohibits rigidly the use of pepper, mustard, and all condiments, except salt. He is equally strict in withholding acids, all kinds of alcoholic liquors, and tea and coffee. But then, as Augustus told the Romans, when they complained of his taxing their wine, he offers them an abundance of pure water instead. M. Fleury protests against so irrational a generalization as this. He admits that the watery regimen may be advantageously prescribed to plethoric persons, to those invalids who have committed excesses at table, or who are afflicted with chronic gastritis, or an affection of the liver, gout, or gravel. But he alleges that it is often hurtful to chlorotic, anemic, scrofulous, and neuropathic subjects.

Dr. Gully‡ makes some sensible, although to the experienced physician, not novel remarks, on the diet of those under

* Lubansky, *Etudes Pratiques sur l'Hydrotherapie*.

† Fleury, *Recherches et Observations sur les Effets et l'Opportunité des Divers Modifications, dites hydrotherapiques*. *Archiv. Gen. de Med.*, Nov., 1848.

‡ *The Water Cure in Chronic Disease &c.*

the hydropathic treatment. After admitting that the appetite and digestive powers are augmented during the water cure, he adds: "But, on the other hand, experience gives me no room to doubt that, by appropriate regulation of the diet to each case, restoration is secured in much less time, and with much less of that constitutional tumult which harsh practice rouses."

Dr. Gully puts the question of vinous stimulants in this way:—"either the stomach has appetite, and does not require the stimulus of alcohol to make it digest, or it has no appetite, and should not have food put in it to digest. Where then is the *necessity* for the daily wine bibbing? Besides, the stomach will only bear a certain amount of stimulation, and if it receives it from the wine it is unable to receive it from the food also; so that the digestion of the latter is materially interfered with by the former, and the appetite for the stimulus of aliment diminished in proportion as that of alcohol is applied." The reasons for avoiding vinous liquors by those whose viscera are affected by chronic disease are, Dr. Gully properly believes, still more potent. But while thus recording his "belief in the infinitely superior wisdom of abstinence from alcoholic liquors, under ordinary circumstances of health and disease," this writer would not advocate the exclusion of such liquids in all cases. In those of extreme exhaustion from loss of blood, or any other depletory cause, or from excessive hysteria, he would not "hesitate to administer any wine or spirit that was nearest; they are, strictly speaking, medicinal means of ready application, and as such may be wisely employed in time and place; but healthy men, and men with chronic disease, do not require medicinal means every day after dinner. Yet there are men silly enough, not only to take a nauseous pill of drugs *before* dinner, but this more pleasant but equally deleterious draught of physic *after* dinner. Strange infatuation." With a full conviction of the soundness of these views I willingly repeat the expression of them from another quarter.

It is worthy of remark, both in relation to the subject of change of diet, and still more to that of temperance reform, and the question needlessly brought up by the class of half-way reformers, that the sudden and entire abstinence from all alcoholic liquors by those inmates of Graefenberg

who had been the most free in drinking them, was not productive of the least inconvenience to the parties.

Drinking of Cold Water.—The operation of sweating, the free exercise and active respiration in an open and pure air, and the abundant alimentation enjoyed by the visitors at Graefenberg, are well calculated to excite thirst and prompt to the free drinking of cold water. Priessnitz, whose pathology is that of nearly all empirics, as by the way it has been of many medical writers, in his attributing diseases to peccant humours, believes, also, that thirst proceeds mainly from this cause. He argues this from the fact that, after the evacuation of these humours, the thirst ceases or becomes slight. Some patients, after they begin the water drinking, are troubled with nausea, and even vomiting and diarrhœa. These are regarded as symptoms of ferment excited by the water, and as encouraging to its further and even more liberal use, which we are told will be rewarded by a removal of the temporary disorder and a better appetite. Priessnitz even directs the liberal imbibition of cold water to the extent of causing vomiting and diarrhœa, in cases of disordered stomach.

We have seen that the annals of German medicine contain examples, long before the announcement of the hydropathic treatment, of the efficacy of free potations of cold water. Thedent's allowance, for example, went beyond the average of Priessnitz. We have also learned the practice of some of the Greek and Roman physicians, to make their patients drink cold water, *ultra satietatem*, and until it produced vomiting. At a recent period Professor Cœrtel went beyond the requirements of the Graefenberg school, in his prescriptions of water drinking conjointly with free ablutions. Bigel relates the case of a friend of his who had suffered for many years from gout in the head, which threatened to produce blindness, but who was entirely cured in four months, and restored to full health by this regimen. The patient drank not less than forty glasses of water daily; but he did not entirely abandon the use of coffee, beer, and wine.

Exercise.—Free exercise in the pure mountain air is one of the means of restoration enjoyed by visitors to Graefenberg. They are enjoined to walk, and they do walk and

run too, down the sides of the mountain with a feeling of pleasure bordering on hilarity, in which the most jaded followers of city dissipation, and the languid invalid, can hardly fail, after a short change of scene, to participate. Here is one great element of success in the hydropathic, which might with much propriety be called the hydraeropathic treatment. The exercise is, moreover, greatly increased by the oft-repeated frictions during the day, in the different forms of bathing, which the invalid is required to practise on himself in conjunction with his attendant, in order to bring on reaction.

“In the treatment by cold water, invigoration of the whole system is a grand point; consequently, where the state of the patient and the weather will permit of exercise in the open air, it must be urgently recommended. It is incredible with what rapid strides active patients, who remain the whole day long in the open air, progress towards recovery in fine weather: their vigour increases perceptibly, and a sense of health and cheerfulness of disposition become daily more evident.”*

If to the exercise we add a plain, though it be gross food, but among the articles of which milk figures largely, and pure water constantly for drink; and, also, regularity in the hours of sleeping, early rising, and the daily stimulus of hope in the restoration of their health, we can find causes adequate to produce many of the cures of chronic diseases, which have been brought about at Graefenberg, even without the wonders of the bath, either general or local. But from the activity and efficacy of this latter-mentioned remedy it is not my intention to detract. Let it be understood, however, that for its judicious employment a sound judgment, aided by all the lights which medical institutes can impart, is required to render it really valuable. It is not a fit subject for every impulsive or speculative philanthropist, or scheming adventurer, to handle after his own fashion, or to urge agreeably to the dogmas of sheer though it may seem to be successful empiricism. That this is not too strong a ground to take, is quite evident from the admissions of the more intelligent and better instructed physi-

* Weiss, The Hand Book of Hydropathy.

cians who have written on or advocated hydropathy. The following passage from Dr. E. Johnson (*op. cit.*) is rather long, but it entirely meets the question, which has a double bearing; first on mere pretenders, who think that the assumption of the hydropathic treatment and the crude pathology of Priessnitz exempt them from the study of medicine in general; and second, on the regular members of the faculty, who are not dispensed from inquiring into and making trials of the remedy, because they cannot conscientiously give their assent either to the pathology by which it is attempted to be sustained, nor to the arts and advertisements by which it is degraded into a mere trade, and a means of levying money from the invalid for the largest period to which his credulity can be imposed on.

"The only difference between the ordinary practitioner and the hydropathist is, that the latter has discovered a *new remedy*. And obviously it is as necessary to know how, when, where, and in what dose, to apply the *new* remedy as the old. And the same kind and amount of knowledge is equally necessary. For an over-dose, or misapplication of the *new* remedy, is as deadly as an over-dose or misapplication of the *old*.

"And here it must be *distinctly and permanently remembered, first*, that the hydropathist does *not* pretend that his remedy is applicable to *all* diseases, nor to all states of the *same* disease. A thorough knowledge of the nature of the several diseases, therefore, to which the human body is liable—to know how to distinguish one from another—to know when the same disease is produced by this cause or by that—which is the same thing as to know when the *same* disease is *curable* and when it is *not curable*—to know in what particular *stage* the disease is when the patient applies for advice—to know whether the symptoms of which he complains are produced by *disorganization* of parts, or whether they are merely *functional*, and only depending on morbid sensibility of the nervous centres—all this, and much more, is clearly a necessary part of the hydropathist's education. For, if he do not possess this knowledge, he will not only do much mischief, but will be continually receiving patients, and vainly submitting them to a long, tedious, and expensive process, when he ought to have known at first that his case was *not* one which could

be benefited by the hydrotherapeutic treatment. For instance, in the case of dropsy, if the disorder have arisen in consequence of mere general debility arising simply from functional derangement, the case is one which will certainly be cured by the water treatment. But if it have arisen in consequence of thoracic adhesions, as between the pericardium and pleura—or in consequence of tuberculated liver—or from the pressure of any internal tumour resting upon any of the large veins, so as to prevent the return of blood towards the heart—to submit *such* a case of dropsy to the water cure is a culpable injustice and most gross cruelty.

“So, again, in epilepsy and paralysis—if these affections have arisen in consequence of some irremovable mechanical agent, as the growth of a spicula of bone, nothing can cure them. But if they have been produced by a clot of blood, which has oozed from some small ruptured vessel, then, I say, and repeat *hardily*, because I have *seen* it, *such cases are curable* by the water treatment united to a *severe course* of abridged diet—or, as I shall call it, *compulsory absorption*.

“*Secondly*, it must also be *distinctly and permanently remembered* that the hydropathic remedy so seemingly simple, is not *unique and one*, but *several*—and that effects *diametrically opposite* to each other may be produced by it.”*

Dr. Gully, another of the more intelligent and conscientious expounders of hydropathy, after speaking of those who run over to Graefenberg for a few weeks and come back water doctors, says : “From such I am also compelled to hold that its employment requires as much nicety and discrimination as any other plan of treatment ; and may not be safely trusted to routine. Knowledge of sound physiology and pathology are never more required than in the practice of the water cure, and in no system of treatment will the great truths of these sciences find more ample and beautiful confirmation.”†

Priessnitz, himself, affords a strong example of the inconveniences, not to use a harsher word, growing out of an

* Hydropathy, &c., pp. 176–8.

† *Op. cit.*, pp. 562–3.

ignorance of medical science, in its large and comprehensive sense. That the Silesian peasant, as he has been called, possesses much shrewdness, and a kind of empirical tact, derived from long observation of diseases, is not to be denied. He deserves credit, also, for his firmness in enforcing the general principles of hygiene in his establishment, and of inducing those who would have turned a deaf ear to an announcement of the truth at home, to believe that an obedience to the practice under these principles is not only possible but comparatively easy. It is to his praise that he could make the votary of fashion, the palled sensualist, the exquisitely sensitive fine lady, the hypochondriac man of letters, all conform to his regulations, any one of the several of which, if suggested by their own physicians, would have been pronounced to be harsh and intolerable, a wild imagining, an ultraism of the most extravagant kind. Thanks to Priessnitz then for his having inspired so many with an affection for water, who were formerly hydrophobic, — entirely ignorant of its use as a bath, and exceedingly coy in making acquaintance with it as a drink. He has carried them still farther: he has shown them that they can not only dispense, at once, with their favourite beverages, wine, beer, and ardent spirits, with impunity, but with positive benefit to their general health and frame of mind.

In giving this praise to Priessnitz, I do not feel that my readers can misunderstand his true position, as a reformer and innovator, or the nature of his claims to invention or discovery. They will have seen that every part of his method has been practised in preceding centuries,—the cold bath in all its varieties, the alternation of sweating and cold bathing, or of cold immersion, and cold affusion after the warm and the vapour bath, the combined use of cold water bathing and drinking,—the free and even excessive draughts of cold water, carried to the production of vomiting and diarrhœa. Even the apparent novelties of wet sheets and towels next the skin, and of sweating by this means, and the addition of heavy bed-clothes, are all found in authors whom I have quoted in preceding chapters.* Still, the merit cannot be denied to Priessnitz, of reviving, and,

* See, particularly, chap. xvii., p. 206.

more completely than before, bringing together the several processes of which the water cure is made up.

I began these remarks by saying that Priessnitz himself was an example of the inconveniences of an ignorance of medical science. Was it owing to this ignorance, or to a fear that if he did not at once separate himself entirely from the medical profession, his own deficiencies would be the sooner observed, and his particular hydropathic merits overshadowed by those who would make it a remedy as part of a entire plan of treatment, but not the remedy to the exclusion of all medicinal agents?

Shall we attribute to the same cause, the prohibition of the use of any surgical instrument or aid, to bring about an earlier opening, and quicker healing of the abscesses which form a part of the *crisis* at Graefenberg? Much needless suffering has been caused to patients by this exclusion.*

Although Priessnitz makes a selection of cases, which he believes will be benefited by his treatment, and rejects those which he believes to be incurable, yet, from his ignorance of diagnosis, and, indeed, of pathology in general, he sometimes commits great mistakes. As, for example, in subjecting a patient, a young female, far advanced in phthisis to the water-practice, under the impression that he had to deal merely with sore throat. One of the visitors at the place thought that it was the business of the patient to tell her disease, and not of Priessnitz to find it out,—a tolerably *naïve*, if not ingenious, excuse. In a case of fixed anchylosis, the water treatment was directed, and persevered in with as much regularity and apparent reliance in its efficacy as if the case had been one of simple arthritic inflammation. New diseases occurring in the course of the treatment are still subjected to the same remedy—water,—water. Intermittent fever sometimes relieved by the hydropathic remedies, is more frequently rebellious to them; but Priessnitz, true to his unity, can see no other mode of relief. On the death of a lady patient at Graefenberg, supposed to be from an internal abscess, the body was examined but no abscess was found. What then was the explanation offered by the man whom his

* Heidenhain, Exposition, &c.

admirers profess to venerate as a second Hippocrates? Neither more nor less than that the deceased had too short a neck for a long life! Very naturally may the narrator, himself once a visitor at Graefenberg, exclaim: "Where could another man be found who dared to express himself in this style? Where find people elsewhere, who, in place of regarding such an answer as a proof of the grossest ignorance and revolting effrontery, could detect in it an evidence of profound wisdom?"*

CHAPTER XXVII.

WATERY REGIMEN (*concluded*)—HYDROPATHY—MODIFICATIONS OF THE HYDROPATHIC METHOD—THE GRADUAL ADVANCES OF PRIESSNITZ IN THE COLD WATER REGIMEN—CERTEL'S PRESCRIPTION OF COLD WATER DRINKING—DRY FOR WET PACKING—HOT AIR IN PLACE OF PACKING—DIFFERENT KINDS OF SWEATING—GOOD EFFECTS OF HYDRIATIC TREATMENT OFTEN ONLY TEMPORARY—ADVICE TO "WATER-CURE ESTABLISHMENTS"—CASE OF HYDROPATHIC TREATMENT—CONCLUSIONS BY M. FLEURY—BY DR. FORBES.

VARIOUS modifications of the original water cure have been made, some by Priessnitz himself, others by his followers, and the more reflecting advocates of the method.†

* H. Ehrenberg, Exposition, &c.

† Priessnitz began with himself, after an accident by which three of his ribs were fractured, and severe contusions received, by the use of cold water in the form of ablutions and sponging. His success made him willing to try his hand on his poor neighbours, and them willing to receive his treatment, in cases of wounds, sprains, and minor injuries. He is supposed to have been led to the use of cold water internally at this time by the unreserved recommendations of cold water drinking by Professor Certel. "By the fortunate and unfortunate results of diseases treated upon this plan, aided by his power of steady observation, he soon became acquainted with the limits of several of his modes of application. *In conjunction with his patients*, he made repeated experiments, and in this manner his system of treatment gradually arrived at a state of extension *not before attained in the*

We ought not to class, under the head of changes, the evasions and omissions of the patients themselves, at the very

annals of medicine. I said, *in conjunction with his patients*; for Priessnitz does not deny that at this period of the origin of his system, *the patients frequently* directed his attention to new methods of applying the cold water, and assisted him in carrying them into effect. The development of his system of treatment progressed rather rapidly. In the year 1826, Priessnitz was acquainted with no other modes of using cold water than in the form of ablutions,—at least to this period it was neither prescribed nor brought into application in any other form by him. These ablutions were confined to slight cases to which they were adequate. Priessnitz' investigations and observations were hitherto limited to trivial complaints, and it was *only the poorer population* of the neighbourhood, and these in *inconsiderable numbers*, who came to him for relief. In the year mentioned he began to use cold water *as a remedy in internal diseases.* Simple ablutions now no longer answered his purpose, and he resorted to wet cloths (*umschläge*) and even to baths; the douche soon followed, and sweating; lastly, cold water, according to Ertel's prescription, was taken internally. This mode of using cold water, and Ertel's cases of cure, which had now appeared, attracted the attention of the public, not only in the neighbourhood, but in a more extended sphere; and in the year 1830, Priessnitz *had already* fifty-four patients, whom he treated with marked success, with cold water only. The fame of this new mode of treatment spread with incredible velocity; and patients of all grades, foreign and native, of all ages and sexes, were seen wandering for relief towards Gräfenberg, to the quiet and rustic residence of Priessnitz: Prussians especially, and persons of rank and influence, were the chief supporters of this method. Under these circumstances, with an increase in the number of patients and a variety of diseases, for which relief was sought, diversified treatment became of course imperatively necessary.

"The peculiar acuteness of Priessnitz invented continually new and efficient modes of application, by which he diversified the operation of cold water, the sole remedy at his command; using it as a refrigerant, sudorific, tonic, antiphlogistic, and even as a powerful stimulant, until it became adequate to all cases. In 1835, *all the customary partial or local baths*, such as head, arm, hip, and foot-baths, &c., were in use; the wet cloths, gargles of cold water, injections into the various cavities of the body, were also in daily use. From that time, one mode of application or the other was more in vogue, as Priessnitz, in his increasing practice, found it most expedient."—(Weiss, *The Hand Book of Hydropathy*. &c.).

time when, at Graefenberg, they professed to regard his dicta as oracular, and without appeal. One of them related to Dr. Ehrenberg, that she was advised by a former visitor to follow no more than half of the directions of Priessnitz, if she wished to be benefited by them.

We are told by M. Fleury (*Recherches, &c.*), that the packing in a wet sheet is now seldom practised at Graefenberg, and that dry wrappings are relied on to cause sweating. This gentleman thinks that sudation and its good effects may be more expeditiously and more comfortably procured by the application of dry heat to the surface of the body, by means of a simple apparatus for the purpose, fed by a spirits-of-wine lamp. The patient is seated on a high chair and is surrounded by blankets or equivalent woollen coverings up to the neck; but these are kept from the skin by a frame under which the hot air penetrates and is diffused over the body. The sweating is caused by a similar agent, as in the blanket wrapping, viz., by accumulated heat, which excites the functions generally, and especially the circulatory and cutaneous ones; but without the prolonged and wearisome application of the hydropathic process,—which lasts three, four, and even five hours in winter. By the dry heat, the desired result is said to be obtained in ten minutes. Some of the hydropathic school protest against this modification as decidedly mischievous. Dr. Gully, on the contrary, expresses his belief in the safety and good effects of a hot air bath, as a substitute for the blanket packing. There is, he tells us, the same nervous and circulatory excitement in both processes: “the pulse, in both cases, rising from twenty to thirty beats in the minute until the breaking out of perspiration. And not a small advantage of this air bath is, that it occupies from thirty to forty-five minutes, whilst the blanket packing is a business of three to five hours.”

This is the first specification that I have seen, in the different treatises on hydropathy, of the effect on the circulation produced by the blanket packing. There is, generally, a sad deficiency of clinical details in hydropathic literature. The different writers seem to have given into the easy indifference in these matters of the chief himself, who has received and treated patients without

making any inquiry into their antecedent diseases, or their constitutional predispositions and infirmities.

But, to return to the substitution of heat, by means of hot air for that of the body retained by the non-conducting blankets and feather bed, Dr. Gully further remarks:—"Still, the head is taxed in both; and it is therefore sometimes advisable, as already stated, to begin by simply heating the patient in blankets, and by degrees advancing to the full perspiration. Where it is desirable to actually *purge* the skin, as in *chalky gout*, in old *rheumatism*, and sometimes in *dropsy*, the air bath has the decided advantage of causing and keeping up a more profuse sweat. On the other hand, when we only desire the sweat as an evidence of excitement, and the warmth of weather curtails the blanket process, it may be as well to employ it."

M. Fleury advances analogous views, when he speaks of the *spoliative* operation of sweating, which, sometimes manifested in the adipose system, reduces obesity, or, in the cellular and serous system, brings about a removal of dropsical effusions. He also regards it as *depurative*—the mode in which it chiefly operates in the hands of the hydropathists. As a simple stimulant and revulsive, the air may be of a high heat, as from 167° to 178° F. For the purpose of diaphoresis, either depurative or *spoliative* (purging from the skin), the range of temperature need not exceed 104° to 120° F., exposure to which, for hours, is not productive of any inconvenience, but, on the other hand, brings on a copious sweat.

Sweating is not, we are told, carried to the same extent in the hydropathic treatment now as formerly. The forced and excessively prolonged sweats, and the eagerness, by pushing the other processes to extremes, to bring on a crisis sooner, have been productive of much mischief. Crises are not necessary to a cure.

Intelligent observers tell us that the entire hydropathic practice is calculated to exalt the functions beyond their common rhythm, and to impart a fulness of health and vivacity of movement which cannot last, and which not unfrequently are followed by renewal of the old disease, or a languor and apathy, the more painful by contrast with a different state but a short time before. Very many who, like Sir

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Edward Bulwer Lytton, were enthusiastic in their praises of hydropathy, and who, in the fulness of their gratitude, deemed it necessary to try to write it up, and regular medicine down, have, after a time, felt as if they had just awoke from a pleasing dream, and revived to a sad consciousness of the infirmities from which they had thought themselves to be entirely exempt. Changes of this kind are not, however, so much a defect of the hydropathic treatment as they are a practical denial of the exaggerated and false promises of some of its practitioners. Men cannot expect to continue in the enjoyment of recovered health, after they have returned to their former life of anxieties of business, or yielded to the follies of fashion, or to vicious indulgences.

Dr. Gully, in "a few words on Water-Cure Establishments," says: "There is too much reason to believe that establishments are rendered attractive to patients by the amusement and the license that are permitted, and the object of keeping them for a long time, by such means, preferred to the legitimate objects of cure." The following might serve as both hint and rebuke to other doctors, besides the hydropathic ones: "Few cures will be made, when the patient is allowed to regulate his own treatment and habits: and no one is so ready to publish the failure and run down the treatment as a patient who has been so mismanaged. He takes his own way, but leaves the responsibility with his doctor: and this is just, for the doctor is to blame who sacrifices his dignity to his cupidity. This thing needs much reform. A good rule for the public would be to suspect all those who advertise and puff their establishments, who put forth the amusements as baits for the fanciful invalid, and wonderful cures for the desperately diseased. In this matter there is but one legitimate mode of proceeding: let the physician *cure* patients,—*they* will be his advertisements: let him publish his experience in a scientific form, and readers will then believe he *knows* what disease *is*; whereas the *ad captandum* and exaggerated stuff, thrust before the public as a medical exposition of the power of the water cure, is no more so than are MORRISON'S propositions about disease, ending in the recommendation of his pills, a true account of that condition. Both the newspaper and the book advertisements are sheer

quackery: and water-cure establishments will thus become mere traps.”*

I shall not pretend to enumerate the various diseases which have been, or are said to be cured by the hydropathic treatment. Enough has been placed before the professional reader to enable him to form a tolerably correct view of the main indications which this branch, we might rather call it supplement, of the watery regimen, is calculated to meet in the practice of medicine. I subjoin, in a note, the details of a case, treated hydropathically, as giving a good idea of the process to which a patient is subjected in a “Water-Cure Establishment.” The reducing or sedative rather than the sudatory process was the one carried out in this case.†

* *Op. cit.*

† “**SYMPTOMATIC FEVER.** *A. Klauke's Case, related by his mother.*—Alexander Klauke, aged three years, was a fine lively child, but with a disposition to inflammatory affections of the stomach and bowels. A month previous to the present disease he had an attack of inflammation of the stomach, accompanied with strong fever, and determination to the head. In the evening the child was put into a bath not quite cold, in which he remained about twenty minutes, additional cold water being added as the temperature arose by the heat from the child. During this time cold water was poured from a tumbler glass on the head, repeated at intervals of a minute, and, as is usual, his whole body was rubbed cautiously, by the maid. He was then taken out of the bath and placed on the sofa, covered over with a sheet and blanket, with the back part of his head in cold water, for ten minutes. By this time reaction had taken place, when wet compresses were applied to the head and back part of the neck, and the body, from the armpits to the hips, wrapped in a similar way. He slept quietly till three o'clock in the morning, when the same process was repeated, the previous symptoms having returned. The child was again placed in bed, where he slept till morning, and was then found to be quite well, and went out as usual.

“A month after this attack he was taken ill in a similar way, but with symptoms much more severe. The fever running high and accompanied by delirium. The treatment was commenced by placing him successively in nine wet sheets, from which the water was but slightly wrung out. In each of these he remained about five minutes. Towards the last, the heat being diminished, he was allowed to remain ten minutes. To the head and breast a thick wet compress was applied in addi-

More correct opinions will be entertained of the scope and application of Hydropathy, by our bearing in mind the following conclusions, with which M. Fleury closes his paper (*Recherches, &c.*), from which I have borrowed in a former chapter :

“ 1. The medication called hydrotherapeutic cannot be considered in the light of a method, a therapeutic formula.

“ 2. It is composed of several distinct modifiers, the union of which may be useless or injurious.

“ 3. Each of these modifiers meets special indications.

“ 4. If, in some cases, it is proper to retain these modifiers united, most commonly it is better to separate them and connect them one with another, in various fashions, in conformity with the indications presented by each case of disease.

“ 5. *Regimen, cold water internally, and sudation* especially, are agents whose power cannot be overlooked, and to which a large part of the success obtained by hydropathy is referable; but still they are only accessory means.

“ 6. *Cold water, externally applied, is, properly speak-*

tion, these being the parts where the heat was greatest. The feet were cold, and as long as they remained so the wet sheet was only applied down to the knees; in the meantime the feet and legs were rubbed strongly with the hands. While the extreme heat continued, the wet sheet was covered by a thick dry one instead of a blanket, as is usual, the feet only being covered (with the blanket). After the last wet sheet he was placed at once in a tepid bath, where he remained an hour, the same process of rubbing and pouring water over the head being practised. The first day the same process was repeated four times, the duration of the last being not so long, when the fever was not so high. During the night the wet cloth was changed every half hour. On the morning of the second day the child refused to go into the water, calling out himself at intervals for additional wet sheets. Orders were given that the inclination of the child should be obeyed. In the course of the morning the child desired himself that he might be put into the bath, where he remained until the heat in the armpits and on the back of the neck was the same as on the rest of the body; this being the general guide for the duration of the bath.

“ The same treatment, slightly varied, was continued four days, when the child was well, and was sent out to play with the other children. In eight days after this a pustule appeared on the foot, which discharged matter freely.”—Johnson, *op. cit.*

ing, the foundation of the medication called hydrotherapic. This agent, the most active of all, is the only one the use of which can be generalized; it alone can be rationally applied to all the cases included in the empirism of Priessnitz."

Those of my medical readers who have not perused the able paper on the subject of Hydropathy—in the twenty-second volume of the *British and Foreign Medical Review*, by the editor, Dr. Forbes, will be gratified to learn the following conclusions reached by its author:—

"1. We should be glad to see Dr. Currie's practice revived (for the sake of experiment at least), in all its boldness, for the suppression of the general febrile paroxysm. On carefully looking over the evidence published by Dr. Currie and his contemporaries, it is impossible to deny that they attained a larger amount of success in treating fever by water than other practitioners have done by other means. We have already pointed out how their practice has been misunderstood by modern writers. But, while we regard this practice as well adapted for treating general fever, we find no proof that it is competent to meet the dangerous local complications with which fever is so often accompanied. These complications may reasonably be expected less frequently, when the early treatment of fever is rendered more efficacious. But, when they do occur, we find nothing in hydropathic writers to show that lancets, leeches, blisters, &c., can be dispensed with.

"2. In a large proportion of cases of gout and rheumatism the water-cure seems to be extremely efficacious. After the evidence in its favour accessible to every body, we think medical men can hardly be justified in omitting—in a certain proportion of cases, at least—a full trial of it. No evidence exists of any special risk from the water practice in such cases.

"3. In that very large class of cases of complex disease, usually known under the name of chronic dyspepsia, in which other modes of treatment have failed or been only partially successful, the practice of Priessnitz is well deserving of trial.

"4. In many chronic nervous affections and general debility we should anticipate great benefit from this system.

"5. In chronic diarrhœa, dysentery, and hemorrhoids, the sitz bath appears to be frequently an effectual remedy.

"6. We find nothing to forbid a cautious use of drugs in combination with hydropathic measures. On the contrary, we are convinced that a judicious combination of the two is the best means of obtaining the full benefit of each. The water-cure contains no substitute for the lancet, active purging, and many other means necessary for the relief of sudden and dangerous local maladies. The banishment of drugs from his practice was necessary, and perhaps natural, on the part of Priessnitz: the like proceeding on the part of qualified medical men superintending water-establishments in this country, evinces ignorance or charlatanry, or both.

"7. With careful and discreet management, in the hands of a properly qualified medical practitioner, the water-cure is very rarely attended with danger.

"8. Many of the principal advantages of hydropathy may be obtained in a private residence, with the assistance of ordinary moveable baths. Therefore, it can easily be brought under the direction of the regular medical practitioner.

"9. In many cases, however, it is evident that what may be termed the mere *accessories* of the water-cure, are of extreme importance in bringing about a favourable result; and these accessories are frequently not available—or available in a very inferior degree—in ordinary practice. Among the more important of these accessories we may mention the following as having relation to most of the chronic cases treated in hydropathic establishments: 1, relief from mental labours of an exhausting or irritating kind, from the anxieties and responsibilities of business, from domestic irritations of various kinds, from mental inaction or ennui, &c.; 2, change of locality, air, scene, society, diet, &c.; 3, the fresh mental stimulus involved in the almost constant occupation of the patient's time, in the performance of the numerous and various dabbings, paddlings, sweatings, washings, drinkings, rubbings, &c., imposed by the water-treatment; 4, the frequent and regular bodily exercise taken in the open air, or within doors; 5, the powerful mental stimulus supplied by the confidence generally reposed by the patients in the means employed, and by the consequent hope, alacrity, cheerfulness, &c.; 6, the total abandonment of vinous and other stimulants, and of drugs,—all of which have, in a large

proportion of cases, been tried and found, not only useless, but, probably, productive of disadvantage.

"10. A certain and not inconsiderable portion of the benefits derived from hydropathic establishments are, however, attainable without them, by other means, as by travelling, &c., &c. For example, we suspect that many of the most striking results witnessed in such establishments, as in the case of Sir Edward Bulwer Lytton or Mr. Lane, would have probably been obtained, if the patients had chosen to hire themselves, and had worked as agricultural labourers, in a dry, healthy district, and had lived on agricultural fare, sufficiently nutritious in quantity and kind, for a sufficient length of time.

"11. Notwithstanding the success of the founder of hydropathy, its practice by non-professional persons can neither be fully advantageous nor safe. At the same time, it is true that very little experience is necessary to enable an educated medical man to acquire sufficient insight into it for purposes of practice. Many of the best hydropathic physicians have, in the first instance, devoted very few weeks to studying the subject in Germany.

"12. Many advantages would result from the subject being taken up by the medical profession. The evils and dangers of quackery would at once be removed from it. Its real merits would soon be known. The tonic portion of its measures might then be employed in conjunction with special remedies of more activity, which, no doubt, would often prove exceedingly beneficial.

"13. The benefits ascribed to hydropathy, but arising indirectly from the abandonment of drugs, vinous and other stimulants, &c., may certainly be obtained without sending patients to Graefenberg.

"14. Finally, it must always be remembered that the distinction between quacks and respectable practitioners is one, not so much of remedies used, as of skill and honesty in using them. Therefore, let our orthodox brethren be especially anxious to establish and to widen, as far as possible, this distinction between themselves and all spurious pretenders. *'Artem medicam denique videmus, si à naturali philosophia destituatur, empiricorum praxi haud multum præstare. Medicina in philosophia non fundata, res infirma est.'*

CHAPTER XXVIII.

THE COLD BATH—RANGE OF THIS BATH—EFFECTS OF THE COLD BATH—FIRST PERIOD, OR THAT OF SEDATION—SYMPTOMS MANIFESTING IT—IN THE SKIN AND INTERNAL ORGANS—THE PULSE—DIMINISHED ANIMAL HEAT—REACTION—ITS NATURE AND EXTENT—THE PERSONS MOST BENEFITED BY THE COLD BATH—INJURIOUS TO INFANTS.

THE standard of temperature to constitute a cold bath is measured more appropriately by the feelings of the bather than by the thermometer, although this instrument is a very useful aid in helping us to determine with some minuteness lines of division which could not be expressed in common language. The thermometrical range in which the sensation of cold is communicated by the water used as a bath is considerable—being, as I have already stated, from 33° F. to 70° , or even 75° F. A subdivision of cold baths has been attempted into *very cold*, *cold*, *cool*, and *temperate*, all imparting, with different degrees of intensity, the sensation of cold to those who are immersed in them. The very cold bath would be, in this arrangement, from near freezing point (33° F.), or that at which water ceases to be fluid, up to 45° or 56° F.; and the cold range between this last limit and 60° or 65° F.

Dr. Forbes, in his article "Bathing," in the Cyclopædia of Practical Medicine, gives the following arrangement "as one founded on practical indications, and, therefore, likely to be useful:" but he, at the same time, disclaims any belief that these are the exact and true limits of the different kinds of baths:—

1. The cold bath	.	.	from 33° to 60°
2. The cool bath	.	.	„ 60° to 70°
3. The temperate bath	.	.	„ 75° to 85°
4. The tepid bath	.	.	„ 85° to 92°
5. The warm bath	.	.	„ 92° to 98°
6. The hot bath	.	.	„ 98° to 112°

I would refer the reader, for farther information on this subject, to my remarks in Chapter XIII., "On the Division of Baths."

For hygienic purposes, and in reference to its ordinary effects on the organism, when we speak of cold bathing we ought to be understood to mean immersion in rivers during the summer time. This would indicate a bath often at the upward boundary of cold, and an approach to that of cool, which latter, although not very definite, when measured by our sensations, may be represented by the thermometrical range from 65° to 75° F. Where the body of water is large, the flow gradual, and the distance from the source considerable, the temperature is not much lower than that of the surrounding air. A difference in the rapidity of flow makes a considerable difference in the sensations of the bather, even though that measured by the thermometer be small. Thus, M. Herpin* tells us, that the tranquil water of the lake of Geneva is commonly spoken of as giving a temperate bath, whilst the rapid one of the Rhone, immediately below the city, is dreaded on account of its coldness; and yet on the same day, and almost at the same time, he ascertained that the real difference in temperature was only a fifth of a degree of Reaumur, or not quite half a degree of Fahrenheit. The successive waves in the case of a running stream have been compared to the successive waves of air produced by fanning,—in each case the heat of the body is more rapidly abstracted than in a stationary water or air.

The cold bath in this part of Pennsylvania cannot be taken without artificial means, at a temperature lower than 52° F., which is that of the springs of the country. The bathing in our rivers is at a considerably higher temperature: that of the Schuylkill, for example, just above, and that of the Delaware, opposite the city, being from 70° to 78° F. at this time (in the month of June).† As a

* *Recherches Sur les Bains d'Arve*. Gaz. Med., t. xii, No. 12.

† The water of the Wissahicon, a small stream which empties into the Schuylkill, a few miles above Philadelphia, gave at the same time, a temperature of 75° F.; that of the air in the shade being 78° F. The water of a spring close to the bank of the Wissahicon was 54°.

general rule in central Europe, and the northern and middle portions of the United States, the temperature of the cold bath ought not to fall below 55° F., and it may with advantage be up to 65° and 70° . In the hydropathic establishment at Graefenberg the degree of cold of the bath is, as the reader will remember, from 40° to 53° F. The water of the river Arve, near Geneva, on which M. Herpin experimented in the months of June, July, and August, exhibited, during this period, an average temperature of 54° F.

The effects of the cold bath are commonly spoken of under two heads, viz., the primary and the secondary. The former result directly from the impression of cold on the skin, and its sympathetic transmission to the internal organs; the latter are attributed to the reaction which ensues on the body's passing from the cold into a warmer medium, or its soon obtaining the protection of clothing, and the aid of exercise.

First Period, or that of Sedation.—The first series of effects of immersion in cold water are manifestly those of sedation,—diminished temperature and paleness of the skin, effacement of the superficial veins, slower respiration and circulation, stoppage of exhalations and secretions, and, in fact, of all the functional acts dependent in whole, or in part on the capillary circulation and orgasm. This system of vessels is collapsed, or in a state of temporary inertness: they no longer receive blood, or very imperfectly admit of that which passes in the direct line of the circulation,—from the arteries into the veins. In the first moments of immersion, the bather suffers from hurried breathing and panting, together with shivering and an acceleration of the pulse, which is smaller than natural. But soon the phenomena antecedently described supervene.

If the cold be greater or long protracted, it gives rise to a sense of suffocation and of constriction at the pit of the stomach; the skin is corrugated, constituting the appearance called goose-flesh; the breathing is laboured, convulsive; speech difficult, and in some persons the voice is entirely lost; the circulation becomes directly depressed; the lips and even cheeks assume a bluish colour; and the heart contracts with renewed frequency, as if to try and overcome the resistance thus offered by the constriction of the

capillary vessels. The muscles are in parts painful and seized with cramps. In a still greater degree of sedation from the cold bath, the teeth chatter, the limbs are quite benumbed, the fingers and toes shrunk, and the face assumes the expression designated as the Hippocratic countenance, with the eyes sunken and features prominent, and pinched up, indicating approaching dissolution.

After this summary of the immediate and direct effects of the cold bath, I would ask the reader to accompany me while I investigate their physiological meaning. In doing so I will repeat what I said in my former work (*On Baths and Mineral Waters*, 1831):

The application of cold water to the surface of the body, whether it be by immersion, or by shower, is promptly succeeded by a general chill and shivering, indicated in familiar language by the word *shock*. The skin is pale and shrunk, but not, as erroneously supposed, in a state of increased contraction or spasm. The prominence of the papillæ and the roughness of the skin at this time, are not the result of an active process, but of the emptying and collapse of the numerous cutaneous vessels which leave the papillæ projecting, as it were, and cause, at the same time, a greater hardness of the skin. The firm fibrous tissue of the true skin and the horny character of the epidermis or scarf skin would naturally convey this sensation of hardness to the touch, when the elasticity and fulness of the capillary network are lost by the removal, for the time, of the contained fluids. That there is really a shrinking of the vessels of the skin; diminished fulness, not only of them but of the vessels in the cellular tissue beneath, we have good evidence in the familiar fact of a ring, which, before the wearer's entering the bath just fitted the finger, or was perhaps rather tight, being found inconveniently large after coming out from it. Nor are the diminished paleness, and loss of fulness or plumpness of the outer surface, evinced in those parts alone which touch the water. A cold bath, coming up only to the middle of the body, even a cold pediluvium or foot bath will remove the colour from the cheeks and give them, in persons of ready sensibility, a comparatively shrunk appearance.

Medical writers, swayed in this instance by hypothesis, rather than observant of facts, have generally supposed that the blood, arrested in its free course through the vessels of the skin and parts immediately subjacent, was driven in increased amount into the internal organs; and hence fears were expressed, and cautions given, not justified by the actual state of the case. A brief enumeration of the phenomena which occur will serve to dispel this illusion. We cannot indeed see what changes are produced internally; but we are able to measure them with tolerable accuracy by particular symptoms, universally recognized as indicative of the real condition of the organs.

First, then, as to the manner in which the lungs are affected. A warm, and, still more, hot vapour given out during respiration indicates an active, and in the latter case, a highly excited state of the pulmonary circulation, and especially of the capillaries of the lining mucous membrane. Now, if a person, whose lungs are in this state of strong functional exercise, goes into a cold bath, we discover very speedily that the air which is expired is no longer hot nor even nearly so warm as common, nor so abundant in vapour. In other words, the air taken into the lungs is returned without undergoing changes to the same extent as before the cold immersion; and this is direct evidence of the diminished activity of the pulmonary circulation and of the secreting function of the respiratory mucous surface, which latter is in fact similarly affected, though perhaps not to the same extent as the skin.

Secondly, as to what transpires in the digestive canal. The changes in it are tolerably well represented by the corresponding alterations of appearance in the tongue and lining membrane of the mouth and fauces. It is well known, that when the stomach is highly excited, irritated, or inflamed, the amount of blood circulating through, and contained in its vessels, is greater than before: there is a sensation of heat in the parts, and thirst; the mouth is dry and parched, and the tongue is in the same state, and in general, preternaturally red. Let a person thus suffering use the cold bath, and what results? The mouth loses its dryness, the tongue much of its redness, if it do not become actually pale, thirst is no longer felt, and the sensation of inward heat complained of, as well in the

stomach as in the chest, has disappeared. Surely these two series of phenomena in the pulmonary and digestive apparatus, for changes similar to those above described in the state of the stomach, take place also in the course of the intestinal canal, afford no evidence of an unusual determination of blood to the organs of which they consist. On the contrary, we have an intimate conviction, from the feelings and symptoms, that there is now less blood, and a less active circulation, as well as diminished sensibility in these parts, such as we know to be in the skin.

If, in the third place, we are asked, whether the paleness of the face, and the obviously diminished activity of the external vessels of the neck and head be replaced, in the cold bath, by an accumulation of blood in the brain, we cannot, on examination, but answer in the negative. The functions of the brain are vigorous in proportion to the amount of blood distributed through this organ; and it is only when the supply is excessive that the mental faculties, for a while preternaturally active, become disordered and weakened, as in the state preceding delirium and apoplexy, and temporarily lost pending these maladies. But no symptoms analogous to these are discovered on immersion in the cold bath, and when the presumed determination of blood to the brain is supposed to exist. From the first application of the cold fluid, there follows impaired mental vivacity; the person feels dull, has his range of ideas limited, and perceptions blunted; he is torpid, but it is the torpor of gradually lessened cerebral circulation, unaccompanied by those sensations of fulness, and ringing in the ears, which would be caused by undue determination of blood to the part. Restoration of the accustomed activity of the faculties and senses generally, in the case of the cold bath, is obtained by means the very opposite of those to which we would have recourse where undue determination of blood existed. External warmth, and a mild, stimulating drink, are sufficient to relieve the torpor from cold; they would aggravate the state of a brain, of which undue determination of blood had been the cause.

With the diminished activity of the brain and nervous system generally, there is, as an unavoidable consequence, less muscular power. The muscles deprived of the accustomed stimulus of the nerves, and also of the blood in their

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capillaries, which sympathize with those of the skin, are thrown into a state of inaction: their fibres approximate passively, owing to the distending fluids being withdrawn, and they are less bulky than usual. But we must not confound this approximation, any more than occasional or irregular spasm or cramp in portions of them, with increase of contraction and of tonicity. The irregularity with which they may be supposed to be deprived of the stimulating influences of the blood in the capillaries, and of the nerves distributed to them, owing to their different degrees of sympathy with the skin, will sufficiently explain the feeling of partial contraction, or peculiar creeping movement occasionally experienced by a person in the cold bath. If this last be prolonged, the complete torpor of the nervous system, and of the capillaries throughout the body insures that of the muscles, which eventually become powerless and motionless, however inordinate and irregular may have been their contractions previously.

The effects of cold bathing on the circulation, as evinced by the contractions of the heart and the pulsations at the wrist, are somewhat dependent on the sensibility of the individual immersed. At times, where the impression on the sentient surface of the skin is prompt and powerful, and that by consensus or sympathy on the pulmonary mucous surface equally sudden and strong, the interruption to the capillary circulation in the lungs calls on the sensorium or cerebral centre for increased efforts of the respiratory muscles to heave and expand the chest; hence the breathing is panting and hurried, and the heart, struggling to clear itself of the blood thus hastily returned to it in a smaller circle, contracts with increased frequency. After awhile, however, when the central portions of the nervous system, cerebro-spinal and ganglionic, participate with the sentient expansions in yielding to the influence of cold, the heart beats slower and feebler, and the number of pulsations from being more frequent and hurried, now become slower and more uniform. We cannot for a moment confound the hurried respiration of some bathers on first entering a cold bath, with that which is produced by a real augmentation of blood in the lungs, and its rapid circulation through them, as after great exercise and the ingestion of nutritive and diffusible stimulants.

That the cold bath diminishes the frequency of the pulse, is a point positively affirmed by Marcard and Currie. The former, indeed, says that his experience is chiefly confined to what he calls cool baths, in which the water was of the temperature of 60° to 63° of Fahrenheit. Buchan* asserts, that in all whom he had any opportunities of making observations, it was at first accelerated; but he adds, that in the experiments instituted by Dr. Currie, the pulsations of the person, who was the subject of them, were found to decrease uniformly from ten to fifteen beats per minute, becoming at the same time firm, regular, and small. Athill, though he expressly states that the pulse is greatly hurried during cold immersion, admits its frequent retardation, and tells us that it is diminished in frequency from seventy-six to sixty beats in a minute, in water of 52° Fahrenheit.† Floyer says, that "in cold baths the pulse is small, slow, and rare."

To these testimonies I may now add those of recent observers. Londe found the pulse to be at first accelerated, but afterwards slower than common. Herpin noticed that the pulse became feeble, even to an almost entire extinction, in infants; and that the beatings of the heart were increased in force but not in frequency. Chossat relates that the pulse fell from 60 to 38 beats in a minute, both in a common cold and in a river bath; and that all the functions were less active.

But whatever doubts might have existed respecting the directly sedative and depressing effects of the cold bath, must be dispelled by a knowledge of its effects on calorification, or the development of animal heat. When we discover that the evolution of caloric is less, and the ability to furnish it is diminished, we are satisfied at once of the feeble functions of the three systems, pulmonary, capillary, and nervous, since it is on the combined energy of these that the formation of animal heat in the organism mainly depends. Not only are we apprized of this diminished temperature by our sensations, but we also learn the fact by the application of the thermometer to a part of the body, under the tongue, to which the water has not access. Even for some time after leaving the bath, and

* Observations on Cold Bathing. † Exercit. Therap. Inaug.

when we feel a glow of pleasurable warmth, the temperature is still less than before immersion ;* showing how profound was the sedative impression on the nervous system produced by the cold of the water.

Additional proof of this fact has been furnished by the experiments of M. Herpin (*op. cit.*), which were made since I wrote the preceding remarks. A boy, eight years of age, was immersed, during a minute only, in the river Arve, the temperature of which, in the summer months, is, we have seen, 54° F. ; he was then quickly dried, and a thermometer, in being applied between his thighs, indicated 73° F. In the case of another person, on whom the experiment was made a few moments after coming out of the river, the thermometer indicated the same depression.

To resume : The first or direct effects of the cold bath, whether we regard the phenomena evinced on the skin and membranes with which it directly sympathises, or those on the senses, and the brain and heart, are unequivocally sedative, and, under longer continuance, enfeebling and stupifying. Some have referred many of the first effects of cold immersion or affusion to the shock, or suddenness of impression on the nervous system. But we know, that if a person immersed in a warm bath of 98° be gradually subjected to the operation of cold by lowering the temperature of the bath by the introduction of cold water, the customary effects of cold bathing will be experienced, although the individual in question was barely sensible of the change, and certainly experienced no shock.†

On coming out of the water, and while the bather is yet exposed to the air, the sensation of cold is increased, and it is usually attended with shivering.—There is also a still farther reduction of animal heat.‡ These effects are most perceptible when immersion has been practised in the sea, or in a running stream.

Reaction.—In all living animals the system endeavours to react under depressing agencies, unless they be of such power and concentration as to extinguish life at once. Of this tendency we see continual proofs in the effects of medicinal and poisonous agents of the sedative and narcotic

* Currie, *op. cit.* Athill, *ut supra*.

† Giannini, tom. i., p. 65.

‡ Currie and Buchan.

classes. Calm, bordering on insensibility, is often succeeded by delirious extravagances and convulsions—a cold by a hot, burning skin,—a small and weak, by a full and strong pulse. Analogous effects, but of less intensity, result from the operation of cold and the cold bath. Even during the continued application of the cause, as of cold or cold water, there is, after a short period, a struggle of the system to make up for its last warmth by the development of fresh ; and they who are exposed to the cold, as in a day of winter travel for example, are tantalized by the feeling of returning warmth even in their extremities. But this effect is transitory, and the system soon shows the power of continued application of cold by progressively increased torpor and final insensibility. Analogous phenomena occur in the cold bath. The first shock and depression yield, for a short period, to a partial return of the regular exercise of the functions. Some, like M. Begin,* who describes his sensations while immersed in the water of the river Mosselle on a cold winter's day, would persuade us that they enjoy, during this second period, not only a tranquil exercise of the functions, but a positive expansion of frame and buoyancy of spirits, as if they were, for the time, in the purer regions of space. This period of enjoyment is represented to last from fifteen to twenty minutes, after which the cold water resumes its attributes, and there ensue shivering and a general trembling of the body, and such feebleness of muscular movements that the bather is in danger of sinking. Such is the state of cutaneous insensibility that, in coming out of this excessively cold bath, the skin is not chilled by the air, nor is its being actually rubbed off productive of pain or even sensation.

True reaction, the series of phenomena usually understood by this term, does not occur until after the bather has left the water, and the skin is well dried and the usual garments are resumed. Now begins the period in which the cold bath is alleged to manifest stimulating and tonic effects. Unfortunately for hygiene and practical medicine, the sensations of a particular class—the sanguine and the robust—have been received as a measure of the operation of the cold bath generally, and been interpreted in a sense

* Dict. des Sciences, Med. T. L., p. 361, *et seq.*

which a careful analysis will by no means justify. Let us then pursue this analysis.

The glow over the surface of the body and feeling of general warmth—a restored equable circulation—vivacity of the senses and readiness to engage in muscular movements, are adduced as evidences of the stimulating and tonic effects of the cold bath. But the fallacy of such reasoning is soon exposed, when we inquire minutely into all the circumstances of the case. So far from there being a real increase of heat, the thermometer shows that the skin has not even at this time its customary temperature. The agreeable sensations then, derivable from this source, must proceed from the loss of the superfluous caloric and the moderated action of the parts which naturally evolve it. As to the glow experienced, it is merely relative to the cold medium in which the body had been immersed a few minutes before, and is a direct consequence of a law of the animal economy, by which an occasional and temporary abstraction of its appropriate stimulus renders an organ more susceptible to the impression of this latter: as in the case of a person, for example, who has been for some time in a dark room and then returns to the light.

But not only is there a forced repose, at least a diminished excitement of the organs of calorification, but also of those of sensation and motion; and hence, on coming out of the bath, the accumulated nervous power enables the individual to perform, for a time, the various functions with considerable promptitude and energy. The animal economy in such a case has not been stimulated: it has not by any means received a direct accession of strength; it has merely been allowed, in a measure, to rest and enjoy comparative exemption from the operation of agencies which, in their very nature, are more or less exhausting. It has, in fact, been placed in a state somewhat analogous to sleep, with this difference, that the cold exerts its sedative influence more particularly on organic life or the nutritive viscera, while the quietude of sleep is more especially evinced in the organs of animal life or of relation.

Redness of the skin, commonly described as an evidence of salutary reaction after the cold bath, is viewed by M. Herpin in the light of a passive congestion of the

capillaries, rather than an active return of the cutaneous circulation. The great diminution of animal heat after a cold bath has been already mentioned. The persistence of this diminution, even after the restored feeling of agreeable warmth, is worthy of notice as going to show what I have laid some stress on ; viz., that the reaction is not an acquisition of new power or increase of vital force. M. Herpin held his right hand, during a minute, in the cold water of the Arve : he then put into its palm the bulb of a thermometer, which he had held in the other hand, until the mercury rose to 93° F. Grasping the instrument, in the hand that had been immersed, for a quarter of an hour, during the last ten minutes of which he was walking briskly, he found that the mercury fell, at first, to 68° F., and remained at this line during two minutes ; in six minutes afterwards it was at $72\frac{1}{2}^{\circ}$, in nine minutes at $74\frac{1}{2}^{\circ}$; and in fifteen minutes at $83\frac{1}{2}^{\circ}$.

But in very many persons, immersion in cold water is not followed by these secondary effects, or reaction. In them, we can only observe a persistence of the first and direct effects of the bath, viz., a sense of coldness, shivering, languor, dulness of the senses, disinclination to thought and motion, with pains in the head and joints, and feeble pulse. These symptoms are of most frequent occurrence in persons constitutionally weak and phlegmatic, who possess little energy of circulation, and are subject to cold extremities ; in fine, to those who would seem to require to be roused by stimuli and strengthened by tonics. Now surely if the cold bath were either tonic or stimulant, it ought to be beneficial to this class of subjects ; and yet, general experience predominating over false theory, shows us conclusively that it makes them feebler than before. Nor need this fact excite our surprise when the true operation of the cold bath is appreciated as it ought to be, and in the way in which I have endeavoured to display it in the preceding pages. What is the effect of sudden and great cold on a person whose organs possess but a limited degree of energy, and in whom the functions of sensibility, calorification, and respiration are especially feeble ? Not only is the evolution of caloric suspended, but the organs by which it is formed are rendered, in a measure, torpid, and unable, even when the depressing power of cold is with

drawn, to secrete or generate it as before : similar evils are inflicted, through the skin, on the respiratory and digestive surfaces, which are unable to change with the requisite promptitude the air and food, respectively, which may be applied to them : the nervous system at large is enfeebled, and hence also disinclination to motion, for the muscles are very closely allied to the nerves, and whatever exhausts or enfeebles the latter, prevents the free and vigorous movements of the former. This sensation of cold may last for hours and even days, as in the instance of the young man already mentioned in p. 33.

General experience confirms the correctness of this view of the effects of the cold bath. We find that the sanguine and robust, in whom the animal heat is habitually great and rather in excess, are they who can use it with the most comfort and advantage. If had recourse to in infancy and early life, it furnishes a very good test of the innate vigor of the individual ; the robust child will probably bear well the application ; he will often thrive *while* using it, though it may not be *on account* of using it. But the thin, delicate, and feeble infant, whose temperature is already too low, and whose functions react imperfectly under any depressing agency, will be permanently and prejudicially affected by cold immersion. The example of Spartan and Welsh mothers and nurses, together with occasional speculations of theorists, should weigh little in these cases against our knowledge and experience directly obtained from physiology and daily observation. The actually less animal heat of children, and the greater readiness with which they part with it, ought, at once, to satisfy us of the impropriety of still further reducing it, and of enfeebling by cold the sources of its supply.

The more sensible hydropathic writers very properly rebuke the extravagant theory of others of the school, who advocate the bathing of infants in cold water directly after birth. "The proposition deserves no attention, as it is contrary to nature."*

Cold bathing is said to give tone to the skin, and through it to the system at large, and thus to afford protection against the effects of mutations and extremes of weather and sea-

* Weiss, *op. cit.*

son. The beneficial operation of the cold bath does not, however, need the admission of such an hypothesis. Its action is to blunt the sensibility of the skin, and in this way to abate the morbid susceptibility of this tegument, as well as a similar state of the internal organs, with all of which it has a direct sympathy through the intervention of the nervous system.

That cold bathing should favour nutrition by preventing waste is readily understood from its effects on the secretions, which it retards and sometimes entirely arrests, and in this way contributes to keep up a certain degree of fulness of the vascular system. The injurious effects of great cold, either atmospherical or applied through the cold bath, on the plethoric and those whose organs are overcharged with blood, and prone to congestion of the brain, lungs, and liver, are explicable by this retention of a part of the blood, which ought to be eliminated, and particularly by the functions of secretion and excretion, as performed on the skin. This view will be found more consonant with physiology and pathology than that which attributes the mischief of cold bathing, in persons thus constituted, to a retrocession of blood from the external parts, and its accumulation and congestion in the internal organs.

CHAPTER XXIX.

**HYGIENIC CONDITIONS FOR THE USE OF THE COLD BATH—
GALEN'S ADVICE—BATHING IN RIVERS—THE COLD BATH IN
INFANCY AND EARLY LIFE—IS INJURIOUS IMMEDIATELY AT
AND FOR SOME YEARS AFTER BIRTH—SPARTAN USAGES—
ROUSSEAU — GALEN — SUITABLE PREPARATION — CIRCUM-
STANCES IN ADULT LIFE BENEFITED BY COLD BATHING—
ITS PROPHYLACTIC PROPERTIES.**

Hygienic Conditions for the Use of the Cold Bath.—After what has just been said, in this chapter and in preceding passages, and particularly in the chapter on "The Hygiene of Bathing," the reader will, I hope, be able without difficulty to see the proper indications for the use of

the cold bath in common states of health,—or, at least, in those states of the economy which do not amount to disease, nor require the intervention of a medical adviser. For in this light alone are my present remarks and all those of a *hygienic* nature to be received. When I speak of bathing as a *remedy* for disease, I address myself to my medical brethren, by whom alone can any remedy be judiciously advised, and its operation guided, with probability of its displaying curative effects.

The text, an enlargement on which will include all the necessary circumstances for the advantageous use of the cold bath will be found in Chapter XIV., p. 174, of this volume. It is short, and may be repeated in this place.

“If cold bathing is to be resorted to, a prime condition for its use is a certain degree of sanguineous excitement, whether this be habitual, as in the young and the robust, or temporary, as after active exercise, exposure to a warm medium, or a feverish heat of the skin.”

Galen’s advice on the subject is clear and judicious, and may be taken as a good standard to guide us in the hygienic use of the cold bath. He specifies with great care the various requisite preparations; some consisting in the regulation of external agents; others in the state of the body itself. He says, that a person who intends to use cold bathing should have reached the middle of his fourth septenary; that he should begin in summer, and choose the calmest day, and the warmest time of the day; and have made use previously of the gymnastrium.

As regards the state of the body itself, Galen says, that, not only should the person be young, and enjoy good spirits even to hilarity, but be exempt from any, even temporary, ailment or deviation from his common health during the day or the night preceding the bath. The body must be previously well rubbed with towels; and, to a greater extent, with rougher towels than common. Even if the assistant gymnastes were to arm his hands with close-fitting mittens, and rub the body, it would be well. After this the person is to be anointed, and then exercised in various ways. He is to go at once, and not slowly creep into the water, so that his whole body shall be surrounded at the same time with the same medium; and in this way the

shivering be prevented that would otherwise be felt. The water should be neither tepid nor raw, or icy cold, but of a medium temperature. Probably that which Galen calls elsewhere temperate, and which figures in the division of Dr. Forbes, was the degree meant.

The bather, on coming out from the water, is to be rubbed with oil, and this is to be done by several persons, so as to expedite the operation. After he is dressed he will take a repast, eating more and drinking less than common. The cold bath causes a better appetite and digestion, and less thirst than before. It gives alacrity for exercise, and renders the limbs compact, muscular, and active, and the skin harder and thicker than before.

The feelings of the bather and the state of the skin will be the guides for the duration of the bath. If the colour of the skin be soon restored after a bath and friction, we may suppose that his stay in it was right; but if on coming out and being rubbed the skin does not recover its natural heat and colour, the stay has been too long.*

On the other hand, Galen believed cold bathing to be injurious to thin habits, old men and children, very cold constitutions, and those who live intemperately and use no exercise; and it is, he adds, dangerous after venery, lassitude, crudities, vomiting, gripes, looseness, watching, and to those who are not accustomed to it.

The opinion of Paulus Ægineta is little more than a paraphrase of that of Galen. He says: "I think well of the cold bath, and yet I do not say that it is proper for those who use no restriction as to diet, but only to those who live correctly, and take exercise and food seasonably. It may answer with most people very well, when they want to get much cooled to swim in water during the season of summer, provided they are young and brawny, and have been previously heated by friction. They ought to attend, however, that they be not in a state of lassitude from venery, or any other cause, nor suffering from indigestion, nor after vomiting, nor after evacuation of the bowels, nor when in want of sleep. It may be attended with danger, if used at random."

* *De Sanitate Tuenda*, lib. iii., cap. iv.

Although the young, and those of sanguine temperament, and the robust, may bathe in cold water daily, their ability to do so with benefit is lost by even slight changes in their functions. To them the cautions given at p. 176, in the chapter on "The Hygiene of Bathing," are entirely applicable. I will venture to repeat them: "A sudden reduction of strength, such as may occur after intemperance at table, an evening debauch, or excess of any kind, or even excessive exercise in walking or in field sports, will forbid recourse to the cold bath on the following morning, even though the individual thus offending may have been in the habit of using it regularly."

Persons who make free use of alcoholic drinks, or indulge in that of tobacco, will not derive the same good effects from the bath as they who are abstinent from such stimulants and narcotics. Their system being liable to fluctuations of excitement and depression, is not so prompt to react under the temporary sedation of cold, as if it were exempt from these deteriorating agencies. Floyer's advice, repeated in a former chapter, that they who would derive the best effects from cold bathing should, also, drink freely of cold water, is a sound one, and amply verified by many: even before the strong enforcement in its favour furnished by hydropathic practices.

The advance into old age of those who in the vigour of their days had used the cold bath regularly, need not be a disqualification for continuing the practice,—provided the general health remains good. But if there be evident feebleness of the functions, or disorder in any one of them, so as to prevent the customary allowance of nutritive food, or of exercise being taken, then should the cold bath be withheld, or simple ablution followed by active friction substituted in its stead. If even this is not followed by ready reaction, the tepid or the warm bath must be resorted to.

Bathing in Rivers.—For bathing in rivers, during the summer months, fewer restrictions are requisite than for simple immersion in a bath tub; both on account of the generally higher temperature of the water, and the exercise of swimming or equivalent movements in the stream. The moderate excitement of the system produced by the walk to the river side before immersion, and the readiness of

reaction from the walk homewards, after coming out from the water, are favouring circumstances towards insuring the best hygienic effects of the cold, or, in this case we ought rather to say, cool bath.

Bad consequences will ensue from river bathing, if it is indulged in for too long a period, and while the sun is darting its hot rays on the head of the bather. From these causes I have seen continued fever, of some days duration, and violent headache with slight delirium, arise in boys who had thus imprudently exposed themselves.

The period during which a person may enjoy bathing in a river, will depend, of course, on his habits in this particular, his constitutional and present vigour, and the temperature of the water. In the Delaware or the Schuylkill, for instance, the temperature of which at this time (June) is often 76° F., a young person in common health may bathe for half an hour, desporting himself the while by swimming, and other analogous exercises. Very narrow limitation of time, on the other hand, would be imposed on those who plunge into a stream like the Arve, near Geneva, which even in summer does not raise the thermometer beyond 54 degrees of Fahrenheit. In such a medium, we can easily agree with M. Herpin, in fixing the duration of the bath at one or two minutes. This experimenter could not remain motionless in the water more than three-quarters of a minute, although by dint of swimming without cessation he has been able to prolong the period to fifteen minutes. M. Rostan could not tolerate longer than six minutes' immersion in the river Seine, when its temperature was 43° F.* Few are endowed with the powers of endurance of M. Begin, who remained for a period of twenty minutes in the water of the Moselle, when the temperature of the air only varied from $36\frac{1}{2}^{\circ}$ to $45\frac{1}{2}^{\circ}$ F., and that of the river was probably about the same. This gentleman took nine such baths between the 12th and 20th of October, 1819. The description of his delightful feelings during the greater part of the period of his immersion was alluded to in a former page. Few persons will be found to imitate him in this particular, for few have his vigorous constitution and powers of reaction under such great sedation.

* Levy, *op. cit.*

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The same rules and precautions ought to guide those who use river bathing, as were laid down for the hygiene of cold bathing in general (Chapter XIV.); although, perhaps, somewhat more latitude may be allowed to the class who generally resort to the former mode, and who by their age, and habits of exercise or labour, are able to bear if not be benefited by the sedation of cold. The hour selected by them is generally more in reference to their recess from study or labour than to any hygienic consideration. Two mistakes are not unfrequently committed by them; the one is to bathe too soon after dinner: the other is to bathe in the evening. They who take an early and simple dinner may enjoy river bathing in the latter part of the evening without detriment, although a preferable hour would be in the morning before breakfast, if the individual be in full health; or towards noon. The risk from the cold bath in the evening, or about twilight, to those who have been fatigued by much exercise, either in various sports or continued labour during the day preceding, is instructively set forth in the narrative given from Currie. (Chapters XIV. and XXVIII.)

The Cold Bath in Infancy.—The propriety of the habitual use of the cold bath in infancy and early life, has been a subject of earnest discussion. Speculative writers on education, as well as some medical ones, have advocated the practice; which does not, however, find support in physiology, nor in the actual and direct effects of cold on very young subjects—measured by the phenomena already described. (See Chap. II., p. 32, and Chap. XXVIII, p. 336.)

The recommendation, which is not confined to ultrahydropathists, to immerse the infant at birth in cold water, and continue to do so daily afterwards, is obviously opposed both to analogy, and to a knowledge of the play of the functions in the new being, and particularly of calorification or the evolution of animal heat. The historical reader will, perhaps, be partial to a practice, which he had early learned was familiar to the hardy sons of Sparta, and the warlike youth of Rome.

Cold bathing was a part of the severe physical education of the Spartans, whose endurance of fatigue and privation is proverbial. It was natural to suppose that a national usage like this was one of the causes of that

bodily prowess and hardiness which made them the best soldiers in Greece. But, as often happens in other matters, an associated circumstance has been too hastily assumed as a cause. The citizens of Sparta were, when occasion required it, all soldiers; few claimed to be exempt from the hardships of a camp life, because few, not naturally hardy, and possessed of great physical powers, could survive the severity of the early discipline of their education. The exposure of delicate and deformed children, a practice strongly recommended by Lycurgus, was the first means of removing those who, in after life, might, through inherent feebleness be prevented from acting the part required of them by their pitiless laws. They, whose infirmities were less evident in early life, would be severely tried by the cold bath, and by a style of garment which was the same amid the vicissitudes of seasons; and it is no forced inference to admit, even if more direct evidence were wanting, that many would sink under a treatment which was not so much a means of making hardy citizens, as of sacrificing the feeble and the delicate.

Cold bathing of tender infants, without regard to constitution and temporary changes of health, acts in a manner nearly analogous to the test of nitric acid on the metallic alloys. If gold be in them, it remains untouched, and is exhibited in its native brightness; the other metals are corroded and dissolved. So with the cold bath: the feeble and valetudinary sink under its use, while the strong and robust are exhibited in a more distinct point of view; and are even benefited by their acquiring a habit of endurance of cold, which, when suddenly applied, is so formidable to the health, and generally adverse to comfort.

Rousseau—who, with all his extremes and eccentricities of opinion and conduct, has written, in his *Emile*, much instructive advice on both the physical and mental education of children, must stand exonerated from the absurdity of recommending the cold bath for infants of very tender age. His advice is, to wash children often; merely wiping and rubbing lacerates them. But, he continues, in proportion as they acquire vigour, *diminish gradually the warmth of the water*, until at length you wash them, both summer and winter, in cold, and even ice water. The directions of this writer are, plainly, to give the child the benefit

of frequent ablutions with water, the temperature of which is to be gradually reduced, as the little being grows older and stronger. In all this we see nothing opposed to physiology and experience. The shock from ablution is but momentary, and the depression is also of very brief duration ; both being counteracted by the accompanying friction of the skin, while applying the water in this way.

Galen, a greater teacher of hygiene than Rousseau, after having adverted to the alleged custom of the Germans, of plunging their infants into cold water, asks : " Who among us would take an infant just born, and warm from the womb, and plunge it into a river with a view to strengthen its body ? It might do to harden the skins of asses or animals of that kind, in order to make them bear the pain of cold ; but to a reasonable being, man, what I ask would be the use of it ? " *

Dr. Marshall Hall says, " I must protest altogether against that mode of cold bathing which consists in the immersion of the infant over head in cold water. It is a barbarous practice, the suggestion of a vague philosophy—if philosophy it can be called, unsupported by any analogy in animated nature." Note to Underwood's Treatise on Diseases of Children.

By suitable preparation, a child, at the age of five or six years, may, if in common health, be brought to bear the cold, perhaps we ought to say the cool, bath with advantage. Holding in mind the sedative operation of the cold bath, by its obtunding sensibility and carrying off animal heat, we can readily understand how it should reduce that which is excessive in the former, and redundant in the latter ; and by preventing exaggerated action, and fluctuation of the functions generally, contribute to protect the system from various ailments. Thus, for example, where the skin is continually excited to pour out sweat, and, of course, is more impressionable to the action of atmospheric cold and moisture, the secondary effects of which are, sore throats, colds, &c., the soothing and sedative influence of the cold bath ought to be enlisted as a prophylactic for these disorders. So, also, where the balance between supply and waste, or between digestion of food and its conver-

* De Sanit. Tuend. lib. i. cap. 10.

sion into blood on the one hand, and its conversion into new products, and their elimination by the secretions or by excessive discharges from the bowels and kidneys, on the other hand, cold bathing will moderate the undue action of the secretory organs and apparatus; and, in this way, indirectly give tone and strength. But, in order that children as well as adults may derive benefit from cold bathing, their regimen, in other respects, ought to be appropriate to their constitution and age: and especially should the food be plain yet nutritive, and of easy digestion. Any sudden prostration of strength, or any ailment will be deemed sufficient cause to postpone the use of the daily bath, until the customary health is regained, or medical advice invoked to ascertain the course to be pursued.

If, however, the reaction be not complete, so that the feet and hands do not feel warm, or if the child complains of chilliness or pain in the head, back, or limbs—no uncommon symptoms following the use of the cold bath—this must be omitted until additional vigour, or a higher grade of excitement is obtained for the young subject. There will be less probability of deficient reaction, if the mother, nurse, or other attendant, not content with hurriedly and imperfectly drying the skin, would, also, thoroughly rub it, and particularly that of the back and limbs, for some time, or until an obvious redness of this tegument is produced by the essential adjuvant to all the varieties and forms of bathing. Left to itself, the child will generally take exercise enough to favour reaction still more, and to place its system in the best state to derive good effects from the bath.

The young of both sexes in boarding-schools, and in cities, who are deprived, for the most part, of the facilities for river bathing, ought to have some equivalent in access to a piscina, large enough and deep enough to allow of the exercise of swimming, and of a temperature which should be cool rather than cold in summer, and in winter border on the tepid. Deprived, as these persons unfortunately are, of the requisite amount of bodily exercise to keep up healthy excitement, and to insure an increase of vigour with increase of years, they are illy-prepared to bear the shock of immersion in a common cold bath. To a limited extent,

some opportunities of this kind are offered in a few bathing establishments in our chief cities. At least in Philadelphia there are such—but for boys and persons of the male sex alone. They ought to be obtainable for young persons of the other sex, also : as we learn to be the case in Paris, and probably other cities on the continent of Europe. Considering the causes of deterioration of the bodily health, so continuedly and increasingly at work in our large cities, no means of correction and amelioration are more called for than suitable bathing establishments, and space for exercise and sports of various kinds, which, while they call the body into activity, also occupy pleasantly the mind.

Circumstances in Adult Life Benefited by Cold Bathing.

—Persons endowed with great mobility of temperament, who are readily excited and readily depressed, and whose nervous system is soon exhausted by either bodily or mental efforts, will often find relief in the moderately cold or the cool bath. By it their sensibility is rendered more uniform, and withal less acute; they are made less impressionable; also less liable to fall into indirect debility from over-excitement. Failing to be benefited by the cold, they ought not to persist in its use, but have recourse at once to the tepid or the warm bath.

To a class of persons, becoming, with the advancement of civilization, every year more numerous, an occasional use of the cold bath by immersion, or daily sponging with cold water, is of great benefit. These suffer from a sedentary life, devotion to the desk in business or study, and complain of a troublesome heat and dryness of the hands, and sometimes of the feet, with accelerated pulse and thirst: their appetite is not good, nor their sleep sound or refreshing. Though their systems be actually weaker than usual, yet is there morbid activity of the skin, owing, in part, to the vessels of this part not relieving themselves by free and regular perspiration. Cold bathing, by moderating cutaneous excitement, and relieving the perspiratory organs, removes the unpleasant feeling of heat and dryness, and, by sympathy, produces nearly correspondent effects on the stomach. The use of the flesh brush and exercise in the open air are, it may readily be supposed, powerful auxiliaries to the measures just recommended.

There are many persons who, though enjoying what is often called full health, are liable to colds, rheumatic pains, and stitches from any slight exposure to cold or moist air. Their vascular and nervous systems are both tolerably excitable, and they are readily thrown into perspiration from even moderate exercise or warm apartments. In them, it is desirable so far to regulate the function of the skin as to moderate its excitement, and prevent the consequent debility which follows this state. Cold bathing accomplishes this purpose, and keeps the skin of a less uniform excitement, renders it less liable to sweat so freely from exposure to external warmth or by active exercise, and of course prevents the subsequent languor and susceptibility to morbid and enfeebling agencies. It would be a great mistake, in such a case, to talk of the tonic action of cold bathing. Its beneficial operation is evinced here at a time when no stimulus or tonic is admissible, and in habits sanguine and plethoric, on whom nearly similar effects with those from cold bathing would be produced by a moderate bleeding, reduction of the usual quantity of food, and diluent drinks.

The *prophylactic* properties of the cold bath have been, not without reason, highly praised. Against various febrile diseases of an epidemic character, it has long been used with advantage. As a part of nautical hygiene, bathing in sea water has been practised by the crews of ships-of-war in intertropical regions; and, we are told, with considerable benefit, where yellow fever was committing its ravages. In these cases the temperature of the water, differing but little from that of the air, is merely cool, or rather temperate (from 76° to 80°).

Whenever persons are congregated in numbers for any length of time, as on board of ships-of-war, or passenger-vessels, and in barracks, poor-houses, and asylums of various kinds, one great means of protection against typhous fevers and fatal bowel diseases, will be daily ablution by means of a bath,—cool in summer, and tepid, if not actually warm, in winter.

CHAPTER XXX.

THERAPEUTICAL USES OF THE COLD BATH—MODUS OPERANDI OF COLD—FEVERS—DR. CURRIE, OBLIGATIONS TO—DR. R. JACKSON—EASTERN PRACTICE—SAMOILOWITZ'S PRACTICE IN THE PLAGUE—CASES—COLD BATHING IN AUTUMNAL REMITTENTS—UNEQUAL TEMPERATURE AND EXCITEMENT TREATED BY ALTERNATE AFFUSIONS OF WARM AND COLD WATER—GALEN'S ADVICE AND CASE—DR. R. JACKSON—THIS TREATMENT IN CONGESTIVE FEVER—COLD BATHING IN INTERMITTENT AND REMITTENT FEVERS.

Therapeutical Uses of the Cold Bath.—The application of cold bathing to the cure of a great variety of diseases, dates from an early period in the history of medicine. We have seen that, locally, it was recommended by Hippocrates in inflammations of the joints, and injuries from sprains and fractures, &c. But to Celsus, and especially Galen, are we indebted for a more detailed account of the use and efficacy of the different kinds of bathing, including the cold, in diseases. In their directions for the conduct of invalids resorting to the thermæ, it has been stated (Chapter VII.) that the warm bath, or the caldarium, preceded the immersion in the cold bath,—the labrum or piscina of the frigidarium. I recal to the mind of my readers this fact, in order to impress on them the true view which we ought to entertain of the therapeutical value of the cold bath. The Roman physicians, just mentioned, required their patients to be in a state of excitement prior to the reduction brought about by this remedy. If it were a stimulus or tonic, they would scarcely have exhibited a stimulus, such as that of heat undoubtedly is, to prepare the system for it: and if they could have relied on its causing a reaction equivalent to the excitement from a stimulus, they would have been content with its use alone.

A glance at the classes of disease, and the particular stages of those in which the cold bath is had recourse to, will suffice to show its true therapeutical character. These

are, fevers, inflammations, hemorrhages, convulsive affections associated with more or less vascular action in the nervous centres, and irritative disorders in which, although the general system be weak, the parts affected are more or less excited. The particular period is the paroxysmal, that in which either the general or the local excitement predominates. We require, as a necessary condition for the use of the cold bath, a certain amount of endurance under its sedative and often depressing influence, which may depend, either on the persistence of the febrile or inflammatory excitement of the disease, or on the vital energy arising from original vigour of constitution. We see in it a remedy akin to, and associated with, bloodletting and other depletory means, and as, on frequent occasions, a substitute for them. We do not say that the patient is too strong, or that his system has too much tone, or is too much excited, or his skin too hot, or pulse too active, to allow of the cold bath; but we are often heard to say, that he is too weak, is too much depressed, his pulse too feeble, his skin too cold or clammy to justify a trial of this remedy. Begun as a sedative, and if carried farther acting as a depressing agent, we can readily understand the indications which encourage or deter in the use of the cold bath. Call it a stimulant or a tonic, and we are at once involved in contradictions and inextricable confusion. The difficulties which embarrass us in the hygienic use of cold bathing are greatly increased in its therapeutical application, if we adhere to the commonly received notion of its tonic character. Most of these disappear by our receiving it in the class of sedatives or contra-stimulants.

I do not mean to claim, by the adoption of my views, a complete explanation of all the phenomena attending the use of the cold bath; but I do believe that they will better indicate the general operation of the remedy than any of the current ones on the subject. The first and powerful impression of cold on the entire nervous system, expressed by the term *shock*, had better be received as a separate fact, than arbitrarily connected with any series of symptoms or therapeutical phenomena, in a classification or arrangement of the *Materia Medica*. The extreme difficulty of the task of making any satisfactory classification, which shall include a methodical division, and indicate, at the

same time, the requisite distinctions among the classes, must be too well known to every teacher and writer on this branch of medicine.

In taking sedation as a convenient expression of the general range of the phenomena to which the cold bath gives rise, we must be aware that incident to sedation when it results from different articles of the *Materia Medica*, are effects other than of mere reduction. The various tissues and organic systems constituting the entire organism, are modified and altered temporarily in their structure, and more abidingly in their functions. The irritation, the excitement, the febrile disorder, are not simply suspended: they are removed, and this implies an alteration, a vital change in the entire series of functions performed by the capillaries, and especially those of the membranes, including, of course, all the secretions and animal heat among the number, and all the modes of innervation which are mainly manifested on membranous expansions.

Fevers.—I shall not enter here into any retrospective view of the causes—whether from false theories among physicians, or ignorant prejudices, though still the result of false theory among the people at large—which so long retarded the general use of cold bathing in fevers. One might suppose that this remedy would have been immediately adopted, as part of the reform introduced by Sydenham; and that the cooling regimen was but very imperfectly adhered to, when, with the admission of cold and fresh air into the apartments of the febrile patient, there was not coupled the administration externally and internally of cold fresh water to his body. The practice of bathing in fevers, though adopted occasionally at different times and in various countries, was never fairly introduced into clinical medicine in a systematized shape, until the publication of the work* of the late Dr. Currie, of Liverpool, in 1797. This gentleman refers to some successful trials of cold ablution in fever made by Dr. Wright as far back as 1777, and also by Dr. C.'s colleague, Dr. Brandreth. Dr. Robert Jackson of the British Army published his success with the remedy in 1791. Some of his cases dated as far back as 1774.

* "Medical Reports of the Effects of Water, Cold and Warm, as a Remedy in Fever and other diseases, whether applied to the surface of the body or used internally."

The first time of Dr. Currie's employing the affusion of cold water was on the occasion of a fever in the Liverpool Infirmary, which broke out on the 9th of December, 1787.

The physicians of the East, more particularly in Mahometan countries, being for the most part devoted followers of the Galenical school, have frequent recourse to bathing in febrile diseases. Sir John Chardin, the celebrated traveller in Persia, in which country he resided many years, gives an interesting example of this in his own case. He had been attacked with the bilious remittent fever of the country, which made such rapid progress as to elicit the most gloomy prognosis from his friend and travelling companion, a French surgeon. Chardin, with the consent of his friend, sent for the Governor's physician, by whom he was directed to take frequent draughts of water cooled with snow, diversified by barley water and "willow water" similarly cooled. This not being found enough for the purposes of refrigeration, the bed was taken from under the patient and a mat substituted for it; the floor was also freely watered, "so that it might be said to have been quite covered with water," and two men were ordered to fan him. The fever still raging, the apothecary sent by the physician had Chardin placed on a chair and supported by two men, while he gradually poured the contents of two buckets of cold water over his body "from the haunches downwards, and then taking a large bottle of rose water bathed in the same manner his head, face, arms, and breast." A laxative confection had been administered in the morning, which operated in the evening. At this time the patient ate, by the orders of his physician, a mess of rice boiled in water, with cinnamon and the bark of dried pomegranate pounded together. He had taken no nourishment up to this time for five days.

The next day the same potations as before were continued, and so also was the confection, with dietetic additions of emulsions of cold seeds, and raw cucumbers. Verjuice was put into the mess which he took at noon and in the evening, to give it an agreeable taste; and it "most wonderfully lessened" his thirst.

On the following day, the same course was pursued, but the patient was much purged by the medicine. Night failed to bring relief; but, on the contrary, it was passed

in pain and with fever. On the next day the physician prescribed two pints of emulsion and a large dose of confection, as on the preceding; and half an hour afterwards a julep. "After which," says Sir John, "I fell asleep, and when I awaked in the afternoon my head was clear, I was without fever, perfectly tranquil, and, as I thought, entirely restored to health." On the morning of the fifth day of treatment, the patient was declared to be convalescent, and was ordered by his physician to live ten days together on chicken and rice.

In two days more after this opinion, Sir John was able to continue his journey, having been previously provided by his kind physician with materials for ten emulsions, and thirty-five drachms of cooling confection. Of this last he was ordered to take one every morning on awaking, and to drink after it a glass of water.

Dr. Currie, who has given the narrative of Sir John Chardin's case in full, remarks: "The laxative medicines were no doubt of service in carrying off the morbid contents of the alimentary canal; but they seem to have been carried to excess on the 29th May, and to this circumstance the return of fever may be imputed. The bitter medicine was no doubt a decoction or infusion of some vegetable, in its qualities resembling the cinchona; and the cooling confection was certainly the celebrated mithridate, a combination of opium and aromatics, well known over the eastern as well as the western world."

In Abyssinia, according to Bruce, the practice of using cold water, externally as well as by drink, is very general in the violent fevers of that country. Remembering, however, the high heat there throughout the year, we must be aware that the temperature of the water is proportionably elevated, probably equal to 76° or even 80° of Fahrenheit. Savary tells us that the Egyptians pursue nearly a similar practice in their fevers.

More was done by Sir John Floyer, and his associate Baynard, in the work *On the History of Cold Bathing*, than by any other physician before their time, to make the cold bath popular in England. Their eulogies on the practice occasionally border on extravagance; but it must be acknowledged that the work contains numerous instances of the efficacy of their favourite remedy. To some

of these I have taken occasion to refer in a former chapter (XVII). The experience of Floyer of the benefits of cold bathing was, however, chiefly in various chronic maladies rather than fevers. The practice of De Hahn in the epidemic fever at Breslau, in 1737, is more to the present purpose. It consisted of the external use of cold water, as already stated (Chapter XIX).

One of the most interesting accounts of the use of cold ablution, in modern times, is that given by Samoilowitz in his History of the Plague at Moscow (1771). When we say cold ablution, we do not give so much the precise or technical language for the practice, as that which corresponds most nearly with his method, which consisted in frictions of the skin with pounded ice, and in the application of cloths dipped in very cold water, or inclosing the ice itself.*

Some of the details of the practice of Samoilowitz are illustrative of the true value of the remedial action of cold in febrile diseases.†

* Giannini, *op. cit.*

† The first case which he cites is that of a young girl sixteen years of age, who, on the second day of her disease (the plague), exhibited mortal symptoms—universal tremors, and fainting on any attempt to sit up, continued stupor, involuntary renal and intestinal discharges, and excessive menstruation; skin dry; acute inguinal pains, but no bubo. In this extremity the author directed frictions of ice at ten o'clock in the morning; the face and neck were simply bathed with cloths dipped in ice water. Scarcely was this process, which lasted about an hour, completed, when the whole surface of the body became of a lively red colour, and vapour rose from it like when one comes out of a bath. Some coldness and trembling were afterwards experienced, and the patient was well dried and put to bed. The frictions with ice were, on the reappearance of many of the symptoms, repeated at two o'clock in the afternoon and at ten in the evening.

On the next or third day of the disease, things were nearly stationary; the ice frictions were repeated four times, and cold acidulated rice water given internally. On the fourth day the symptoms were somewhat abated; a bubo began to rise: the frictions were used four times. The drink was cold water acidulated with a little elixir of vitriol. There was henceforward a gradual amelioration of the symptoms until the eighth day, when the skin became dry, the pulse harder, fuller and

This writer seems to have foreseen the probability of his cold treatment being usefully applied to other diseases having an analogy to the plague; and his anticipations have been fully verified. In forms of fever in which the evolution of heat is excessive, the skin, either partially or entirely, acrid and hot to the touch, the brain affected with delirium or stupor, thirst urgent, tongue either dry and furred, or red and shining, or darkly incrustated, cold immersion or affusion, and, still more frequently, cold ablution or sponging have been found signally efficacious. Nor are we at this time restrained by the fears entertained by Currie, of the prejudicial effects of the cold bath in fevers with local inflammation. Without entering into minute pathological investigations, or giving my own creed, in detail, of the origin of fevers, it is sufficient to say, that in our autumnal remittents, whether in the first, or what is sometimes called inflammatory stage, and in the second, or

more frequent, probably owing to the liberal use of bark on the preceding day. The frictions had still been employed, but less frequently. Now, cloths dipped in ice water were freely rubbed over the surface. The following day found her once more convalescent. In place of the bark, a glass of wine was allowed her at dinner. On the sixteenth day from her first seizure, she had entirely recovered. Before recourse was had to the cold applications, the chief thing prescribed on the first day was an emetic, which was repeated in the evening. The result of its operation was not very flattering, and we are left fairly to infer, that the active and curative means in this case, from the morning of the second day of the disease, were the frictions with ice and cold acidulated drinks.

The next case detailed by Samoilowitz was of a young man seventeen years of age, on whom, in addition to many symptoms of a very grave character, there appeared a petechial eruption. The frictions of ice were practised on him until his skin became red and he began to tremble with cold. There would seem to be some contradiction in this part of the narrative, did we not bear in mind that the redness was here the result of the mechanical action of rubbing, while the chilling influence of the ice was, notwithstanding, finally displayed. This patient entirely recovered on the seventh day. The only means of cure additional to the ice frictions, mentioned by the author, was an emetic administered on the first day. Carbuncles appeared on this person, which on the fourth day began to slough.

typhoid or congestive, there are unequivocal symptoms, at times of gastritis, at others of gastro-enteritis, and again of arachnitis and cerebritis—and sometimes all these conjoined.—In these diseases, we can have no hesitation, when the skin is of an exalted temperature, not only to sponge the surface freely with cold water, or to immerse the whole body in the same, but also to apply pounded ice, or cloths dipped in ice water, to the region more particularly excited and phlogosed, and in which the heat is greatest; as, for instance, to the head and over the epigastrium.

Not unfrequently the temperature of the surface is so unequal that neither cold immersion nor affusion would seem to be indicated, and yet on occasions both have been employed with success. Here, however, the safest plan, and that recognized by experience as the most efficacious, consists in the local application of cold. It often happens that, while the carotids and temporals throb with painful force, and the face is flushed and head excessively hot, the feet are at the same time cold.—In such a case, cloths containing ice, or dipped in ice water, should be kept to the head; the feet being moderately stimulated by warm pediluvia, frictions, or sinapisms. Similar applications are required in certain cases of gastric fever, or at least in fevers in which gastric symptoms predominate; such as great heat in the stomach, and of the skin of the epigastric region, tenderness and often pain on pressure, dry parched tongue and fauces. When the morbid heat is felt all over the abdomen, and the other symptoms are also present, an excellent adjunct to cold ablution is a cold enema.

A still more impressive mode of applying cold in these cases of local determination is by the douching of the affected parts,—of which more anon.

All these modifications of cold bathing can, however, be directed with advantage only in those cases in which, although there be irregular and unequal excitement of the organs, there is still ready general susceptibility, by which the local impressions are responded to in the shape of reaction of the entire system. When, on the other hand, there are torpor and want of ready *consensus* and sympathy among the several organs, and consequent difficulty of reaction, as in deep congestion; or if reaction

comes on it is irregular and fitful, endangering the structure of one organ while another is yet benumbed as it were,—a different course of hydrotherapeutics must be pursued. It will then be most prudent and useful to follow the precepts and practice of Galen, revived and enforced in later times by Dr. Robert Jackson* of the British Army. These are, to precede cold bathing with warm affusions followed by frictions, so that the general susceptibility shall be restored and insured before the patient is subjected to the shock of the cold bath.

The reader will better understand the practice of Galen, by my placing before him the details of a case, as they are recorded by this great teacher himself. They will be found in a note subjoined,† as translated by Dr. Jackson. This

* An Exposition of the Practice of Affusing Cold Water to the Surface of the Body, as a Remedy for the Cure of Fever.

† “It is fit and proper, as soon as the first paroxysm begins to decline, to conduct the patient to the bath, to direct that he be affused lavishly with warm water, if agreeable to his feelings,—not once merely, but repeatedly—and after an interval. This is the general view; but omitting all other examples of experiment, I shall content myself with mentioning that of a person, who, having bathed in the styptic waters known by the name of Albula, was seized with fever in consequence of the constriction of the skin thereby induced. This will serve to give an illustration of the principle on which I act; and the fact itself must be held to be authentic, inasmuch as it was witnessed by professional men of eminence, one an Erasistratean, the other of the Methodic School. It seemed advisable, according to the view of the physicians now alluded to, that abstinence should be enjoined on the subject of this narrative; I, on the contrary, not acquiescing in the opinion (for I arrived after these persons had taken their leave), conducted the patient to the bath without loss of time; where, affusing him lavishly with warm oil, and rubbing him very gently, I ordered him to remain a considerable time immersed in warm water; then, removing him from the warm water, and submitting him in the customary manner to the application of cold water, I covered him with a sheet and directed him to recline for such time as he should recover from agitation; after which, reconducting him to the bath, anointing him with oil, rubbing him and commanding him to remain for a length of time in the warm water, removing him, plunging him into the cold reservoir; and then wiping him dry, I administered nourishment, viz., immediately after the operations were finished, a draught of water followed

gentleman, in commenting on this case, says : " It deserves mention in this place that Galen does not conduct his patient to the bath till the violence of the paroxysm had begun to subside ; and further, that he exposes him in the heated air of the bathing room, affusing oils and employing frictions previously to immersion in the warm water, —when removed from this he is plunged into the cold reservoir. The process of management is a luxurious one ; and we have reason to expect, from the alternations which it embraces, that the effect cannot fail to be a considerable one on the existing actions of the system." Dr. Jackson's directions so nearly resemble those of Galen that it is not necessary to repeat them in detail. In place of the frictions and inunction recommended by the Greek writer, he orders friction with brushes, soap, and warm water.*

This treatment might be safely and advantageously employed in the first period, or that of invasion, of the congestive fevers of our country, in which there is strong persistent irritation of the ganglionic system of nutritive life and numbness and torpor of the encephalo-spinal portion, or that of animal life. As I have said in another work :† " Here the irritation is persistent, and is manifested by the activity of abdominal circulation, the pulsation of the aorta and its cœliac and mesenteric branches, increased afflux of fluids, and even congestion in the mucous membranes, liver, and spleen, and increased and perverted secretions from the stomach, intestines, and liver. It is the continued irritation in this region, which, transmitted to the brain, slowly it is true, because circuitously and through the plexus and ganglions of the sympathetic, fatigues this organ, makes it, also, a centre of afflux, and contributes to the production of coma, or of coma alternating with delirium and convulsions, which marks the worst form of congestive fever in its early stage."

Under these circumstances of unequal excitement and positive congestion, the Galenical practice would seem to

by a portion of barley gruel, and, at a short interval, some lettuce."—*Method. Medend.*, lib. iv.

* See p. 275 of " An Exposition," &c.

† Bell & Stokes's Lectures, vol. ii. Treatment of Congestive Fever.

be clearly indicated. We have many well-attested cases of the efficacy of the cold dash or douche at this time, some of which I have recorded in my "Lectures." The premising of warm affusion or of the warm bath, if it can be obtained with expedition and ease, would increase the probability of a salutary reaction which is expected from the cold bath by affusion or dash. Of equal promise would be a like course pursued in the treatment of epidemic cholera, and of the congestive forms of typhous fever.

Guided by a sound knowledge of the really immediate effects of cold applied on the human body, we can have little difficulty in pointing out, even *à priori*, the stages of fever, and the forms of disease in general, in which it will be most advantageous. Thus, in the *hot stage of Intermittent Fever*, we have at once an intimate conviction of the efficacy of this remedy. The skin is hot, thirst great, respiration hurried and laborious, pulse frequent and somewhat full, at times resisting; the senses are intolerant of their customary stimulants, and the brain is highly excited, even occasionally to the extent of delirium. The patient cannot bear the slightest covering over him; he pants for a little cool air, and seizes with avidity on cold drinks; he abhors at this time all kinds of stimulants. Physicians are very generally agreed that these latter ought to be withheld; many, and, from my own experience in some hundreds' of cases of this disease, I should say wisely, direct bloodletting. But, if we desire to give the speediest relief in the shortest period and simplest manner, and at the same time prepare the patient for other appropriate remedial means, we shall not hesitate to have recourse to the cold bath, either by immersion or affusion. It is impossible for any person, who has not actually experienced the efficacy of this remedy on himself, to realize the delightful transition from suffering to ease, from the raging heat and unquenchable thirst to the coolness and calmness of sensations, which follow the use of the cold bath in the hot stage of intermittent fever. It cools, soothes, and quiets by effectually reducing the excessive capillary excitement in all the membranes and sensitive expansions. If the cold bath were in the slightest degree stimulating, would we not have recourse to it during, or immediately on the accession of, the cold stage? But no, we employ it in the hot, when we

employ bloodletting, diluents, and saline and cooling remedies, and surely with any other view than to its stimulating operation.

Of the employment of cold bathing during the interval between the paroxysms, I cannot better express my sentiments than in repeating a portion of my "Remarks on the Pathology and Treatment of Intermittent Fever."*

"Just in proportion as the state of the patient during the interval approaches to that exhibited in the hot stage, will cold bathing be useful, and not otherwise. Hence, if there be a steady dry heat of the skin, frequent pulse, with thirst and little or no appetite, we shall derive good effects from cold affusion in the period between the paroxysms. This remedy, therefore, is not, as often taught, akin to bark; the two stand contrasted with each other in their effects, and their use is only properly called for under different and opposite circumstances; the one to allay morbid irritation and inflammation; the other to exalt and strengthen parts already feeble."

My views of the efficacy of the cold bath in *bilious remittent fever* have been already laid before my professional brethren.† Their repetition here will not be deemed inappropriate.

"The close resemblance between the hot stage of intermittent and the exacerbation in remittent fever would, of itself, apart from direct experience, encourage us to use in the latter the remedy of the cold bath, which has been found so effectual in the former. With the knowledge derived from long and attentive observation of the beneficial effects of this remedy in nearly all the forms of fever, including the remittent, I cordially concur with Dr. Dickson in regarding it as among the most efficient of our febrifuge remedies. 'All that we can hope or anticipate from bloodletting may be obtained in a majority of cases by the use of the bath, while the latter possesses the striking and obvious advantage that we can repeat it as often as the symptoms are renewed that require it.' I have used it by affusion, where the reaction was considerable and the patient able to sit up; and in other cases of great local deter-

* North American Medical and Surgical Journal, vol. viii., p. 264-5.

† Bell & Stokes's Lectures, vol. ii. Treatment of Bilious Remittent Fever.

mination and heat, as in the stomach and head, I have directed ice or cloths taken out of cold water to be applied to these parts, with the most soothing effects. For an irritable stomach and craving thirst, this remedy and an allowance of ice-water for drink, or pellets of ice allowed to dissolve gradually in the mouth, are preferable to all the draughts and mixtures hitherto devised. Immersion can be practised where a bath-tub is at hand, by assistants raising the body of the patient in a sheet and placing him gently in the water. If a prompt and decidedly sedative impression be desired, cold water may be poured at some height on the head, nucha, and along the spine. In cases in which the shock from immersion, or the douche or spout bath cannot be borne, ablution is practised by sponging the surface of the body or a particular part of it with the cold water. The general indications for the use of the cold bath are applicable to its use in the disease before us, viz.,—high excitement of the vascular including the capillary tissue, and inordinate determination to particular organs. Exhaustion, feebleness of frame, and copious discharges, contraindicate its use."

CHAPTER XXXI.

**COLD DRINKS CONJOINTLY WITH COLD BATHING IN FEVERS—
COLD BATHING IN TYPHOUS AND TYPHOID FEVERS—ERRO-
NEOUS PATHOLOGY PREVENTING THE USE OF THE COLD
BATH IN EXANTHEMATOUS FEVERS—SCARLET FEVER CURED
BY COLD BATHING—CURRIE'S CASES—THE AUTHOR'S EX-
PERIENCE—HYDROPATHIC PRACTICE IN SCARLATINA—
SMALL-POX NOT BENEFITED BY COLD BATHING—MEASLES
—THAER'S USE OF THE COLD BATH IN MEASLES—CONDI-
TIONS FOR ITS USE—FROELICH'S TABLE—HYDROPATHIC
TREATMENT OF MEASLES—COLD BATHING IN MILIARY AND
PETECHIAL FEVERS.**

IF, as I observed in my former work on the present sub-
ject, our prescriptions of cold bathing in fevers be not more
frequently followed by decidedly beneficial results, the

cause must be found in an oversight of the *consensus* at this time between the skin and gastric intestinal surface, and of the fact that the irritation, indicated by excessive heat, dryness, and suspended secretion of the external surface, has for counterpart nearly the same state of things on the internal. Symptoms then, not less than the cravings of the patient, seem to call for the administration of simple cool or cold fluids for drink, as imperatively as for bathing.

We may not feel inclined to carry the watery regimen to the extent practised by Cirillo and the Spanish and Neapolitan schools (as described in Chapter XVI. of this volume); but it must, at the same time, be admitted, that physicians are singularly inconsistent in their practice, when they direct cold water to be applied to the skin, with the view of moderating excessive action of its capillaries and morbid evolution of caloric, and yet administer stimulants in the shape of cordial draughts and juleps, and also, tonics, to the gastric mucous surface, which is, at this time, a sufferer equally with the skin from inordinate capillary excitement. The obvious symptoms furnished by each of these two surfaces, the cutaneous, and the digestive mucous, the admitted consensus or sympathy between them, the general sameness of effect, both of heat and warmth applied by means of water, ought all to guard us against the pernicious error of exciting the stomach, which is in a state of not less excessive irritation than the skin. The disappearance of internal heat and thirst, and a less dry and parched tongue, after cold immersion or affusion; and, *è converso*, after drinking cold water, the softness and even sensible perspiration on a skin hitherto of a dry acrid heat, are evidences of the sameness of morbid condition of these two organs in febrile diseases, and guides for a correct method of curing them. A still farther confirmation of this view is found in the salutary effects of injections of cold water into the lower portion of the intestinal canal. These often, of themselves, allay thirst and remove the morbid heat of the skin.

Of all the forms of fever the *typhous* is that in which the cold bath has obtained the greatest number of suffrages in its favour. Currie's directions for its use in this disease are clear and sound. "The safest and most advantageous

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time," he tells us, "for using the aspersion or affusion of cold water is when the exacerbation is at its height, or immediately after its declination is begun; and this has led me always to direct it to be employed from six to nine in the evening; but it may be safely used at any time of the day, *when there is no sense of chilliness present, when the heat of the surface is steadily above what is natural, and when there is no general or profuse sensible perspiration.*"

These directions will not, however, preclude the use of the remedy in those cases in which the sweat is not the solution of a paroxysm, but is continued and is of a glutinous nature, and accompanied with constant and acrid heat of the skin and corresponding irritation of the mucous membranes, as manifested by a dry and furred tongue, and mouth and fauces dry and parched.

The temperature of the skin measured at the axilla, in different cases recorded by Dr. Currie, varied from 100° to 103° F., while the pulse beat from 96 to 112 in a minute. After affusion of water from 45° to 50° F. over the naked body, the skin was dried and the patient again put in bed: the animal heat measured by a thermometer placed under the tongue fell to 98° F., and the pulse to 98, 94, and 84 in the minute. Sometimes a perspiration would break out after the affusion—an effect pointed out by Galen, as one to be expected from the cold bath in fever.

Giannini,* who had charge of a large hospital at Milan, gives testimony in favour of cold immersion in typhous and petechial fevers, in as strong terms as Currie himself.

Various are the forms in which cold water has been applied to the surface of the body in typhous fever. Immersion, affusion, shower, and douche have, severally, been tried with success. "According to the predominance of excitement in an organ, or region, as at one time of the head, at another of the epigastric region, will be the special direction of the cold shower, or the application of cold cloths or even of ice. Dr. Stokes has spoken of cold applications to the head. I have used with marked benefit this remedy to the epigastric region, the heat of which, and often of the whole abdomen, is often so excessive in typhous and typhoid fevers. The patient will

* *Op. Cit.*, *Capitolo vi.*

press, with eviednce of pleasurable sensation, the cold cloths, or ice folded in cloths on his epigastrium, and ask for a renewal of them."*

Of late a hydropathic modification has been introduced into the treatment of this fever. Mr. Stallard, of Leicester, England, concludes an article on the subject, as follows:

"1. That the judicious use of the wet sheet has a powerful influence in relieving many of the most distressing symptoms of fever.

"2. That if applied *very early* in the disease, it may in some cases arrest its further progress.

"3. That if used *later* in the disease it has a controlling influence, bringing the fever to a termination much earlier than by any other known treatment.

"4. That the ordinary *complications* of fever are no arguments against, but rather for its use.

"5. That with this treatment, weak broths and milk and water, *ad libitum*, may be allowed.

"6. That the first symptoms of the subsidence of the fever, were a cool and often moist condition of the skin, a diminution of thirst, and an improvement of the tongue. When these changes occur, the treatment must directly be discontinued, and bark and better diet be ordered.

"7. That some of the worst cases of typhus fever were convalescent, and walking about on the fifteenth day from the commencement of the attack." Mr. Burrows adduces his own experience in favour of this practice.—(*Ranking's Abstract*, No. 6, 1848.)

In *typhoid* fever the cold bath has been used with marked benefit. Not to multiply proofs of this I will content myself with mentioning the practice of Dr. N. Smith, of New Haven, as recorded in a volume of *Medical and Surgical Essays*, edited by his son, Dr. N. R. Smith, of the Maryland University. His method was "to turn down the bed-clothes and to dash from a pint to a gallon of cold water on the patient's head, face, and body, so as to wet both the bed and body linen thoroughly. It is better that he should lie on a straw bed when this is done; it is not, however, essential. If his body should be very hot, he may be turned upon his side, and the water dashed upon his back.

* Bell & Stokes, *op. cit.* Treatment of Typhous Fever.

"As soon as his linen and the bed-clothes begin to dry, and the heat in the head and breast begins to return to the surface, the water should be again applied, and in this way the heat may be kept down to the natural standard, or rather below, on the surface, so that the skin may feel rather cool to the hand of a healthy person.

"It is not very material what the temperature of the water is, if it is below blood heat, excepting the shock given by its first contact, which in cases where there is much stupor or coma, is of some importance; in general, the effect is produced chiefly by the evaporation."

Considering our present facilities for procuring oil cloth, oiled silk, or gum elastic sheets, one or other of these ought to be placed over the bedding and under the body of the patient, before he receives the cold affusion in the manner just directed.

Exanthematous Fevers.—The false pathology so long prevalent respecting eruptive diseases in general, and more especially those of the acute exanthematous kind, has led to very erroneous modes of practice, among which stands conspicuous for its mischievous effects the free use of cordials and other stimulants, and external heat. It was alleged, that it was necessary to bring out on the skin the morbid and peccant matter, which, if pent in, would kill the patient, or produce, at the least, the most dangerous disturbances of internal organs. Our present improved knowledge of the state of the membranes, and of the order and succession of their morbid changes, teaches us that, in proportion as any one of the three surfaces, pulmonary mucous, digestive mucous, and cutaneous, is irritated, the others are proportionably disturbed in their functions; and that the means of moderating the excitement of one of them, in acute disease, is to allay that of the others. Hence we find that irritation of the stomach precedes the eruption on the skin in small-pox, and that in proportion to the intensity of the former, as in drunkards, debauchees of either sex, or where intemperate stimulation has been erroneously had recourse to as a preventive, the latter, or cutaneous eruption, is more unseemly, unmanageable, and malignant. The chances, in such cases, are also greater, that the lining pulmonary membrane will become affected with pustules of small-pox resembling those of the

skin—a result which I have often seen in subjects dead of this formidable disease. If, again, the skin, when thus covered with eruption, be stimulated by much clothing and hot air, the state of the pulmonary and digestive mucous membrane, that is to say, the pulmonic and gastric symptoms will be aggravated. I speak now of the acute form of the exanthemata, when all the sympathies are direct and active. The treatment of these maladies ought, one would suppose, to have been long ago based on a theory which is the direct summing up of morbid phenomena. But the onward march of truth is slow. Isolated facts in therapeutics abounded, but they were, in a measure, valueless until they had been collected and arranged, and illustrated by sound physiology. Upwards of a century ago, the internal use of common cold water in scarlet fever, small-pox, and measles, and instances of the efficacy of this simple means to restore repelled eruption and bring on sweat were pointed out;* but yet to this very day the traditional faith in exclusively internal drugging and external heat maintains its ascendancy with the crowd—the great and little vulgar, including many a physician.

In scarlet fever cold bathing has displayed the best effects. Here, *à priori*, we should anticipate much from it. The skin of an acrid heat, high membranous irritation involving the reticulated capillary and nervous tissues, without always corresponding excitement of the general bloodvessel system, is a state of things calling for the sedation of cold, but not allowing of extensive sanguineous depletion. The disease is almost purely membranous, and for awhile restricted to the muco-cutaneous surfaces with which after a time the serous system sympathizes. On these the cold bath operates with promptness and decisive effects, since the impression produced on the skin is felt almost at the same moment throughout the digestive and pulmonary mucous surfaces.

Currie details the history of two cases of scarlatina occurring in his own family, in which he employed cold affusion with entire success. The patients were, respectively, three and five years old. The heat rose in the eldest, not many hours after the first chill and sickness of

* Hancocke's *Febrifugum Magnum*, &c. London, 1723.

stomach, to 108° F. "As soon as the sensation of heat was steady in my eldest boy, I stripped him naked, and poured four gallons of water over him, of the temperature of 64°. The usual good effects immediately appeared, but at the end of two hours he was as hot as ever—the remedy was again applied, and repeated as the return of heat indicated. By the time the eldest was ready for his third affusion the youngest was ready for his first. The heat rose in the eldest to 109°, in the youngest to 108°, and the pulse in each was upwards of 150°. In thirty-two hours the first had the affusion fourteen times; eight times cold, twice cool, and four times tepid. Twelve affusions sufficed in the case of the youngest, of which seven were cold. The fever was in both completely subdued. On the morning of the third day they were both evidently safe; and on the morning of the fourth, though the pulse was still a little more frequent than natural, they were both convalescent. In this state they inclined to sleep and rest. The scarf-skin peeled off them both, and each had a slight degree of swelling in the hands, but none of the other secondary symptoms."

My own experience of the remedial value of cold bathing in scarlet fever has been ample, and of the most satisfactory kind. In addition to numerous opportunities in private practice, my position, as physician of the Philadelphia Dispensary for upwards of twelve years, gave me abundant and frequent opportunities of treating this formidable disease. Without my pretending to rely on cold bathing to the exclusion of other remedies, I can safely say that there is no other one which unites to anything like the same extent, efficacy with safety and immediately pleasurable results, as the cold bath. How often have I seen the little sufferer, with burning heat and delirium, and unable to obtain sleep or repose of any kind, tranquilized immediately by the cold affusion, and fall into a sweet and refreshing sleep immediately afterwards.

The importance of an early recourse to the external use of cold water in this fever, on which Currie laid so much stress, ought to be felt and acted on by every practitioner of medicine. The sedative effect of cold will be salutary in proportion to the previous general excitement of the capillary system of the membranes, and become less useful if not

of very equivocal benefit, after they are weakened by protracted excitement and inordinate action. Hence it is, that in the more advanced stages of this disease, the capillaries, having acquired the habit of morbid distension, will not readily recover their wonted diameter and elasticity; even after the morbid stimulus of heat has been removed, and the nervous sensibility abated by the cold bath. There would be some risk in persisting at this time in the use of the remedy. It may add direct to indirect debility of the capillaries, and deprive them of the power of resisting the *vis à tergo* of the blood in the larger vessels. The sensations of the patient, if the heat still continue inordinate, will be indeed more agreeable after the cold bath, but for the reasons just given the disease will be far from being subdued. Indeed we should have reason to fear that the inertia and torpor of the already weakened capillaries caused by the cold, might end in death of the parts, viz., either of the skin, or of the mucous membrane with which it sympathizes, or portions of both. It is in this advanced stage of the fever, or in cases where the morbid action was evinced in the skin of the face and neck and over the stomach, while that on the limbs was cool, that I have found sponging the heated and flushed portions with cold water, or immersion in the tepid bath from 85° to 90° so serviceable. We still abstract heat and moderate excitement by these means, but we do it less violently and with less risk of dangerous torpor, or of death of the membranes. This chain of reasoning, and the practice based on it, are mainly applicable to fevers with cutaneous eruption, in which the skin is so far implicated as to undergo structural change and disorganization; as in scarlet fever, small pox, measles, and erysipelas. In the gastro-cerebral fevers, on the other hand, known by the names of remittent, bilious, yellow, and typhus, we are called upon for less reserve in the free application of cold to the skin, in the second stage. The cutaneous excitement is high and persistent for many days, and allows of, and requires free and repeated cold affusion, or, at the least, ablution.

The other parts of the treatment, medicinal and dietetic, of eruptive fevers, ought to harmonize with the use of the cold bath,—in the early stage and before the febrile excitement has begun to decline. Hence, the patient should lie

on a mattress; the body and bed-clothes light; the room of a cool temperature and well-aired. The drinks should be of simple cold water, or this fluid may be weakly acidulated with lemon juice, or flavoured with saccharo-acid fruits or jellies. In the beginning of the disease, if the habit be full and sthenic, and especially if there be evident lesion of, or undue determination to a particular organ,—brain, stomach, or lungs,—it will be most prudent to detract blood either from the arm, or by means of leeches applied near the suffering organ. An emetic of ipecacuanha is often serviceable. The bowels should be kept regular by mild laxatives at first and afterwards by enemata.

As the disease advances and the excitement is reduced, while the skin is of unequal temperature in different regions, the tepid, and even the warm, will advantageously replace the cold bath.

Hydrotherapy claims its ability to cure scarlatina. I shall not repeat the recommendations of its extravagant advocates, who insist on a perseverance in the treatment, no matter what may be the symptoms of the disease. Weiss* more rationally and truly remarks, that a mild case of scarlatina requires nothing more than a mild diet and keeping the patient in a uniform, and that a cool temperature, and to guard against his taking cold. But where the eruption is not perfectly developed, and the fever is high and restlessness great, “the wet envelopment” ought immediately to be had recourse to. The wet sheets should be changed as soon as they become warm, and by this shall we be guided in a repetition of their use. “It frequently happens that after the first, second, or third change of the wet sheet the eruption appears perfectly developed. As soon as this favourable symptom is observed we must change the sheets less frequently, and leave nature to act freely for herself.” An early use of the remedy is recommended. In obstinate cases, care must be taken not to reduce too much the animal heat, and therefore it will be “advisable to leave the patient, after the first to the fourth change of sheets, in the moist warmth of the envelopment, until the sheet has become quite dry; not to change them in fact, until the appearance of the rash, which is generally on the face or neck.”

* *Op. cit.*

The internal use of water is properly urged at the same time with its external use. Weiss objects to a frequent repetition of cooling applications to the throat during the first stage, especially when inflammation runs high. A farther caution is offered against the exaggerated use of cold water in any form.

In cases of retroceded eruption, cold affusion is recommended to be continued for half a minute or a minute, by plunging the patient three or four times in cold water. When Weiss adds, "The more evident the coldness of the surface, the more speedily should we proceed to the use of the plunging bath," he ought to have specified the stage of the disease, and the concomitant circumstance of great oppression rather than of depression, and of much internal heat and thirst, with dryness of tongue and fauces. But if the pulse be small and weak, the skin cold, and no thirst or internal heat present, then, we cannot but think, is cold affusion or immersion a perilous remedy. The tepid or the warm bath and frictions ought to take its place.

By what seems to me a singular contradiction, the wet sheet is recommended in the work of Weiss, where the skin is dry, hot, and burning, and where the fever is violent. He ought, at least, to have indicated with minuteness the frequency of its repetition, so as to insure its sedative effect, for if used in the manner already described, viz., to allow it to remain on until it is dry, it will be far more apt to stimulate than soothe the skin, and certainly it is in this way a much more exciting application than cold immersion or affusion. We are to understand, however, that in the cases now referred to by the hydropathic writer, the eruption has not appeared or has suddenly retroceded. The effect of the wet sheet is said to be quite astonishing; for a tardy rash will sometimes show itself in perfection in the course of a few minutes after the use of the wet sheet.

The candid confession of Weiss, that "the tendency to morbid sequels after scarlatina we cannot prevent by the most judicious hydropathic treatment," contrasts very favourably for him with the impudent assertions of some of the water-cure school, of unvarying success with their remedy. The advice is a sound one, which inculcates the great utility of diaphoresis in dropsy after scarlet fever.

"As long as traces of dropsy are observable, the patient should sweat for an hour once daily, at least, and should remain in a state of gentle diaphoresis during the whole day."

In *small-pox* I have not found cold bathing, in any shape, of that benefit which I had been prepared to expect from the favourable notices of the practice by other writers. I have elsewhere recorded my opinions on this subject, when giving a history of the small-pox epidemic which prevailed in this city in 1823 and 1824.*

"The application of cold water to the skin was tried by us on the strength of its alleged good effects in this disease, but in no case had we reason to be satisfied with it. The state of the cutaneous surface, during the vesicular and pustular stages, is such as to prevent its transmitting the usual impressions to the interior. Cold may deaden it, and hasten the disorganization of its tissue, but cannot arrest and suspend morbid capillary action here, as in ordinary fevers or diseases with great local determination, as to the head, &c. If useful at all, it will, we apprehend, be in the forming stage of the disease, before the skin is altered by the eruptive effort." This last was the time, I might have added, in which Rhazes directed the cold bath. See Chapter XVI., p. 200.

In the treatment of *measles*, cold bathing, although regarded by many with dread, has been used with benefit. Among the accounts of this nature, is that given by Dr. Thaer, a Prussian physician. In an epidemical visitation of measles which occurred in the neighbourhood of Berlin during the autumn of 1825, this gentleman directed the use of ablution with cold water and vinegar in sixty-eight cases. Out of these, there was but one death, and that was of a person in whom there were pulmonary tubercles, and in whose case the ablution had been practised contrary to the advice of the physician. Contrasted with this favourable result, was the fact of eleven deaths out of fifty-two sick of the same disease, but on whom the remedy had not been used. It was remarked, that the children who

* North American Medical and Surgical Journal, Vol. II., p. 51, 52. Article on *Small-Pox and Varioloid*, by Drs. Mitchell and Bell, attending physicians to the then Small-Pox Hospital.

had been bathed were, for the most part, perfectly cured in the space of eight days ; the desquamation was less extensive and more rapid in its course after the ablutions ; the convalescents exposed (contrary indeed to Dr. Thær's orders) did not experience, on that account, any inconvenience, although they had some remains of cough. When the irritation of the lungs had lasted some time, copious expectoration supervened after the use of the cold lotions ; and when the pulmonary disease was in its incipient state, it was cured without expectoration so soon as the functions of the skin became regular. In three patients, the eruption was observed to come out immediately after the use of the lotions ; although, prior to this, there had not been the slightest evidence of it ; and whenever the eruption appeared, the other symptoms were considerably moderated in violence.

The conditions for prescribing cold abluion in these cases were, 1. That the temperature of the body of the patient should be above 98° Fahrenheit, and that there co-existed restlessness and shortness of breath. 2. That the water for abluion should be colder in proportion as the body of the patient was hotter. Dr. Thær was, in this respect, regulated by the table of Frœlich, which he always carried about with him, together with a small thermometer, the bulb of which he placed under the axilla of his patient. 3. That sponging or abluion was never to be resorted to when the little patient was in a tranquil state, or perspiring.*

I shall here introduce the table of Frœlich, which will serve as a useful guide to direct the practitioner in the employment of bathing, and also as an apt illustration of the principles on which the remedial powers of the bath must rest. The greater the heat, and the higher the excitement, the colder should be the water and the longer the period of immersion : a practice perfectly in accordance with the creed which admits the directly sedative power of cold, but contradictory and absurd, if we suppose with Currie and others the stimulating power of this agent.

* North American Medical and Surgical Journal, vol. viii., p. 414, 415.

Heat of the body by Fahr. Therm.	Temp. of the water by Fahr. Therm.	Duration in minutes of the	
		Ablutions.	Baths.
98	90½	4	...
99½	85	4	...
100	75	4	1½ to 1
101	65 to 70	6	1 to 2
102	60 to 70	4 to 6	2 to 3
103	60 to 70	8	6 to 8
104	60	...	3 to 4
105	55	...	2 to 3
106	40	...	1 to 3
107	40	...	1 to 3
108	35	...	3 to 4
108½	35	...	3 to 4
109	35	...	3 to 4
110	35	...	3 to 4
111	35	...	3 to 4

The hydropathic treatment of measles is to be conducted on the same principles as that of scarlet fever. "Even in those cases in which we cannot succeed in reproducing the eruption, cold affusion or sweating in the wet sheets will moderate these symptoms. We may also use bandages as auxiliaries, where separate organs or parts are attacked.

"Diarrhœa remaining after measles is to be treated by bandages round the abdomen, by the use of two or three clysters daily, and by mucilaginous diet."—Weiss.

The free use of cold water as a drink in measles has been spoken of before in terms of commendation. The experience in this respect of the Rev. Mr. Hancock finds abundant confirmation by the hydropathic school.

In fevers vaguely called *miliary* and *petechial*, that is in fevers, in which petechial or miliary eruptions have been a common, though not an essential symptom, cold affusion has been used with advantage. Giannini, who speaks of the remedy in such strong terms of eulogy in the hot stage of intermittent fever, confirms the favourable opinion of it, expressed by Currie, in the diseases now under consideration. When resorted to at the first invasion of the fever, cold immersion will often cut it short and prepare for prompt convalescence. Even when the disease is advanced, either it or cold affusion is still an agreeable remedy, and will prove the most successful palliative. The conditions already insisted on are to be at-

tended to here, viz. : to select the epoch of the paroxysm, when the fever is intermittent, and of the exacerbation, when of a remittent character, and in which the heat of skin is greatest.

In conclusion of this part of the subject, we may say, in the language of Hegewisch, that affusions of cold water may be used when the heat exceeds the standard temperature of the body, and then only in the acme of the febrile heat, never during the cold stage ; the skin should be dry, not moist, much less covered with sweat. The remedy is best adapted to fevers arising from contagion, and should be used as soon as possible after their invasion, and best of all in the first hot stage succeeding the infection : then may the disease be extinguished in the first three days—and even when it cannot be applied so soon, it contributes greatly to alleviate the symptoms and accelerate the cure.

CHAPTER XXXII.

THE COLD BATH IN HEMORRHAGES—IN EPISTAXIS—IN HEMOPTYSIS—IN INFLAMMATIONS—INFLAMMATIONS OF THE NERVOUS SYSTEM—IN GOUT—DR. GOOD'S PERSONAL EXPERIENCE—GIANNINI'S CASES—HYDROPATHIC TREATMENT—COLD BATHING IN RHEUMATISM—GIANNINI'S EXPERIENCE.

Hemorrhages.—Physicians, participating in the notions of the vulgar, that the blood is driven to the internal organs by the application of cold to the skin, were long deterred from the free use of the cold bath in *hemorrhages*. Popular experience had very early shown the good effects of cold applications in bleeding from the nose,—and ought to have been sufficient to expose the fallacy of this hypothesis. Still the extended use of the remedy to other forms of internal bleeding was exceedingly slow, and looked upon as hazardous in the extreme. Reasoning from the obvious phenomena produced by cold bathing which I have already detailed, we cannot fail to satisfy ourselves *à priori*, that, consentaneously with the diminished action and temporary torpor of the skin, are similar states of the mucous mem-

brane of the nose, lungs, stomach, intestines, bladder, and uterus, on which, respectively, take place epistaxis, hemoptysis, hematemesis, mælena and hemorrhoids, hematuria, and menorrhagia.

When describing the effects of cold water topically applied, I mentioned its utility, combined with drinks of the same liquid, in various hemorrhages (p. 230). If we bear in mind the fact, that nearly all hemorrhages take place from mucous membranes, and that these have a direct sympathy with the skin, we can have little hesitation in applying at once a remedy such as the cold bath, which shall produce in the capillaries of the mucous system, from which the sanguineous discharge takes place, an impression and therapeutical effect analogous to that which are produced on the skin. These are, unequivocal sedation, diminished activity of the vessels, both as regards their sensibility, their power of evolving caloric, and of circulating the blood. We cannot, therefore, have any fear of the blood being driven into the internal organs, and of their suffering from accumulation and congestion of this fluid; since we know that in them also, as well as in the skin, there is a diminution of circulatory energy. Nor need we fear from reaction and increase of hemorrhage, in consequence, after the cold bath, for the diseased parts, we have good reason to believe, remain, as in the case of the skin, longer in a state of sedation than is supposed.

Cold, applied by means of wet cloths to the back of the neck or to the scrotum, is a popular and efficient remedy for stopping epistaxis, or bleeding at the nose. Darwin, be it said incidentally, expresses his belief that the epistaxis of elderly people most frequently attends those whose livers are enlarged or inflamed by the too frequent use of fermented liquors. Among other means of relief, he mentions plunging the head into cold water with powdered salt hastily dissolved in it.

In *hemoptysis* or spitting of blood, the cold bath by immersion, has been tried by different practitioners with good effect. The application of cloths wet with cold water to the chest has been already adverted to, p. 230.

The question of remedial measures in *hemoptysis* can never be discussed without our recollecting its frequent

complication with tubercles of the lungs, and, in fact, of its being often, alas, how often! a symptom of phthisis pulmonalis. Hence, in directing the cold bath we must take into consideration not only the state of the vascular system of the patient, but also the extent to which the disease has recurred, and its subjection to other modes of treatment. Over some of them the cold bath will have a preference, as interfering less with regular digestion and nutritive life, both of which it is so desirable to preserve in tuberculous subjects. Bloodletting, antimonials, sugar of lead, &c., although at times called for, are all objectionable on this ground.

A frequent renewal of the cold bath or cold cloths is requisite to keep down the morbid action of the capillaries of the part from which the bleeding takes place; so as to insure a somewhat prolonged sedation, and guard against the risk of real reaction. On this ground I should prefer the mode of applying the cold water just mentioned to that recommended by the hydropathists. The alternate chilling and excitement of the skin, in fact the wet sheet, then heat and sweating, and then the cold bath, are participated in by the pulmonary mucous membrane; and, if so, the effects must be, to say the least, of very doubtful therapeutical value.

These views just expressed, respecting the anticipated and actual results of cold bathing in hemoptysis, will apply to the other form of hemorrhage; in which, however, we are less embarrassed by tubercular complication than in pulmonary hemorrhage. An exception to this remark occurs in uterine hemorrhage from cancer in the womb, in which the bleeding is a direct effect of the destruction of parts by cancerous ulceration. For some details on the use of the local application of cold water in hemorrhages the reader is referred to Chapter XX. of this volume. In the treatment of all of them, we shall find the efficacy of the remedy now under consideration greatly increased by cold drinks, so as to produce a refrigeration of the gastric mucous membrane, and by cold lavements, with the design of causing a similar condition of the extended surface of the lower bowels. The conjoined use of these three modes of applying cold water will produce a degree of sedation, and, if they be continued, of direct reduction, of

morbid excitement, not exceeded by any other mode of treatment at our command.

In *inflammations* of the various organs the same general indications present themselves as in hemorrhages, which last are, in fact, the natural means of relief of a morbidly full and excited organ,—just then in a state of imminency of inflammation. In both these pathological conditions we must, however, bear in mind, the difference of action and tone in the vessels, particularly the capillaries, during the first and the more advanced stages of the disease. In the first, when the inflamed tissue contains not only an increased amount of blood, but also exhibits greater heat and sensibility, and evolves more animal heat than common, and maintains quick and active responsive sympathies with the other organs, cold, directly applied to the diseased part or to a surface with which it sympathizes, will, by its refrigeratory power abstract the already excessive heat, and by its sedative effect diminish the excitement of the nervous and capillary tissues, and of course diminish the secretion of caloric and the diameter of the vessels.

If cold be early applied, the suspension of the stimulus of heat, and the recovered diameter of the vessels, allow the part to resume its former condition. But if the application be delayed until the vessels have been long dilated, they will not soon readily recover their former elasticity and tone, even although the stimulus of heat and the excitement of the nervous tissue have been withdrawn. There will even be a risk of cold at this time producing such a torpor, if not actually deadening of the part, as to prevent reaction, and the resumption by the diseased tissue of its first state of structure and function. In all these effects of cold in the different stages of inflammation, we cannot fail to see its true therapeutical character.

In the first stage we use cold freely, and at a time when we also have recourse to bloodletting, to salines, to antimonials, digitalis, and to purgatives; all of them agents avowedly of a reducing character, used to moderate inordinate excitement and its frequent accompaniment, inordinate sensibility and pain. In the second stage, on the other hand, we withhold cold or use it sparingly, or substitute tepid or warm temperature in its stead, just as

we withhold the articles of the *Materia Medica* now enumerated, or use them sparingly, or substitute tonics or mild stimulants in their stead. How, I would ask, can we reconcile the use of cold in the first instance, and withholding it in the second, with the hypothesis of its being a stimulant or a tonic, or both?

Inflammations of the Nervous System.—In the large class of diseases of the nervous system, in which the brain and spinal marrow and their investing membranes are affected with inflammation, the external use of cold, either by bathing or more frequently still by topical applications, has long been a favourite part of therapeutical practice. Thus, for example, in encephalitis and arachnitis, with their symptoms, themselves often regarded as the actual diseases, viz., delirium, maniacal ravings, and various convulsive movements, followed not unfrequently by paralysis, cold, through the means of pounded ice or cold lotions to the head, or of the cold douche directed on this part, is a remedy frequently suggested and employed. I have been more struck with the tranquilizing effect of the cold applications to the posterior part of the cerebellum and the nape of the neck, or the nucha, than when they were directed to the summit or lateral regions. On this point, however, something will depend on the part more especially the seat of inflammation, as, for instance, whether it be the cerebrum or the cerebellum, the superior hemispheres or the base of the brain.

Dr. Stokes gives some minute and very appropriate directions for the use of cold applications to the head in inflammation of the brain. The mode which he prefers, “in all cases, and particularly in that of the child, is to take a piece of smooth ice, about the size of a dollar, and half an inch thick, this is to be placed in the hollow of a fine cup sponge, and steadily moved over the whole surface.”* He refers, also, in terms of strong commendation, to what he calls Dr. Abercrombie’s mode of applying cold to the head, and which consists in pouring on the shaven head the contents of a jug of cold water in a small continuous stream. This is, in fact, a cold douche, with which the continental physicians have been long

* Bell & Stokes’s Lectures, vol. ii., p. 471.

familiar. Of this I shall speak more particularly very soon. Dr. Stokes dwells very properly on the necessity of keeping up a sustained and prolonged impression of cold in acute inflammations, when we wish to obtain its full refrigerating and reducing effects. He also judiciously enjoins the physician himself to stand by and see the thing properly done.

Simple Acute and Epidemic Meningitis are benefited, and sometimes greatly controlled, by cold applications, made in the same manner as in encephalitis.

Gout and Rheumatism.—The efficacy of cold bathing and cold douching in *gout*, strongly asserted by some writers, has been contested by a larger number. The former have on their side Hippocrates; and in modern times Bartholinus in 1566, Zacutus Lusitanus in 1641, with successive advocates down to Giannini and Good in our own day. Bartholinus speaks of the use of snow as a common application, and Prechlin both of snow and cold sea water, towards the close of the seventeenth century.

We are told that there is danger from the practice of cold bathing in *gout*, on account of the risk of metastasis from the affected extremities to the stomach or other great viscus; and moreover, that a disease depending on constitutional deterioration, including a change in the blood itself, cannot be safely or certainly benefited by a temporary immersion, still less by affusion of cold water or its application by a douche on the gouty limb. To these fears and objections it may be replied, that the continued exhibition of cordials and other stimulants affords no immunity against metastasis; and that even where there is a peccant matter eliminated, as in the exanthemata, we are not restrained from cold bathing by fears of retaining it in the system, or of preventing its maturation and discharge.

The question really turns on the vigour of the gouty subject, the acuteness of the diseases, and the condition of the functions generally—in fact, on the very same circumstances of which we are required to take cognizance in directing the cold bath for other diseases. In the hygienic view of the subject, also, we have seen that functional vigour and excitement are favourable, and weakness and depression adverse to the use of this bath. An individual in the first-mentioned condition will take a pedilu-

vium with pleasure and refreshment ; while one in the latter will be seized with pain and cramp in the stomach, and a stricture across the chest, or violent headache, or pain in the region of the heart. These unpleasant effects occur in persons who have never had gout nor suffered under a gouty diathesis. We do not talk of metastasis in such cases. We see, or ought to see, simply a sudden diminution of function and vitality, with associated disturbances in an organ, say the stomach, which is secondarily impressed in a sudden manner by the application of cold to the feet, just as it occasionally is when primarily impressed by drinking cold water.

In a case of acute gout in a vigorous subject, the stomach will not be likely to suffer from the abatement or removal of the arthritic inflammation ; but, on the contrary, by this viscus undergoing a sedation analogous to that of the joint, it will cease to be irritated, and will be placed in a more favourable state than before for the discharge of its appropriate function. Thus thought Dr. Good when, in the forty-seventh year of his age, after three days' suffering from a first attack of gout in one of his feet, he plunged the affected limb in a basin of cold water, four or five times in succession. "The application was peculiarly refreshing ; the fiery heat and pain, and all the inflammatory symptoms diminished instantly ; he repeated the cold bathing two hours afterwards, and continued to do so during the whole of the day ; the complaint gradually diminishing upon every repetition. He slept soundly all night, the pain was trifling, and the inflammation had almost subsided by the morning : he was able to hobble a little in the course of the day ; and in four and twenty hours more the fit completely disappeared, and he was capable of resuming his accustomed exercise of walking. For five or six years afterwards he suffered annually from a like attack, but always had immediate recourse to cold immersion or affusion. No paroxysm continued longer than about three days, nor any one ever confined him totally to his house for a day."

"During the preceding paroxysm, the appetite being good, the bowels regular, and the pulse not much quickened, he made use of no collateral means, nor ever found the use of the cold water productive of the least inconve-

nience ; though he has occasionally been sensible of a gradual creeping through the system of the peculiar aura just adverted to, which may perhaps be called the *aura podagrica*, but which constituted no unpleasant sensation.”*

To this statement Dr. Good, in a second edition of his great work, adds, that in a subsequent attack of the gout, accompanied with a more irritable state of the general frame than heretefore, he did not venture on the cold bath, but confined himself chiefly to the wine of colchicum, with very frequently a full dose of magnesia.

Giannini relates the history of several cases of gout, occurring in his hospital practice, in which cold immersion was productive of immediate relief, without any sinister result. His account of the symptoms is very slight, and one can hardly resist the belief that his cases, for the most part of country people, were really ones of rheumatism.

The first case was of a countryman, aged 48 years, who had suffered for 15 days' preceding from swelling and pain of his hands and left knee, and accompanied with inability to move his limbs, and fever. Twenty-five years before this person had undergone a similar attack, which lasted five months, during which period he suffered from continual pain.

Giannini determined to proceed cautiously in this his first trial of the cold bath in gout, and, accordingly, he had his patient first immersed in a warm one, from which he gradually abstracted some of the water, and had the quantity replaced by that of a cold temperature. He soon observed that, in proportion as the cold of the water was increased, the pain diminished, and the use of the upper limbs was in equal degree regained. He then directed the patient to put an arm out of the bath, and subjected it to an abundant affusion of cold water, from which the greatest relief was obtained. The stay in the bath was during a period of two minutes. An important part of the narrative must not be omitted, viz. : the administration of half an ounce of bark, and a drachm of laudanum. Sleep, of which the sufferer had been so long deprived, imparted to him its refreshing influence for the whole night after the use of the bath. On

* The Study of Medicine, Class iii., Order ii., Species iii.

the following day there was entire absence of pain. No immersion was practised, but the bark and laudanum were repeated. The third day brought with it slight pains and morbid heat, which were all dissipated by cold immersion of a minute's duration. Took the bark. On the fourth day the patient began to walk. The pulse was natural. Appetite good.

This man was kept in the hospital, in order that Giannini might watch his case. Eight days after the last report, there was a slight renewal of pains in the hands which yielded to the cold immersion : and in ten days from this the same symptoms, which were subdued by the same remedy. So it was once more, after the lapse of another ten days.

Another case, still more strikingly exhibited the remedial power of the cold bath. It was of a youth, an ostler, aged sixteen years, whose hands, arms, knees, and feet were swelled and painful to such a degree as to deprive him of sleep for four days and nights. His pains disappeared immediately after his immersion in the bath, which lasted for a few minutes. It was with difficulty that he could be induced to leave it. Seven days' continuance of the remedy was sufficient to bring about a complete cure, in which the administration of bark and colombo root, in the opinion of Giannini, had but little share. In an hour after the first immersion the patient slept tranquilly.

Dr. Good, in adverting to the mischief charged on the external use of cold water in gout, very justly remarks, that professional judgment is called into exercise in the solution of this question. Against the mischief that has resulted he offsets the great and essential good, and the easy and rapid cures in hundreds of instances. He adds : " Yet it may be doubted whether the injury produced even by an injudicious use of evacuants and refrigerants amounts to a thousandth part of that entailed on the constitution by allowing the gout to make its inroads tacitly and unresisted ; till by degrees it triumphs equally over all the powers, as well of the body as of the mind, and, in the forcible language of Sydenham, ' The miserable wretch is at length so happy as to die.' "

Cold bathing or douching cannot, however, be regarded

as a cure for gout. It is simply a prompt and soothing remedy in the paroxysm, as it is in the hot stage of intermittent fever, and in the paroxysm of remittent fever, and the first and acute stage of erysipelas, scarlet fever, and measles.

Acute rheumatism was treated by Giannini with cold bathing and the administration of Peruvian bark. His design in directing the bath was to procure an artificial remission of the fever, so as to enable him at once to give the bark. A young man who was brought to the hospital with rheumatic fever, and who suffered from pains in the legs, thighs, and arms, was placed in the cold bath during a minute. In three minutes afterwards the pains were abated, and in five minutes they had entirely disappeared.

Giannini observed that in some instances the patients complained of pains after the bath, but of a different kind from the rheumatic ones. They disappeared in a short period after the patient had become warm in bed.*

If it be deemed advisable to have recourse to the cold bath in acute rheumatism, the same principles must govern us as in gout and regular inflammations and fevers. These have been so recently enforced that their repetition cannot be deemed necessary at this time. My remarks on the alleged metastasis in gout are applicable to rheumatism. The danger of alleged transfer of inflammation, in the last-mentioned disease, from the joints to the heart, giving rise to endocarditis or pericarditis, will be found to consist much more in the persistence of the arthritic affection than in a retrocession to any internal organ.

Hydropathy has been freely applied to the treatment of both gout and rheumatism. The reader is, by this time, so well acquainted with this method of cure as to be aware of its consisting of several parts, or processes, in which cold bathing, although it constitutes one of these, is far from being the sole remedy. Dr. E. Johnson (*op. cit.*) gives the outlines of a case of gout and rheumatism of thirteen years' duration, complicated with venereal taint for a part of this time, for which the patient underwent treatment at Græfenberg. "The first crisis which manifested itself was a return of the chancre, which he had contracted six years

* *Op. cit.*, cap. viii.

before. This, however, got perfectly well in a fortnight." In the course of eight months he had completely recovered, was free from all pain, active with his limbs, and able to take any reasonable amount of exercise on foot or on horseback. At the time Dr. Johnson saw him he was covered with a critical eruption all over his limbs and body, and he was only waiting for the subsidence of this to return home. "He was on full treatment the whole time with the exception of the sweating blanket. He wore umschlags night and day, which during the day were renewed five times."

I subjoin, in a note, an account of a case of "Gout in the Hands and Knees," related by Dr. Johnson.*

Weiss enters into detail of the hydropathic treatment of gout,—directs occasionally the tepid as well as the cold bath, and warm bandages alternating with cold ones; also, occasionally a warm pediluvium. He advocates giving nature fair play by not needlessly interfering with her curative efforts. "In cases of urgent necessity the wet envelopment may be repeated with every exacerbation of the fever; nor should the very necessary application of umschlags under the head be forgotten. The ablution which should follow, must be performed with tepid water at 68° to 73° F., never with cold water, because in the latter case the ablution would act as a stimulant and increase the attack." The vocabulary of this writer, in calling water at 68° to 73° tepid, is equalled by his therapeutical notions of cold water being a stimulant. He gives the details of a case of gout, first under Priessnitz,

* Mr. —, 45 years of age, had gout in his hands and feet for twelve years. He began the treatment in July, 1842. At six in the morning leintuch for half an hour—tepid bath for five minutes. At eleven and at five the same treatment repeated. He wore umschlags. On the second day he sweated for two hours—took a tepid bath for two minutes—after which a cold bath for one minute—then another tepid for two minutes. At eleven o'clock he took a foot bath for twenty minutes. At five o'clock he took a leintuch for half an hour, with tepid, &c., &c., as in the morning. This treatment was pursued for ten days. After the tenth day, immediately after the sweating, a cold bath for a minute. In the third week he douched in addition to the other treatment, and wore wet bandages on the knees. He got well rapidly.

and subsequently, and for the greater part of the time, under his own care, which lasted two years and a half; but which ended in a cure.

CHAPTER XXXIII.

COLD BATHING IN BURNS, ERYSIPELAS, AND SUN STROKE—IN NARCOTIC POISONING—PHYSIOLOGICAL EXPLANATION—COLD BATHING IN INSANITY—ACUTE MANIA—COLD BATHING IN CONVULSIVE DISEASES—IN CHRONIC DISEASES—IN SCROFULA—IN CHRONIC RHEUMATISM AND GOUT—HEMICRANIA—WEAKNESS OF VISION—CUTANEOUS DISEASES—COLD DOUCHE—MODE OF USING IT—ITS MODUS OPERANDI—USE OF THE DOUCHE IN INFLAMMATIONS—IN FEVERS—IN DRUNKENNESS AND NARCOTIC POISONING—IN INSANITY—ESQUIROL'S EXPERIENCE—CASES TREATED BY M. BRIERRE DE BOISMONT.

Burns, Erysipelas, Sun-Stroke.—Compatibly with the correct view of the therapeutical action of cold we direct it in burns, where the tissues are not destroyed. So, also, in *erysipelas* and in *sun-stroke*. In all these cases, the tendency of the inflammation is speedily to destroy the vitality and integrity of the affected tissue; and hence, if cold be resorted to it ought not to be of so low a grade or so long applied as to increase this tendency, still less actually to cause the destruction of parts. So soon, therefore, as the first sensations of burning and pain are removed by immersion or the application to the part of water of about 55° F., it may subsequently be replaced by this liquid at 70° and even 80° F., if the sensations, though still morbid, do not amount to any great evolution of heat and painful sensations.

When the skin has been disorganized by the burn we must not anticipate good effects from the cold water; but when there are redness and intense pain, the cold bath or other forms of cold application will often afford signal relief. The cases, including experiments on himself, detailed by Dzondi, are conclusive on this point.

In the burning of the skin from exposure to the sun's

rays, and in the accompanying phenomena of acute headache, or delirium, violent fever, and sometimes insensibility and coma, with great gastric distress and occasional retching, constituting sun stroke—repeated cold affusions have been freely resorted to in all countries and in all ages, from the time of Ætius down to the present day, and with the very best effects.

Narcotic Poisoning.—Resembling sun stroke in many respects, and like it, also, requiring the free use of cold affusions, is the *poisoning by narcotic drugs, such as opium, henbane, stramonium, &c.* The first delirium is here succeeded by stupor and slow stertorous breathing, with irregularity in the distribution of the animal temperature; the skin of the trunk being morbidly hot, and the extremities cold. The carotids pulsate with unusual force and frequency. The central portions of the nervous system—the brain and spinal marrow—are in a measure paralysed, but the ramifications and expansions in the tissues are still morbidly active. The most pressing indication at this time is to prevent the suspension of the respiratory functions. We learn from Carlisle,* and Edwards,† that, in proportion as the animal heat is diminished in the different classes of animals, and individuals of the same class, the want of air is less felt, and the danger of suspended respiration less imminent.‡

Applying this fact to the treatment of slow and laboured breathings of persons poisoned by opium and the like articles, and still more to the suspended respiration of those

* Croonian Lecture, Phil. Trans., 1804.

† On the Influence of Physical Agents.

‡ An animal, a puppy for example, which would die in half an hour from an occlusion of the glottis, produced by a section of the eighth pair of nerves, so that air could not enter its lungs, would yet survive this operation for a whole day, if it were benumbed with cold. Frogs will live from autumn to spring almost entirely under the water of marshes, ponds, and rivulets, which all this time hardly exceeds 50° Fahrenheit. In hot weather, on the contrary, when the temperature of the water, and that of their own bodies, for unlike warm-blooded animals they take in a measure the temperature of the medium in which they live, is elevated, they are obliged to come frequently to the surface to breathe, and can scarcely do without continued pulmonary respiration.

who are in a state of *asphyxia*, or suffocated by inhaling deleterious gases in wells, &c., we can understand how abundant affusions of cold water over the body, and cold air should be so serviceable. By reducing the excessive animal heat, and preventing in degree its formation, we give the lungs an opportunity of performing their functions with less employment of power, until the system gradually recovers its energies. Cold does not in these cases, as so often alleged, act by stimulating and rousing the nervous system—it rather lessens the morbid excitement of this system, and one of its prominent functions, calorification; and by circumscribing the circle of vitality, it enables the lungs to perform for this circumscribed circle what they could not possibly accomplish for the entire and extended one.

The mode of practising the affusion is by dashing cold water on the head and shoulders.

Whatever support the practice of cold affusions, in poisoning with narcotic vegetable substances may receive from this theory, we must be aware that the former has long preceded the latter. Baccius recommended cold baths against the poisonous effects of the mandrake (*podopyllum peltatum*); and Sir John Floyer adds, "this hint ought to excite physicians to inquire how far and on what account cold baths can help the poison of opiates." Farther on, after describing the symptoms produced by swallowing the mandrake, and the relief afforded by cold baths, this last-mentioned author says, "and this effect ought to oblige us to inquire farther, how far cold baths may be proper for sleepy diseases, of which kind the apoplexy, lethargy, and *incubus* may be reckoned, and the sleepiness preceding fits of the mother, and other convulsions." Again, "The seamen cure their sailors by throwing them into the sea when they are dead-drunk, which excites their stupid senses, and makes them very sober." Baccius had, long before (A.D. 1571), told us that drunkenness from wine was removed by affusions of cold water. One is surprised that, after such experience, the use of cold affusions should be regarded as a new remedy in poisoning from opium; at any rate, that it should only get into general use of late years.* The alternate use of the

* See Christison on Poisons, Amer. Edit., p. 536.

cold and warm dash or sponging has been found to be very successful in narcotic poisoning.

The cold bath, in its various modes of immersion, affusion, and douche, has been a favourite remedy with many physicians in the treatment of *insanity*. The late Dr. Rush was partial to it, and advised its repetition two or three times a-day. Esquirol used it with advantage in some cases: he believes it to be "adapted to young, strong, and robust subjects, who are devoured by heat." In a succeeding paragraph, however, in contradiction to this view, he tells us that "the baths of immersion and affusion are particularly useful to subjects enfeebled by masturbation or long grief, and in whose case, we wish to produce a reaction by withdrawing from the centre, nervous power, and calling it to the circumference." The first opinion of this eminent writer and teacher is more entitled to confidence than the second, resting as it does on speculative grounds.

The same principles will be found to govern us in the use of the cold bath in insanity, as in other forms of disease. In *acute mania*, or in the paroxysms of the chronic kind, when marked by much vascular excitement, the cold bath will be found a valuable sedative. So, also, in cases in which there is generally a morbid heat of the skin and thirst, even in cases of long duration, will the remedy be found serviceable. But on this point I shall make some additional remarks when speaking of the use of the cold douche.

Convulsive Diseases.—In the diseases vaguely called convulsive and spasmodic, in which the brain is sometimes the seat of primary, sometimes of secondary irritation, cold bathing has been largely used, both by affusion during the paroxysm, and immersion or affusion during the interval. The remedy acts in two ways: 1st, by reducing vascular action; and 2d, by abating the extreme susceptibility to impressions depending on morbid sensibility of the nervous system. Deceived by the great fulness, and violent throbbing of the vessels of the head in epileptic, and even hysteric seizures, physicians have been too prone to bleed persons suffering in this way. The morbid phenomena are sometimes aggravated by this treatment; as in the strong pulsatile movements of the ves-

sels of the head which are greatly increased. Under these circumstances, either the cold bath or the local application of cold has an evidently soothing effect.

In *chorea*, the attestations in favour of this remedy are very decided from quarters entitled to our entire respect.

When the cerebral irritation is kept up by a morbid condition of the digestive system, less benefit is to be anticipated from cold bathing. In other cases, again, in which an irritation at a remote point of the nervous expansion of the skin causes convulsion, as in *tetanus* and *hydrophobia*, often with very little associated vascular action, the employment of the cold bath has become a mere matter of routine, but has not been followed by satisfactory results.

Chronic Diseases.—The cold bath has acquired reputation in chronic affections of the mucous membranes, which are unaccompanied by visceral inflammation and irritation; such as chronic catarrh, asthma, certain forms of dyspepsia, chronic diarrhœa, leucorrhœa, and gonorrhœa. In organic diseases of the heart, on the other hand, enlargement and induration of the liver, spleen, and uterus, the cold bath is not admissible. The relief afforded by this remedy in chronic diseases, will generally be found proportionate to the degree of vascular excitement and morbid sensibility with which they may be accompanied; and the exercise which ought to follow the use of the remedy. If there be associated anemia, the cold bath will be injurious; and hence it is contraindicated in chlorosis and certain forms of amenorrhœa, in which there is a deficiency of red blood.*

* Clinical experience in this, as in some other views of the treatment of disease, stands opposed to the speculations of Liebig, ingenious and plausible as they are, on the effects of cold applied to the system. "The cooling of the body, by whatever cause it may be produced," says Liebig, "increases the amount of food necessary. The mere exposure to the open air, in a carriage or on the deck of a ship, by increasing radiation and vaporization, increases the loss of heat, and compels us to eat more than usual. The same is true of those who are accustomed to drink large quantities of cold water, which is given off as the temperature of the body, 99½ F." And, again, "With the external cooling the respiratory motions become stronger ·

If illustration of the necessity of making a proper selection of cases, with reference to the constitutional vigour and power of reaction under the sedative influence of the cold bath, be needed, we might refer to the historical notices of the different results of this application in the persons of Augustus Cæsar and his nephew the young Marcellus. The cold bath was made fashionable in Rome by the cure of Augustus for a chronic catarrh, under which he had suffered for some time. Antonius Musa, the successful physician in this case, received from the grateful senate a golden ring of the equestrian order, and by them a statue of him was decreed to be erected in the temple of Esculapius.

Soon, however, a remarkable and melancholy case occurred of the inefficacy if not positively deleterious effect of cold bathing, prescribed by this same Musa for the young Marcellus. The delicate frame of this youth, the hope of Rome and of the world, could not bear the shock and sedation from the cold bath which had been so serviceable in the complaint of his relative, whose frame had been inured to fatigue and hardships by his soldier's life. Marcellus was not, as some have supposed, immediately destroyed by the cold bath, but it prostrated him to such a degree, that he died soon after at the hot springs at Baia, whither he had been sent, in hopes that they would counteract the bad effects of the former practice.*

Chronic rheumatism has been often entirely removed by a judicious course of cold bathing, with the important and, indeed, indispensable ancillaries of friction, suitable clothing, and temperance. "The Rheumatism" says Floyer, "is an old English disease for which cold baths are famous." He relates the case of a married female who had suffered from rheumatism for four years consecutively,

in a lower temperature more oxygen is conveyed to the blood, the waste of matter increases; and if the supply be not kept in equilibrium with this waste, by means of food, the temperature of the body gradually sinks."

Giving all due importance to these chemical notions, the postulate of applied cold must be supposed to refer to its hygienic and moderate, and sustained, rather than its therapeutical and strong and sudden application.

* Biancone—*Lettere Celsiane*.

which had been attended by swelling of the joints and contraction of the fingers, hands, and arms, and emaciation, and a short cough. Floyer was not so far a man of one idea, notwithstanding his enthusiasm in favour of cold bathing, as to see no other additional means of cure; and in this instance he had his patient bled and purged "by way of preparation for the bathing afterwards." Then "she was dipt in the chair three times at each bathing, and she bathed nine times in the whole."

After each bath the patient was put in bed and made to sweat freely. Floyer regards this as a necessary part of the treatment by cold bathing. He also directed steel and antiscorbutics and ointments for the contracted sinews. The result of all was an entire cure, with the exception of some contraction of one knee. His remarks on the general course to be pursued are so judicious that I must insert them here. They would furnish very timeous hints, if not rebukes, to the exclusive hydropathists of the present day, who are more indebted than most of them are aware to Sir John's writings for the extension and systematizing of Priessnitzian practice.

"——— therefore I find that sweating is necessary in bathing for rheumatism. And I also observe, that Evacuations and Alteratives, and Ointments, are necessary as such, as the Disease indicates, besides the Bathing, and therefore I believe *Cold Bathing* can never be made a Quack Medicine, to be prescribed alone, nor to be used for all Diseases; but according to Physical Indications in company with other Medicines, and then they will perform very great Cures."

Vander Heyden relates the case of a Sir Toby Mathews, who was cured of hemicrania and catarrhal defluxion from the affected side of twenty years' duration, by immersion of his head in cold water every morning. He was sixty years of age when he began this practice, which he continued until he had passed his seventieth year, and how much longer still the narrative does not inform us. The worthy knight derived his knowledge of the cold bath in this disease from an English nobleman who had himself been similarly affected, and who was cured by this remedy.

An old and popular remedy for weak vision, consists in immersion of the face, with the eyes open, in cold water, in

the morning. Some immerse the whole head. In chronic inflammation and weakness of the eyes, accompanied with sensation of heat and occasional itching alternating with pain, this modification of the cold bath is often serviceable.

Equally efficacious and less irritating, in some cases, would be the prolonged application over the forehead, temples, and the closed eyes, of compresses dipt in cold water, and renewed as soon as they became warm.

Chronic gout has been, in many instances, benefited; some allege that even the "chalk stone" deposits have been resolved by cold immersion. I shall soon advert to the warm and hot douche for similar purposes.

In the various manifestations of the strumous diathesis, scrofula, rickets, certain cutaneous diseases, &c., the cold bath has been a favourite remedy with the English physicians. Perhaps, I ought to say, that the cool bath as obtained by sea-bathing has been thus regarded. The subjects of these diseases, while they suffer from a defect of nutritive energy, are also affected with irritation and morbid excitement of the capillary and glandular tissue, manifesting itself in painful tumours and ulcerations. The mere debility is not, as so commonly taught, benefited by cold bathing; but the associated irritability and imperfect inflammation are by this remedy; and nutrition is, in part, in consequence of the removal of this morbid condition, now allowed to go on with more regularity and effect; and the individual is thus strengthened.

On this topic I shall have something more to say when the remedial value of sea-bathing comes before us.

The cold bath has been employed at different times, but scarcely ever with systematic regularity, in the treatment of *chronic cutaneous diseases*. Rayer, in the Preliminary Considerations to his great work,* properly remarks: "When we reflect that so many diseases of the skin are owing to the neglect of proper cleanliness, and that the greater number are accompanied with an increased heat of surface, or by morbid secretions, we cannot be surprised

* A Theoretical and Practical Treatise on the Diseases of the Skin. With Notes and Other Additions, by John Bell, M.D.

at the excellent effects obtained from the use of *simple baths*, whether as soothing inflammation actually occurring or preventing its return." This author afterwards speaks of the good effects of cold baths, and bathing in running streams in particular, in a great number of chronic inflammations, which, from their nature, their form, or their long continuance, had become fixed to particular parts. He thinks very highly of narcotic cold baths in the treatment of chronic and painful inflammations of the integuments.

Saunders* relates that it is a common practice for those who frequent Malvern and similar mineral springs for the cure of herpetic eruptions, or ulcerations of any kind, to wet their linen with the water, and dress with it in that state, without receiving any injury. This, be it remembered, was long before Priessnitz recommended water as a remedy, or modern hydropathy was dreamt of.

If the sympathies between the skin and several organs be readily manifested, and there is excitement of the cutaneous surface in a habit not broken down by age, excesses, or affected with fixed visceral disease, cold bathing may be advantageously combined with other remedial measures in cutaneous eruptions of a chronic character. More nicety of diagnosis is demanded in selecting the case, and the stage of the disease, in the very young and in the very aged subjects.

COLD DOUCHE OR SPOUT BATH.—Under this head I propose making some observations on the therapeutical value of cold water, topically applied, as a powerful means of sedation and tranquilizing the organism.

If we except what little we meet with in Celsus and Caelius Aurelianus, it would seem that the practice of local bathing, in the manner practised by the physicians of Italy, France, and Germany, was unknown to the Greeks, and even to the Romans. No Greek or Latin vocabulary expresses what is now properly understood by the term *douche* (*duccia*); nor is what is said of Hercules, or, according to Cocchi, of Silenus, represented under the jet of a fountain, sufficiently clear on this point. I think, however, that the advice of Celsus to any one labouring under headache, *per æstatem id bene largo canali quotidie debet*

* *Op. cit*

aliquandiu subjicere (lib. I. cap. IV.), contains an evident allusion to the douche.*

The douche, properly so called, consists in a jet of water which is directed from a cistern, destined for the purpose, by means of one or more tubes, over any required part of the body; and as this water may fall from a greater or less height, so may also the size of the column be increased and diminished at pleasure, by using tubes of various diameters, but so contrived as to be always kept full by the column of water in it.† A douche is vertical, oblique, or ascending. The oblique douche, or the one, the jet of which forms an acute angle with the ground, is, however, that most generally employed with cold water, and may be considered as the only one necessary for obtaining all the effects desired.

It is a common error, to attribute almost the whole efficacy of the douche to the shock alone, estimating as of little importance the degree of heat of which the water is the conductor; whereas temperature ought to be regarded as the principal agent in the wonderful effects produced by this remedy. It has frequently been Franceschi's lot to observe at the baths of Lucca, that not a few inveterate obstructions of the abdominal viscera, indolent ulcers, or those accompanied by necrosis, and other similar affections, after having resisted a protracted use of the douche below 100 degrees F. (30° R.), have been rapidly removed by a more elevated degree of heat, although the impetus of the water was the same in both cases.‡ It must then be conceded, that the efficacy of douches is, in a great degree, referable to the action of the caloric, rather than to the mechanical impression. We cannot, however, be insensible to the mechanical impulse communicated by the column of water striking on the part; and in this way exciting the

* The lines of Horace, in his epistle to Vala, when speaking of the baths at Baia, may be supposed, also, to refer to the douche:—

Qui caput et stomachum supponere fontibus audent
Chusinis, Gabiosque petunt, et frigida rura.

† Something similar to this is the *dry pumping* at Bath, in England.

‡ *Igèa Dei Bagni, &c.*, di Giacamo Franceschi Lucca, 1815.

skin, and causing, at any rate, a greater readiness to reaction.

The douche may be used so cold as to be near the point of congelation, when we want to procure a diminution of excessive excitement, as in *phrenitis*, *mania*, *otitis*, *ophthalmia*, and, finally, in all those cases where the head shows the predominance of that state, by which the whole system is affected. With this understanding, the saying of Celsus is very true, that nothing is of so much service to the head as cold water, *capiti nil æque prodest atque aqua frigida*. This assertion must, however, be received with some reservation. Little benefit can be expected from either immersing the head or receiving a douche on it, when the headache is caused by, or accompanies, dyspepsia. Where, on the other hand, much local determination, and arterial and even nervous excitement prevail, we may hope for great advantage from the remedy.

Dr. Southwood Smith, in his valuable work on fever, speaks in high terms of what he calls the *cold dash*, which is in fact a cold douche, as one of the best means of subduing violent pain of the head with determination of blood to this part, in fever. He directs the patient to be seated in a large tub; and a man standing on a table beside this vessel, at as great an elevation as his arm can reach, pours upon the naked head of the patient a steady but continued stream of cold water from a watering pot without the rose. The stream is made to fall as nearly as possible upon one and the same spot. At first the elevation must be slight, to prevent a too violent shock.

In the stupor from distilled liquors, opium, and other narcotics, or from sun-stroke, and also in epilepsy, a cold douche directed on the head and nucha is one of our best remedies. In poisoning from deleterious gases, also, it is an agent of great power,—resorted to when common affusion fails to rouse the patient. Quite recently, I have used it, in conjunction with frictions of ice on the head and nucha, in a apoplexy; and with manifest and speedy relief.

Insanity.—In the subacute and chronic diseases of the brain, constituting insanity, cold bathing in the form of douche or by sudden affusion, has been often employed—during the paroxysm. Floyer's case, in which a poor man was suddenly flooded with a cataract of water, is to the point.

Fontana relates two cases of melancholy with delirium cured by cold applications to the head, after all other remedies were found unavailing.

The subduing influence of the cold douche, directed on the head or along the spine of refractory convicts is familiar to the superintendents of some prisons.* It used, in olden times, to be one of the forms of torture.

The cold dash, administered by pouring water on the head of the patient from some height, has been used by Esquirol with entire success. The patient, a girl afflicted with mania, and of a nervous temperament, was placed, with a garment covering her, in a common washing-tub, and water was poured in small quantities on her head till it covered her body, and shivering ensued. On a second application of this method, which was for some time resisted, it was followed by deep sleep, accompanied by copious sweating, and when the patient awoke she was found to have recovered her senses. Dr. Prichard† adds to this statement the expression of his greater confidence in this remedy, derived from having witnessed its application by M. Foville, than from the ordinary methods of applying cold affusions.

Esquirol describes the different forms of douche used in France. At the Salpêtrière, the hospital and infirmary for insane females, of which he was so long the medical superintendent, the douches terminate in tubes of four, six, and twelve times in diameter, and the water falls from different heights. This liquid is generally of the same temperature as that of the atmosphere. The patient receives the douche seated in an arm-chair, or, better still, plunged into a bath of tepid or cold water.

"The douche," says Esquirol, "produces its effects,

* Mr. Frederick A. Packard, who, in addition to his official position of trust and usefulness in the American Sunday School Union, is also extensively known for his judicious zeal in all that relates to prison discipline, has described an apparatus by which this douching is practised at the Auburn Prison, in the State of New York. Mr P's "Memorandum of a late visit to the Auburn Penitentiary," dates September 24th, 1842. It was addressed to "the Philadelphia Society for the Alleviation of the Miseries of Public Prisons."

† A Treatise on Insanity.

both by the action of the cold, and the percussion. It exercises a sympathetic influence upon the region of the epigastrium. It causes cardialgia, and desires to vomit. After its action ceases, the patients are pale, and sometimes sallow. It acts also morally, as a means of repression; a douche often sufficing to calm a raging excitement, to break up dangerous resolutions, or force a patient to obedience. It is that class of the insane who are young, strong and active, who require the douche. They experience after having received it, a sensation of coolness about the head, which is very agreeable to them, and often very useful. It is especially proper in cases attended with cephalalgia. The douche ought to be employed with discretion, and never immediately after a repast. It is necessary to obviate constipation before employing it. Its employment ought to be continued but a few minutes at a time, and its administration never to be left to servants. They may abuse it, and we ought not to be ignorant that the douche is not exempt from grave accidents. Ice has been applied to the head. Its long-continued application calms the cephalalgia and fury which resists bloodletting, general baths, and the douche, especially at the commencement of mania; when there is redness and heat of face, threatening cerebral congestion.”*

Recently, the attention of the profession has been attracted to the subject of cold douching in insanity by the trials and statements of M. Brierre de Boismont. This gentleman, in a memoir read to the French Academy of Medicine, points out the mode and results of his treatment in seventy-two cases. It consisted in subjecting the insane to an immersion in a bath of 82° to 86° F. for several hours, and to douching or irrigation with cold water on the head,—at a height of about four or six feet.

The duration both of the baths and douching was from twelve to fifteen and eighteen hours. The douching may be suspended when the patient is tranquil. We do not learn how the patient procured sleep and gratified the natural wants during this prolonged bathing.

The duration of the treatment was from one to fifteen days; the medium number of baths for each patient six.

* Mental Maladies, &c. Translated by Dr. E. K. Hunt.

If eight or ten baths have been taken without benefiting the patient, their use should be suspended, at any rate for awhile.

Of all the varieties of insanity, those in which the cold douching has been most successful, are, first, acute mania, then simple acute delirium, delirium tremens, puerperal mania, and melancholy monomania with acute symptoms.

Chronic mania with restlessness was ameliorated but not cured.

Of the 72 cases treated by M. Briere de Boismont, 35 were of acute mania, of which 32 were cured; 11 of delirium tremens, all of which were cured; 10 of maniacal exaltation, of which 4 were cured. Ten cases of monomania also terminated favourably. The four cases of chronic periodical monomania were not benefited by the treatment.

Convulsions.—Seeing the dependence of violent convulsive movements of the muscular system on unduly excited brain and spinal marrow, we can have no hesitation in freely using the cold douche, in convulsions not arising from a visible or evident irritant, such as of the gums and worms in young children, punctured wounds, or spiculæ of bone and the like, in subjects of all ages. In these last cases, high excitement of the brain transmitted to the muscles is but sympathetic and in a manner temporary; and even though we should induce a powerful sedation of this organ, we but indispose it for the time being from receiving and transmitting with its customary promptitude the remoter irritation. We cannot destroy its character of a recipient of sensation and irritation, and it is purely in virtue of this office, and not owing to its own organic lesion, that it is unduly excited by injuries of other parts of the sensitive circumference. In these cases the warm bath, as already indicated, will be our best remedy.

When satisfied of the propriety of using the cold douche in convulsions, we should direct the column of water first on the occiput and nucha, and then down the course of the spine. In *erotomania* such a measure would be productive of very tranquilizing effects.

On occasions of great cerebral excitement and convulsive movements, with, at the same time, coldness of the skin, especially of that of the extremities, the patient

might be put in a warm bath while the cold douche is applied to the head. By this means the system is subjected to two forces, each acting beneficially on the parts to which it is applied: the warm bath on the cutaneous capillaries, filling them and proving revulsive; the cold douche on the vessels of the brain and head, generally diminishing the intensity of their action and causing a real sedation. This may be called part of the perturbing treatment, remedial in the particular exigency, but which if persisted in or attempted at other times would be injurious, as opposed to the sympathetic and harmonious action of the various parts of the animal economy with each other.

When we desire to make local applications of cold water, douching will be found an efficient means of carrying our plan into effect. If the skin of the part affected be painful to the touch, the douche ought not to come from any height. The general principles governing us in its use are the same as those which have been already mentioned as proper for the cold bath.

Of the large use made of the cold douche in hydropathy, the reader has been fully informed in a former chapter.

CHAPTER XXXIV.

SEA BATHING—ITS PECULIARITIES—TEMPERATURE OF SEA WATER NEAR THE SHORE—VARIES WITH THE SEASON, WEATHER, AND TIDES—SLOWER EVAPORATION FROM THE SKIN AFTER SEA BATHING—EXCITEMENT OF THE SKIN FROM SALINE DEPOSIT ON IT—SAME RULES FOR SEA AS FOR COLD BATHING—SEASON FOR BATHING—NUMBER OF BATHS—MANNER OF BATHING.

SEA BATHING is a remedy which may be traced to very remote antiquity. The Greeks had so general an esteem for it, that Aristophanes, in the comic scene of leading Plutus to the temple of Esculapius, to cure him of his blindness, has chosen sea bathing as the remedy. Accord-

ing to Suetonius, the water of the sea for the purposes of bathing was first introduced into Rome by Nero.

Peculiarities of Sea Bathing.—If we merely had regard to the temperature of sea water, we should consider immersion in it as simply cold bathing; but there are modifying circumstances connected with the act which demand special notice. Sea bathing is usually preceded by some exercise, a walk or a ride to the beach; it is accompanied by some muscular exertion—struggling against the waves, or, in the more robust, by attempts to swim: with others, again, the whole affair is attended by a dread of danger which powerfully affects the nervous system, and causes hurried breathing, palpitation, and increased rapidity of the circulation. The immersion also is in a dense fluid largely impregnated with salts, by which the skin is sensibly stimulated and even irritated. This surface is, besides, actively impressed by the movement of the waves impinging on it, and causing a kind of massage. Add to these, exposure, at one time to often a cool and keen wind from the sea, which on our coast must of course be easterly, and at another to the full blaze of a meridian sun, and we can readily conceive that sea bathing presents a more complex problem for solution than the mere use of a cold bath.

The temperature of the water of the sea at the coast varies, in the same season, with the tide, according as it is ebb or flow, and even then the thermometer and the feelings will be differently affected according to the hour of the day. During the two or three summer months in which invalids and others resort to the sea shore, the temperature of the water is within the limits of what some writers call cool; that is, between 70° and 80° of Fahrenheit, so as to feel actually warm to some of a sanguine temperament. The shock of immersion is not, of course, so great as in the cold bath, ranging from 40° to 60°, but it is still generally felt, and is followed by the other effects described in a preceding chapter. The difference is in degree, not in kind, and merely amounts to a greater ability of persons whose excitement is but moderate to tolerate the sedation of sea bathing, and to react after coming out of the water.*

* Observations made at Dieppe on the northern coast of

But there is another way, distinct from the effects of mere temperature, in which the skin is affected by bathing in salt water; and this would seem to depend on the slower evaporation of a saline than a simple aqueous fluid; and

France, by M. Gaudet,* for a period of ten years (1837 to 1847), lead to the inference that, compared with the extremes of atmospheric temperature, those of the water of the ocean are but slight. Thus, while the former bounded a range of 18 degrees, or from 50° to 68°, the latter limited this to 9 degrees, or from 59° to 68° F.

The progressive increase of temperature during the month of July never exceeded 2½° F. in any one day, and most generally was only from half to not quite one degree; while the oscillations of atmospheric temperature have been as great as 12° F. in a single day. The temperature of the sea water on the first of July, 1838, was 66° F., and on the thirtieth of the month 66° F. In the month of August the temperature does not undergo any increase, but maintains its maximum. There is a gradual diminution of temperature during the whole of the month of September, corresponding very closely in its rate with the augmentation in July.

The winds which most contributed to lower the temperature at Dieppe were the westerly and south-westerly accompanied with rain; and next to these the north-west and the west-north-west, blowing violently and bearing with them rain.

During the three summer months, the temperature of the sea, as it washes the beach at Dieppe, is 64° F., and that of the air for the same time 63°. The difference between the air and the water of the ocean consists, therefore, as already remarked, in the tenacity with which the latter retains its temperature from day to day, compared with the great fluctuations of the former, although for a given period the average temperature of each is nearly the same. During the four winter months (from December to March) the mean temperature was somewhat over 39° F.

On the coast of England the temperature of the sea, during the months of July and August, averages 63° F. Sometimes it is as high as 72° F. Buchan noticed, at Margate, that between high and low water, or full and ebb of the tide, there would be a difference of ten to twelve degrees of the thermometer, in favour of the first.

M. Le Cœur^b makes the mean temperature of the water of

* *Recherches sur l'Usage et les Effets Hygieniques et Therapeutiques des Bains de Mer.* 3me Edition.

^b *Des Bains de Mer. Guide Medicale et Hygienique du Baigneur.*

the deposit on the skin of saline particles, and consequently mild stimulation of this surface by these particles when subjected to the common friction of the apparel. That such deposit is really formed on the skin in consequence of bathing in the sea, one may easily satisfy himself by applying the tongue to any part of the surface, even after several days have elapsed from the last time of bathing.

This slower evaporation and the deposition of saline particles, after immersion of the body in sea water, will probably serve to explain the admitted fact, that persons, such as fishermen and sailors, whose occupations expose them to the various inclemencies of weather, are less liable to be injured by being soaked with salt water than with rain. Even people of more delicate habits observe that they are less susceptible to take cold after being wet with salt than with fresh water.

Dr. Currie carries too far his belief of the saline ingredients in sea water counteracting the agency of its diminished temperature, when he says: "Thus by the stimulating effects of sea salt on the vessels of the skin, the debilitating action of cold is prevented. Persons immersed in salt water preserve the lustre of the eye, and ruddiness

the ocean, at Caen, in Normandy, from the middle of June to the last of September, 69° F.

The time of the day when the temperature of water is the lowest was, according to the observations of M. Gaudet, in the morning, before eleven o'clock; and its maximum at noon and until five o'clock in the afternoon.

According to Vogel, as cited by M. Gaudet, the temperature of the sea at Doberan, during the bathing season, varies from 70° to 50° F., which would make an average of 60° F. Pfaff, at Kiel (in the Baltic Sea), found the mean temperature of the water in the last half of June, and in the months of July and August, to be a little rising 66° F.

A comparison of the water of the coast of the Mediterranean, and that of the Atlantic to the west of it, gives a difference of temperature to the extent of seven and a half degrees higher in the former than the latter. A bather at Trieste, in the summer of 1835, states that he found the sea water of the coast there to be as high as 86° F. On the southern coast of the United States the water of the Atlantic is doubtless of as elevated a temperature as this. I found that a thermometer immersed in the water of the ocean at Newport, Rhode Island, in the early part of the month of August to be 77° F., at 11 A. M.

of the cheek, longer than those in fresh water of the same temperature, and exhibit the vital reaction stronger when removed from it." This sentence is the more remarkable as containing, in the phrase "debilitating action of cold," an express contradiction of the opinion elsewhere insisted and enlarged on by the author in his *Observations, &c.*, that cold is a stimulant and tonic.

Same Rules for Sea as for Cold Bathing.—The principles which are to regulate the conduct of those who have recourse to sea bathing, either for the recovery of their health or for pleasure, are not materially different from those already inculcated, when I treated expressly of the cold bath. The chief exception is in those cases in which the skin itself is the seat of irritation and disease, and in which the stimulus of the saline particles deposited during the bath proves prejudicial. Perhaps also a greater latitude is allowed in the range of chronic maladies, when we have recourse to sea bathing, on account of the slower evaporation from the skin, and consequently less cold experienced by the bather; and also owing to the stimulation by the saline particles after the skin is dried, coinciding with and increasing the customary reaction after the sedation of cold. On this account very young children and aged persons bear sea better than common cold bathing. Still, however, much of what can be said respecting sea bathing is applicable to the employment of the cold bath, and the directions and hints for our guidance in the former case will serve for our government in the latter, unless the exceptions be expressly specified.

The *season* for sea bathing, along the coast of our middle states, cannot be said properly to begin before the middle of June, and is considered to terminate by the first week, or middle of September. Cold rains and easterly winds create a state and temperature of atmosphere which can be illy borne by the delicate and valetudinary: and such a state is apt to occur at any time before or after the above mentioned period. Indeed this class of persons are, at times, severely tried in the months of July and August, by easterly gales, which are peculiarly searching and distressing.

Still, in this region, and we may say the same of the middle States of the Union, the weather is often hot and sul-

try during the whole month of September, and even until October, and the refreshing and prophylactic effects of sea bathing might very well be procured during all this time.

Even when the weather becomes cool and the temperature of the water of the ocean is undoubtedly lower than during the summer, it is a matter of experience and observation that some persons prefer the autumnal season for their bathing. They allege that the shock is greater and the reaction correspondingly prompt and more decided. Hence, we may infer that the more robust and sanguine, and they whose ailments are associated with, if not kept up by considerable excitement of the general system, or even of a particular organ, may find their advantage in autumnal bathing. Were this latter more the practice, not to say the fashion, among us as it is in England and to a limited extent in France, the full hygienic as well as the therapeutical effects of sea bathing might be participated in by a much larger number of persons.

Fashion and custom do not allow persons to spend more than even a small part of the already too short season at the sea shore. By the time one set of visitors have accustomed themselves to the inconveniences of confined lodgings and crowded tables, and have learned to divide their time with the least discomfort to themselves, and have begun to ascertain the salutary effects of sea bathing, they think it necessary, forsooth, to move off, to be followed by another set, like wave succeeding wave in the ocean before them.

All this is adverse to the intention with which so many leave home; and hence we need not wonder that they return disappointed and little benefited, either as regards a recovery of their health and strength, or of their spirits. Time is not allowed, during such a short stay, for breaking up the habits of indolence, enervation, and the cares of business, and for substituting in their place those of healthful recreation, by regular exercise and looking abroad on external nature for materials of amusing thought and reflection.

At the French watering places, a season of sea bathing consists of from twenty to twenty-five baths; or of from twenty-five to thirty, when it is allowable sometimes to take two on the same day. This supposes a stay of twenty-five days to three weeks at the place. On the

coast of Germany, the variable nature of the weather prevents regular daily bathing ; and hence the season requires a residence of six weeks at the shore. A double season at the French watering places, supposing an interval of a few days between the two parts or seasons, will include forty to fifty baths.

For weaker subjects, such as delicate children and girls not yet nubile, a season of fifteen or twenty baths will suffice. Scrofulous subjects, again, often do not exhibit the good effects of sea bathing until after the first season ; and they, of all invalids, take the greatest number of baths.

After a time, the toleration of sea bathing by subjects of a feeble frame, or of studious and sedentary habits, who have bathed for awhile, if not for a season, is exhausted. The symptoms indicating this, and of course a cessation of the practice, are headache, or hemicrania, irritability of disposition, a feeling of general fatigue with disinclination to muscular exercise, the countenance sad and care-worn, eyes injected, nausea, sometimes vomiting, and, in fine, a kind of sea-sickness.

Some persons bear two baths daily. These are scrofulous children, strongly constituted females, who are exempt from utero-vaginal irritation, certain paraplegics, and even vigorous subjects who are sufferers from nervous pains of a rheumatic character, when they evidently require a decided sedation.

In order to render the double bathing safe and serviceable, the two baths ought to be separated by as long a period as possible ; as the effects of the first bath are often felt or observed several hours afterwards, if the second is taken prematurely there will be a *crossing* of effects which may be productive of harm. Moreover, the twice daily baths ought not to be taken every day. They should alternate with the single ones. They ought not to be begun until the single baths have been previously taken for a certain period. A neglect of this rule has not unfrequently been productive of mischief. Double bathing is injurious to the sanguine hypochondriac, to those who cough, to the chlorotic, to young persons who have just reached puberty, and who have been subject from early life to sore throat and ear-ache. Nor in any case is it advisable for two baths to be taken daily, in the latter

part of the season. This prohibition is on account of the more lively impression produced by the cold or of the greater force of the waves at this time.

Sea bathing will be suspended for awhile, varying from one to eight days, whenever it produces, or there occurs any notable derangement of function, including sometimes, those of the brain, manifested by great excitability and even irascibility, particularly in children. They who are much harassed by a cough, or who are subject to sore throat, showing itself in inflammation of the palate and uvula had better abstain from the bath. Certain physiological effects of the bath, such as hyperemia of the skin, so great as to prevent sleep, and physiological changes in the system, as for example, the coming on of the menses, will be causes for suspending the bath. Great and sudden changes of weather, as from warm to cold and wet, or cold with a strong wind will prevent bathing.

Sea, like cold bathing, may be divided into general and topical: in the former, the whole body is immersed, or exposed to a shower or affusion of water; in the second, it is applied to a particular spot or part. My remarks will be, first, on general sea bathing, and these will be made under the several heads of *manner, time, and physiological, hygienic, and therapeutical effects.*

Manner of Bathing.—As regards the facilities and aids for bathing along our sea coast, little can be said in their praise. We have borrowed none of the plans for bathing by the aid of piers or jetties, or of machines, which, either floating or allowing of limited movement on the beach, are so common along the English coast. The objections made to the use of the latter with us, on account of the rapid rise of the tide and violent surf, do not certainly apply to all our watering places; and even where these difficulties are present, a moderate share of ingenuity would suffice to obviate them, and add greatly to the comfort of those who resort to the sea shore for bathing. In the case of females and children, the bustle and alarm of open bathing on the shore, little moderated by the officious interference of some rough Meg Merriless or Long Tom of a guide employed for the occasion, must appear in strong contrast with the quietness, privacy, and sense of security enjoyed in a machine consisting of a dressing room above

and a bath below, to which latter one descends by steps in the direction of the sea. Here, properly sheltered, the bather, without fear or undue haste, can enjoy immersion, and even exercise the limbs with some freedom. If a man, he has it in his power to pass at once into the open sea, and desport himself with swimming, as the side of the bathing shed in that direction does not come down quite to the surface of the water. The machine is let down along an inclined plane, or kind of rail-road, sufficiently far into the sea to allow the water to be of a suitable depth in the bath ; and at a given signal it is drawn up again on the beach : or it may rest on wheels, so as to admit of its being readily propelled into the water, and when required drawn out. In place of the wooden shed, adjoining the dressing room, a simple awning of canvass might be substituted, which while it protected the bather from the sun and rain, and insured the requisite privacy, would allow of more light, and give the bath a more cheerful appearance.

But for fear the reader should suppose that there is no pleasure in the present method of bathing at our watering places, I must add, on the testimony of ladies themselves, to whom, in general, the arrangements which I have criticised would seem to be most objectionable, that they would not exchange the dashing of the breakers and the pleasing fear, which these bursting over their heads occasions for all the quiet and security of a calm sea and smooth beach, even with the additional comforts of machines. They describe the scene to be quite exhilarating, as they enter the water, in a line, hand in hand, and breast the advancing wave—while giving and receiving assistance, and responding to each other's exclamations and burst of laughter, at the ducking of those over whom the surf shall take a more especial fancy to break. Doubtless there is only wanting the pencil of an Albano to make us duly sensible of the picturesque appearance of groups like these, assured as we are of the individual loveliness often met with among them. The sameness of costume might be compensated for by the variety of attitudes into which it is presumed the fair bathers would be involuntarily thrown.

After alluding to the expressions of repugnance and horror from the fair sex, at the idea of being dragged head

foremost into the water by the guides at the English watering places, Dr. Buchan adds, that the proper office and duty of a guide is surely very obvious, and consists solely in taking care that no accident befalls the timorous or the imprudent, while descending from, or returning into the machine, or during the time they remain in the water.

We can account, however, for this conduct of the guides, from the practice of plunging head foremost into the water, where circumstances permit, being generally advised: but on what principle we cannot so well discover. It is not improbable, that some of the kinds of headache attributed to bathing in reality originate from this precipitate plan of immersion. The occurrence of the pain may be explained by the mechanical violence with which the head strikes the water; by the unnatural attitude in which the body is thrown, the heels being upward and figuring away in the air like the dancers at Communipaw; and, finally, by the holding of the breath at the time, and the consequently suspended return of blood from the head.

It may happen, however, that individuals, in whom there is habitual determination to the head, with a sensation of fulness and throbbing temples, and who, at the same time, suffer from cold feet, require a more decided abatement of vascular action of the head than would ensue on simple immersion of the lower part of the body. Hence we can conceive how the wearing of a covering on the head, while a person is in the water, might prove on occasions prejudicial. Buchan relates cases of headache, drowsiness, and other unpleasant feelings which had been felt by persons who wore a cap during the time of their bathing, but who were soon relieved of all such after they discontinued the use of this covering. "In one gentleman, the intimate connection between this complaint and the exposure of the external surface of the head to the influence of the water was exemplified in a singular manner. If he enclosed his ears within the cap he was generally affected with the headache, which he never experienced when he took the precaution to leave these parts uncovered." There is another kind of headache to which the delicate and infirm are subject from the coldness of the water, or remaining too long in it, to which I shall advert again.

CHAPTER XXXV.

SEA BATHING (*continued*)—HOURS OF BATHING, BEFORE BREAKFAST OR BEFORE DINNER—SOMETIMES IN THE EVENING—DURATION OF A SEA BATH—PHYSIOLOGICAL EFFECTS OF SEA BATHING—HYGIENE OF SEA BATHING—GOOD EFFECTS OF SEA AIR—CAUTIONS AGAINST CHANGES OF TEMPERATURE—REGULARITY OF HOURS AND MEALS—EXERCISE.

Hour of Bathing.—A rule of the most general, if not universal application, in regard to the hour for bathing, whether in common or sea water, warm or cold, is, that it should be before a meal, and never on a full stomach, or during the first stage of digestion. By general consent, the morning is preferred for sea bathing, and rightly enough; but it would be erroneous to suppose, as some do, that it is impossible to bathe too early, or that no other time of the day will answer for the purpose. This point cannot be properly examined and understood unless we carry with us a just appreciation of the primary operation of sea bathing, and of the constitution and temporary state of body in which it is usually resorted to with advantage. Sea as a variety of cold bathing is directly sedative; of course, it is best tolerated by the sanguine, the vigorous, and the robust among the healthy, and by those labouring under febrile excitement among the invalids.

With this understanding of the case, we are safe in directing invalids or valetudinarians to bathe before breakfast, if they rise with a warm, and even hot skin, and reach the water before they can be said to have lost the warmth of their bed, or after they have been put into a glow by exercise. This advice must not be understood to apply to those who awake in a perspiration, or whose skin at the time is moist with sweat. Bathing under such circumstances would be injurious. In a few words, the rule is, to bathe when the skin is warm, or hot, and dry, and not when it is cooled, chilled, or perspiring.

In laying down the rule, therefore, that cold and sea,

like all other kinds of bathing, are best practised on an empty stomach, it by no means follows that we are of necessity tied down to an early morning or noon hour, without regard to the hour of repast, or our sensations at the time, or the correspondence between this hour and a state of bodily excitement, or the reverse. A person who takes a light breakfast may bathe three hours afterwards, without prejudice, as far as regards having taken a meal. Or he may, if feeble and languid during the day, with a cool skin and slow circulation, defer the operation, until late in the afternoon or evening; provided, always, that he has eaten a light and small early dinner. With due attention to this last condition, we would not err in preferring the evening to the morning for bathing, on account of the greater probability of the system being in a state of some febrile excitement during the former than the latter period. It sometimes happens that a person who suffers all day from languor, headache, and vague pains in the limbs, after bathing in the morning, will, if he have recourse to the practice in the evening instead, spend a tranquil night, sleep soundly, and awake in the morning with additional alacrity and strength, prepared to move about and take free exercise during the remainder of the day.

For the most part, the bathing at the watering places in the United States is begun too soon after breakfast,—certainly before the digestion of that meal is half completed. Thus, for instance, they who breakfast at eight will be found, many of them, going to the beach at ten o'clock.

Considering the great diversity of constitutions and ailments of those who resort to the sea shore for health, and the different hours at which the febrile excitement comes on, we cannot but be struck at the absurdity of all of them going to the beach to bathe at the same hour—marching at a given signal, like so many recruits in the hands of a drill serjeant.

Another consideration here presents itself. If machines are not used, the time of bathing must be in a measure regulated by the state of the tide—and according as this varies the temperature of the sea will undergo changes: It has been observed that when high water occurs about two or three o'clock in the afternoon, the temperature of the sea is from ten to twelve degrees above what it was at

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low water, at eight o'clock in the morning of the same day.

Persons in full health, who resort to the shore for variety and pleasure, need not be very particular as to the hour when they bathe, or the period, as regards a few minutes more or less, during which they remain in the water—provided that they do not enter it immediately after a meal, nor during the state of lassitude produced by excessive bodily exertion, or by undue indulgence in much eating, and drinking strong liquors. In fine, the precautions laid down for the government of those who desire to use the cold bath are applicable in the present case.

Duration of a Sea Bath.—To determine how long it is proper to continue in the water requires that we should take into consideration the habits of the invalid, his disease, and the rise or decrease of the febrile or morbid irritation under which he may labour. When there are doubts about reaction, or the excitement of the system is little, if any, above the natural standard, he must be satisfied with a single immersion or plunge, and then to leave the water, and after well drying and rubbing the skin to resume the usual habiliments. Buchan says, that he has had repeatedly occasion to remark, that the same person by returning into the water several times has at length become so enfeebled, as with difficulty to be able to regain the machine; and has continued to be affected with headache, chilliness, and general lassitude during the remainder of the day.

Dr. Currie has ascertained by direct experiments, that the pulse and animal heat, lessened in a cold salt water bath, were still farther depressed after the person had come out of the water and remained for a few minutes exposed to the air. Similar effects have been already pointed out as occurring after immersion in the common cold bath. But a circumstance also worthy of being mentioned is, that the greatest loss of animal heat, during the stay in the bath, was experienced about two minutes after immersion. The thermometer in the mouth continued to rise from this time until the expiration of ten to twelve and sixteen minutes, though it was still lower than before immersion.

In confirmation of the greater advantages to be derived from remaining in the water for a limited period than from

repeated immersions, we are told of the guides at bathing places, who continue often for hours together in the water, without sustaining any material injury. Habit must come in for a large share of this toleration. Buchan says that he has frequently remarked the reaction to be more powerful, and the glow on the surface of the body more vivid after remaining under water for about a minute than when the immersion was only instantaneous. The rule ought to be, to leave the water before the temporary reaction is over and the second chill is felt.

M. Gaudet, who for a period of eleven years, as medical inspector of the baths at Dieppe, has carefully watched the effects of sea bathing in those who resorted to that place, is very particular in restricting the period of the duration of the bath.

He would not allow even those bathers who were under the most favourable conditions, to prolong the period of immersion beyond twelve to fifteen minutes: and even this limit was only reached after graduated trials and ascertaining the amount of vital energy in each individual.

As to the cases of very rare occurrence, in which the duration of the bath was prolonged to twenty or thirty minutes, they were of young persons of a fleshy habit, inclining towards lymphatic obesity, and distinguished by great obtuseness of sensibility. Some subjects of this physiological constitution, who had suffered from an old sprain, or scrofula, or even relaxation of the uterus, were benefited by this protracted stay in the water.

These precautions, the result of long and careful observations, although in harmony with the experience of English physicians, would seem harshly if not cruelly restrictive on many young persons of both sexes, who resort to the sea shore in the United States, and who think themselves quite prudent if they leave the water after having spent half an hour in it.

Not with a view to alarm the rash but to instruct the prudently-disposed, it may be well for me to repeat, after M. Gaudet, some of the evils which he has observed to ensue from protracting unduly the period of bathing at the sea shore. These are, inadequate reaction and prolonged coldness and lassitude, manifested by paleness of the skin, blueness of the lips, &c.; sleeplessness and loss of appetite

in bilious habits; diarrhœa in young subjects; bronchitis in those with a delicate chest; earache in young lymphatic persons; cephalic congestions, bleeding at the nose, and rheumatic pains in adults; headache with great throbbing of the vessels, giddiness and other cerebral disturbances, in individuals subject to "a rush of blood" to the head, and those who have suffered antecedently from nervous pains and other symptoms, in consequence of wounds of the head; pains in the loins in those who labour under fluor albus; various spasmodic disorders, sense of choking and suffocation in the chlorotic, or those who are affected with "green sickness."

From the same cause—imprudent delay in the water while bathing—arise disturbances of the digestive system, such as gastric irritation, indigestion, colic with nausea and diarrhœa, gastralgia, and hepatic pains.

M. Gaudet gives a scale by which he graduates the duration of the bath according to the sex, age, constitution, idiosyncrasies, and actual infirmities of those resorting to the sea shore.

1. Nervous women long affected with disease, and depressed by moral causes, ought not to take more than one to two, or, at most, three immersions or dips.

2. Children of a tender age, and of a lymphatic constitution, and who are subject to inflammation of the throat, or who have a cough at the time; they, also, who are liable to spasmodic affections, or predisposed to diseases of the brain, ought not to remain in the water longer than from one to three minutes. Equally restricted, in this respect, should be young girls under puberty, and young females subject to cough, and pains shooting through the breast and shoulders, or who have heretofore suffered from symptoms of chest affection of a serous nature; persons of any age or of either sex born of phthisical parents, and who are themselves liable to shortness of breath and pains of the chest, but who are still in average health. In this classification will come, likewise, those troubled with fluor albus, the neuralgic of both sexes; the chlorotic; adults enfeebled by prolonged dyspepsia, and the aged paralytic.

3. From two to five minutes is the allotted period for persons subject to rheumatic and gouty pains, for women

of a thin habit of body and a nervous temperament, who are subject to uterine hemorrhage and leucorrhœa, for young persons who have not yet attained their growth, rickety children, they who have suffered from gastro-intestinal irritation, or from a late sickness, or periodical fever.

4. Young persons and scrofulous subjects who are tolerably strong, and not excitable, may prolong the bath to five or ten minutes.

5. Robust adults of a sanguine or lymphatic temperament who are of a full frame, and in whom nutrition is active, bear sea bathing very well for a period of from ten to twenty minutes.

6. Young people and lymphatic females with little susceptibility, scrofulous adolescents, take with advantage a bath of from twenty to thirty minutes. Paraplegics, who are not debilitated, bear twenty minutes' immersion with impunity; and for subjects with chronic sprains, M. Gaudet has directed a bath of half an hour's duration.

Physiological Effects of Sea Bathing.—These are primary or immediate, and secondary or mediate. Sometimes they consist in a merely increased activity of a function or of functions; sometimes they amount to such a degree of excitement and exaggeration as to border on the pathological.

I. The intensity of the first impression, the shock, is momentary; the coming on of the second varies in time according to the person. The difference in the degree of resistance to the secondary impression of sea bathing by immersion constitutes a standard by which to measure, in advance, the duration of the bath, and the degree of efficacy to be expected from it.

Some hardly feel any impression on entering the water: the colour of their complexion is not altered, and their features are calm. They may remain in the water half an hour, an hour even, especially if they exercise themselves in swimming, without any secondary chill. This class consists of young persons or of adults who are healthy and vigorous, and manifest embonpoint, with a marked activity of the vascular system of the skin; and of individuals who have been accustomed to cold baths at home or to river bathing.

II. Those of another class, on the contrary, of which the

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greater number of bathers is made up, feel a lively sensation of cold, accompanied with a general shiver and a feeling of suffocation, and constriction of the chest and epigastrium,—a shock, in fact. I need not detail all the phenomena accompanying or immediately succeeding this state. They are the same as those already described to result from the cold bath. These soon yield, however, to a feeling of comfort bordering on pleasure, which lasts from five to ten minutes, and even a quarter of an hour, until the second chill supervenes. The weak, and they who lead a sedentary life, feel the secondary chill the soonest: they who are in full health or in the vigour of life are slow to experience it.

Sometimes, but they are exceptional cases, we meet with persons who have been exhausted the evening before by prolonged exercise, or by dancing and other dissipation, and who awoke with headache, derive immediately restorative effects from the cold bath: they have a better appetite, and increased muscular strength which lasts nearly through the day.

They whose circulation is habitually active sometimes have headache, vertigo, and ringing in the ears; while nervous persons on coming out of the water lose their headache.

Children who have been debilitated by recent disease, and whose circulation is very rapid, have their pulse retarded by the bath. In a child of nine years' old, the number of its pulsations was diminished from 140° to 100° in a minute, by the first immersion; on the fifth they were reduced to 88, at which rate they remained.

The reaction or glow after the bath varies both in its promptness and extent, as we found to be the case with the ordinary cold bath.

Children are at first very averse to sea bathing, but they soon become reconciled to and even take pleasure in it.

Secondary Physiological Effects of Sea Bathing — These are partly hygienic, and in part are merged into the therapeutical.

The greater number of bathers experience, after the first immersions, a certain degree of general lassitude, oppression of body and mind, disinclination to walk, or a feeling of numbness and sleepiness in the course of the

day, especially after a meal. Their sleep at night is deeper and heavier than common. Notwithstanding this kind of fatigue, after a few days their skin becomes clearer, and the phenomena indicating a nervous collapse yield to those of expansion.

Sometimes the unpleasant feelings just enumerated are of still greater intensity : the head is full, the eyes somewhat injected, and sparks of light flash before them when reading or writing is attempted. Toothache and earache are often induced or aggravated. The sensibility of the uterus and mammæ are greatly increased. The appetite is, notwithstanding, increased, and constipation takes the place of previous regularity of bowels or of diarrhœa. The sleep is disturbed by dreams, starts, cramps, and irritation of the bladder almost amounting to dysury. Finally, there supervenes on the surface of the body itching, heat of different parts, and partial or general sweats.

These physiological phenomena gradually disappear in most bathers. They may occur to those who are the most prudent ; but are still more likely to appear in those who bathe when the sea is stormy, and especially if the immersion be too prolonged.

Some young but feeble persons, on coming out of the water after too long a bath, are seized with vomiting and pain of the epigastrium, or with fever.

There are other effects of sea bathing not readily explicable—viz., dryness and crispness of the hair, and a certain degree of unctuous feeling of the skin.

Children, and especially nervous ones, are liable, after sea bathing, to great moral excitement, manifesting itself in irritability of disposition, pettishness, turbulence, and fickleness—all child-like manifestations by the way, even at a distance from the shore.

The irritation of the skin, already adverted to, amounts often to eruptions, which usually appear after every bath, and disappear in the course of the day. Sometimes the irritation centres on one spot, and the eruption assumes a character different from the first. Sometimes it is accompanied by chill, headache, sleeplessness, itching, pricking, febrile heat, and vomiting. Commonly it lasts for a period of the first four or five days of bathing ; it affects, in preference, children of a lymphatic temperament, young per-

sons, robust adults, and, in general, all those who have the superficial veins dilated; but not so frequently females. It appears most about the neck, the upper limbs, on the trunk, and especially in one of the hypochondria: but not so often in the abdomen as in the chest.

The eruption consists sometimes of red and measles-like patches, interspersed with vesicular elevations or simple maculæ like flea-bites; sometimes an uniform scarlet rash, which disappears under the pressure of the finger.

Sometimes this eruption simulates prurigo. There is a kind of eruption of papulo-vesicles, similar to those caused by a pitch plaster, especially noticed at the German watering places, and called "bath-miliaria."

Urticaria, or nettle-rash, is quite common after sea bathing—quick to come and quick to disappear. True furuncles have been seen on the great labiæ of women; and *favus* in scrofulous children. Adults with ephelides on their face, have these in general aggravated by sea bathing. At times, two different eruptions are associated together at the same time; as, for instance, pseudo-scarlatina and eczema.

The mediate physiological operation of a sea bath is sometimes limited to an ephemeral fever, particularly in young children, girls who have recently reached puberty or who are near it, and females whose cutaneous system is active.*

Hygiene of Sea bathing.—M. Gaudet, from whose work I have borrowed freely, in describing the physiological effects of sea bathing, enters minutely into a consideration of the hygienic and therapeutical effects of the remedy. He describes the effects of residence at the sea shore on persons in the different periods of their life. The vivifying influence of maritime air on young scrofulous subjects is pointed out. Russell's practice of cutting short the hair of all scrofulous children, subjecting them to both the external and internal use of sea water, is repeated.

A share, and that no inconsiderable one, of the benefits which are derived from a visit to the sea shore, or any watering place, and which are often attributed to sea bathing, ought to be referred to change of scene and occupation, by

* Gaudet, *op. cit.*

which the mind is agreeably occupied, and the nervous system no longer harassed by cares and excitements, which deteriorate the important functions of digestion, respiration, circulation, and secretion. This position admitted, and few will dispute it, since every individual has more or less personal experience of its correctness, it follows necessarily, that to obtain or rather not to neutralize all the good effects from the change, the plain precepts of hygiene, which inculcate regular meals and sleep, and avoidance of all undue excitement, whether from the bottle, the gaming table, or the ball room, or from heedless indulgence in ill nature, peevishness, or anger, must be adhered to. Society is not to be shunned by the invalid, but he or she, as the case may be, ought to shun that kind of company or assemblage in which uncomfortable exertions by minute attention to the toilette, and the frivolities of fashion are required, or in which innumerable little incidents are occurring, calculated to excite or depress that ever active principle of our nature, vanity. It is not in our power always to enjoy the pleasures of friendship, or of social intercourse sustained by community of tastes and feelings; but if deprived of positive pleasures, we need not invite on ourselves positive annoyances, by encouraging the intrusions of those from whom we derive no instruction, nor any useful or ennobling example. Still less ought we to display the weakness of seeking the society of such people; and thus subjecting ourselves to a kind of slavery as annoying to the mind as injurious to health. If free agency be at any time desirable, it is especially so for an invalid abroad, who ought to keep himself clear of all the chains of bad habits, and the entanglements of idle, frivolous, or dissolute company. At home, in the bosom of his family, or surrounded by affectionate friends, he is less exposed to danger from these causes.

The breathing of a purer air than customary, additional exercise, and pleasurable mental excitement, must come in for a large share of the cures attributed to sea bathing. But, if ladies fair, of whatever age or degree, wish to obtain relief from their maladies, call them what we may—nervousness or weakness, or hysteria, or direct obstruction of a function, the regularity of which is so necessary for their health; and if they pant for a return of good looks

and good spirits, they must shun the crowded evening assembly, or the mazes of the tempting dance, or the indulgence of an occasionally wayward appetite, in just tasting this fricandeau, or that paté, or drinking strong coffee or tea. As to cordials, whether we call them liqueurs, or porter or wine—they are happily becoming such unfashionable beverages that it is less necessary than heretofore to caution against their use. Medical theory and experience, sound sense, and popular observation, are, at last, in this respect, coincident with and supporters of feminine delicacy.

Aware of the sudden vicissitudes of temperature in our climate, even in the midst of summer, and of the peculiar force with which they are felt on the sea shore, persons visiting it ought always to provide themselves with thick cotton and woollen garments, to be put on when there is a sudden fall of the thermometer, and change of wind from a westerly to an easterly direction. Days will occur even in July and August, at the sea shore, which are as cold and inclement, and require the body to be as much protected, as in the last of October or the beginning of March. Precautions of this nature are more particularly necessary to those persons who are subject to catarrhs, rheumatism, or bowel complaints.

Exercises of various kinds ought to be had recourse to by the invalid, according to his strength, and the facility of indulging in them. Walking and riding, and boat sailing, are among the chief of these. The view of the sea, and, still more, committing ourselves to its bosom in a boat, are well calculated to impress the mind with blended feelings of admiration and awe, and to give it an expansion well adapted to destroy the little petty feelings of vexatious hypochondriacism and nervousness.

The arguments used to prove the impropriety of cold bathing when the body is in a state of exhaustion apply to the rushing into the sea immediately after a long and perhaps a fatiguing journey. The following incident will serve as a salutary caution on this head. It is of the same nature as that related by Currie and repeated in the present volume (Chapter XIV). A gentleman, being engaged on a shooting party, had prolonged his amusement to a late hour in the evening without taking any refreshment. Exhausted

with hunger and fatigue he made a hearty supper, and without much exceeding his usual quantity of wine, a degree of intoxication, owing in a great measure to the previous abstinence, rapidly took place. Next morning, with a view to remove the languor which is the consequence of such excesses, he determined to bathe. The moment he emerged from the water, it seemed, to use his own expression, as if his head were about to explode. With considerable difficulty he regained the bathing machine. An intense headache, accompanied with a painful and torpid state of the limbs with total aversion to food, continued during the whole of the day; and several weeks elapsed before he became perfectly free from a kind of stupor, and recovered his usual state of health.*

Bearing on this point are the following judicious remarks of Buchan, unfortunately too applicable to the frequenters of the sea shore in the United States. There is no small danger in the more delicate of either sex, especially of females, encountering the cold and bleak midnight blasts from the sea, in that exhausted state which must be the consequence of long-continued exertion in rooms where the air is heated, contaminated, and exhausted by the aggregated number of people, and of lights. It is impossible that the energies of life can be sufficiently recruited by a short and probably perturbed sleep, to render the use of the cold bath, on the succeeding morning, salutary, or even safe. They, who choose to indulge in the evening bath, ought to abstain from the morning bath.

Knowing the refrigerating effects of exposure of the naked body to the air, after coming out of the bath, we cannot be too solicitous in recommending a speedy resumption of the customary clothing. A great part of the unpleasant sensations experienced by bathers, during their dressing, may be obviated by the easy expedient of enfolding the whole body, immediately on emerging from the water, in a dry and ample flannel wrapper. The flannel readily absorbs whatever superfluous moisture may remain adhering to the surface, and thus supersedes the tedious process of wiping the skin; while, at the same time, it completely prevents all loss of heat by evaporation, or by the successive contact of fresh portions of cold air.

* Buchan, *op. cit.*

CHAPTER XXXVI.

SEA BATHING (*continued*)—PRECAUTIONS AFTER THE BATH—SEA AIR—HYGIENICAL AND THERAPEUTICAL EFFECTS OF SEA BATHING—ORDER IN WHICH THESE ARE MANIFESTED—SECONDARY EFFECTS—SEA BATHING IN INFANTILE DISEASES—CAUTION AGAINST EXPOSURE TO THE COOL AIR OF MORNINGS AND EVENINGS—SEA BATHING IN DISEASES OF FEMALES—RETARDED MENSTRUATION—MENORRHAGIA—DYSMENORRHŒA—AMENORRHŒA—CHLOROSIS—DISPLACEMENTS OF THE UTERUS—NEURALGIA.

Precautions after the Bath.—A few words will be in place here, respecting the practices advisable after bathing. A moderate walk or ride serves to promote reaction after coming out of the bath, and to equalize the circulation; but the exercise should not, in either case, be prolonged so as to induce any degree of sensible perspiration, still less of lassitude. An objection is sometimes made to watering places on account of the distance from the lodging-houses to the beach. This is in fact a recommendation,—since the bather by a moderate ride or walk to the beach is placed in a favourable state for encountering the chill or shock of immersion, without his suffering undue sedation; and by the like exercise on his return, a salutary reaction will be more likely obtained.

If a person has used the bath at an improper time, or in too feeble a state of body to experience any reaction after coming out, but, on the contrary, he remains for some time cold and shivering, we ought immediately to direct removal to a warm bed—frictions over the skin generally, and especially the chest and extremities; and, what is the most efficacious remedy of all, a bladder or bottle filled with hot water and applied to the pit of the stomach. Unless under the circumstances just indicated, the practice of going to bed after bathing is not to be recommended.

With many persons who have bathed, it is a necessary condition for the recovery of their natural temperature and

frequency of pulse, after morning bathing, that they should take breakfast. Should they who bathe towards noon feel chilly afterwards, they will experience a similar benefit from taking a basin of soup, or a warm infusion of lemon peel, ginger, or mace, or even of an aromatic herb; any of which will be found, at least, equally efficacious as a spirituous cordial disguised in the form of a drug. By similar means we may remove the headache experienced, after bathing, by delicate persons, especially females. The pain is generally seated in the external, or the back part of the head, which feels cold. This complaint has been compared to the headache in hysteria, or which accompanies the cold fit of an ague, as well as that which occurs the day after inebriation, and appears to be the result of a general torpor of the system, produced by the coldness of the bath. In general it may, we are told, be obviated by covering the head with a warm woollen cap immediately after bathing.

It has been recommended, also, to wash the hair, after each sea bath, with fresh water, with a view of preventing rheumatic headache, *tic douloureux*, coryza, &c., in those predisposed to such disorders.

Sea Air.—The first exciting effects of marine air on children, and the same may be said of adults, ought to be mitigated by a less substantial food than common, by moderate exercise, and cold or cool baths of common water.

Chronic bronchitis with copious secretion, and accompanied by much debility and dyspepsia, is greatly benefited by sea air—provided there be no tubercles present. Cough, on the other hand, associated with hemoptysis, is aggravated by a maritime residence.

Chlorotic females are peculiarly susceptible to the keen and often raw air of the coast, and often suffer in consequence from colic and diarrhœa. Neuralgic pains are of frequent occurrence from a similar cause.

On the other hand, the invigorating influence of sea air is speedily manifested in those who have led a sedentary life and been deeply absorbed in study or the cares of business.

Hygienic and Therapeutic Effects of Sea Bathing.—Readers may be somewhat curious to learn the order in which sea bathing displays its hygienic and therapeutical effects. These are manifested, first on the skin, then on

digestion, the functions of the nervous system, and on nutrition—and the most early on young and especially infantile subjects.

I. Individuals whose skin is thin and white, show increased vascularity of this tissue as early as the third day of sea bathing. This action is more particularly evident in the capillaries of the face. In those who have naturally a red colour of the cheeks, the tint is deeper and more evenly diffused. Its excess in those whose colour is too great, and especially in children, is corrected by the same means. They, again, whose complexion is pale, either naturally or by disease, acquire greater activity of the capillary vessels,—the features become fuller, almost to the extent of simulating increase of flesh. After three, four, five, or six baths, lymphatic, scrofulous, or otherwise feeble children, evince these effects in a marked manner.

The slowest to obtain these facial colorations are the chlorotic, the anemic, and those emaciated with scrofula.

II. After the changes in the skin, those in the digestive apparatus manifest themselves the most readily. The appetite is improved by the time the third bath is taken, in certain cases of scrofula accompanied with entire inappetency.

The bowels, in some cases, become more constipated in those already disposed to this state; while in others they are more free, and the stools are improved in appearance, by sea bathing,—without our being able to explain the cause of these different appearances.

III. Improvement in muscular strength follows very soon that of the digestion. This effect is seen in persons of all ages; but more especially in children

IV. The first evident modification which the nervous system undergoes by sea bathing is a prolonged and sounder sleep. Sometimes, for the first few days, there is an increase of nervous mobility, especially in children, which is adverse to sound sleep; but after six or eight baths this state soon yields to the one first described.

In adults there are more frequent irregularities in this respect. As a general rule the amount of sleep in those who bathe is proportionate to their debility and the full sedative operation of the bath. They who are stronger sometimes have their sleep disturbed at first; but after awhile it is protracted beyond the usual time.

V. Nutrition, itself the result of a series of functional acts, cannot be expected to be immediately benefited by any course, either hygienical or therapeutical. So soon, however, as the state of the digestive and nervous systems is improved, and there is greater readiness for muscular exercise, the body begins to show an improvement in nutrition. This effect is manifested in children before the season of bathing has quite expired. In adults, the increase of flesh is not perceptible until some time after.

If we look at the immediate changes, by the working of the functions as described above, in the diseases more commonly treated by sea bathing, we find:—1. That four to six days bathing excites scrofulous fistulas in children to increased suppuration. In from fifteen to eighteen days, caries of the hands and feet have ceased in a great measure, and the greater part of the fistulas have become closed. A reduction by resolution, of vast engorgements of the lymphatic glands of the neck, has been brought about after seventeen days of bathing.

2. Diarrhœa, particularly in children, yields rapidly to sea bathing. This remedy, conjoined with the reviving influence of sea air, often does wonders in the summer complaint of children (*cholera infantum*), with the important proviso that suitable food be administered, and the water for drink be not brackish or otherwise impure.

Constipation affecting adults requires a long time,—a season and sometimes more for its removal.

In passive enlargement of the liver and spleen from congestion, or from chronic inflammation which has become stationary, sea bathing has exerted what may be called a discutient or resolvent effect.

3. Amenorrhœa, associated with a great disturbance of the organism, does not yield to sea bathing, until the requisite modifications have been imparted to this latter. Hence, the menses in some cases do not appear until the second season. In the opposite state, on the other hand, or that of excessive menstruation, some young females, who were pale and exhausted, began to recover their colour and strength after two or three baths.

4. Females who have descent of the womb, without other uterine disease or complication, are often sensibly relieved after the first two or three baths. After each bath.

they feel themselves, for a good portion of the day, able to walk without inconvenience,—even although they sometimes suffer more than usual from their customary local pains. At a more advanced period of the season, when these persons have obtained more definitively good effects from regular and continued bathing, they cease to suffer any inconvenience even from exercise taken beyond the measure of usage or prudence.

5. In the deep-seated diseases of the nervous system, sea bathing manifests its good effects with a promptitude quite unexpected. Some paraplegics have walked with a firmer step, and have felt their limbs warmed for a certain period,—after the first three baths.

6. The phenomena that take place on the skin during sea bathing are of a most deterging nature. During the first few days, furfuraceous scales, and anomalous papulæ, especially those connected with a lymphatic temperament, often disappear entirely.

7. The restoration of the general strength in chronic maladies, or where it has been gradually lost, is, of course, a work of time; and beneficial as sea bathing may be found, we can hardly hope that its curative powers, in such cases, will be manifested during the first season.

Secondary Hygienic and Therapeutic Effects of Sea Bathing.—Under this head we include the modifications which the organism undergoes after the season of bathing has elapsed. Analogous changes in the functions are observed after an alterative course of medicines undertaken for the cure of chronic diseases. A pregnant example of this nature is presented to us in the effects which follow, often after a long interval, the administration of mineral waters.

Among the most obvious and salutary secondary effects of sea bathing, is the protection which it gives against the return of certain diseases to which the bathers had been, in former years, habitually subject. Of these we may mention catarrhal affections in both children and adults, and also disorders of the digestive canal in the former, and rheumatism in the latter. Scrofulous children continue, during the ensuing fall and winter, to derive the restorative effects from the sea bathing begun in the previous summer. On the approach of spring this class of subjects again suffer from the disease, and require a return to the sea shore.

Among the most constant of the secondary effects of sea bathing is an evident increase of the stature of children and young persons. A slow but beneficial action, from the same cause, is obvious in chlorotic subjects, and in those afflicted with uterine diseases. Patients affected with these latter often leave the shore in a desponding mood, under the feeling and belief that they have not derived any benefit from their residence there; but in a month or two months afterwards, these persons are astonished at the evident amelioration of their symptoms, which goes on increasing for a considerable period.

In hysterical affections, and in cutaneous diseases, a length of time often elapses before any good result is observable from sea bathing.

Among the secondary effects of sea bathing, should be noticed, sometimes cutaneous eruptions of a depurating character, sometimes cramps of the stomach.

Occasionally, the only effects from the practice are those of a secondary and even remote nature—obtained after weeks and even months from the time of leaving the sea shore.

Sea Bathing in Infantile Diseases.—M. Gaudet, in his introductory remarks on the curative virtues of sea bathing in the diseases of children, indulges in a warm eulogy on the excellent prophylactic powers of the practice. Applying what Floyer had said of the efficacy of cold bathing for those of tender age, the French author writes: experience has abundantly proved that sea bathing “aids the growth of children, strengthens their delicate limbs, gives them the glow of health, and renders them fitted to become either useful men or robust mothers.” The time, he thinks, is not far distant when sea bathing will be generally resorted to as the best means of physical education of children, for whom already in cases of scrofula and rickets it is the most efficacious of therapeutical agents.

M. Gaudet classifies the children who are brought to the sea shore under the following designations: The weak; the lymphatic; the scrofulous; the rickety; the nervous; those predisposed to spasmodic affections; those liable to cerebral diseases; those subject to inflammations of the mucous membrane of the nose and throat; those affected with cough or bronchitis in different degrees, or predis-

posed to these affections; those subject to diseases of the gastro-intestinal mucous membrane.

In reference to the first division, or the weak children, M. Gaudet assures us, that, after a season of twenty to thirty baths, combined with the benefits of daily exercise and gymnastics rationally practised, they commonly recovered their appetite, made good blood, and acquired a certain degree of plumpness of frame and increase of stature and of strength; so that they who had been using irons were able to throw them off, and to correct the vicious attitudes which they had previously contracted.

Scrofulous children were prepared for sea bathing by their first taking the warm salt water baths, the temperature of which was successively diminished. The duration of the sea bath was only for a few minutes. The auxiliary practices, of exposing the affected parts to the waves of the sea, affusions on the head, lotions and other local applications of sea water to the inflamed eyelids, irrigation on the indolent glandular swellings, and periostoses which had passed to the chronic state, and also on the swelled joints and caries of the diseased bones,—should not be forgotten on the occasion. The simple douche, by a single tube, is too powerful, and irritates into acute inflammation the affected gland, or the bony structure.

The internal use of sea water ought to be associated most frequently with its external use by bathing. The quantity to be drunk is from a tablespoonful to a wine-glassful every day.

The effects of this treatment are soon manifested in a most satisfactory manner

The greater number of young scrofulous subjects ought to take from sixty to seventy baths, which are equivalent to two or three seasons.

The continued good effects of the bathing are evinced often for a length of time after quitting the sea shore.

I shall not follow M. Gaudet in the details of his pathological views and successful therapeutics in the several classes of children already enumerated. It is well to mention, however, his precautionary treatment of those young subjects who are predisposed to cerebral diseases. He begins the season with them by immersion, for ten minutes, in sea water warmed from 86° to 90° F. After-

wards, sea bathing of half a minute or a minute's duration is to be practised. Abundant affusions on the head and douching along the spine are, also, important auxiliaries.

Among the spasmodic diseases, *acute chorea* is that which is most promptly subdued by sea bathing. The chronic stage, although not removed, is greatly ameliorated by this means—in conjunction with suitable exercises, common and gymnastic, including swimming.

A salutary advice is urged on parents and others: not to allow their children, especially those suffering from or liable to cough and bronchial affections, to be exposed to the raw air of the shore, in the morning or evening. The previous gain by bathing is sometimes entirely lost by neglect of this precaution.

In the habitual diarrhœa of children, the good effects of sea bathing is sometimes not observable until after a considerable lapse of time.

In Diseases of Females.—Young girls, who have not yet had their menses, often have their health so modified that this periodical discharge is brought on by sea bathing. The period of immersion ought to be very short,—not more than two or three minutes.

Irregularities in the menstruation of young girls, sometimes showing themselves in imperfect, sometimes in excessive and too frequent discharges, are best met, at first, by tepid sea baths. After this they can make use of sea bathing, but in very brief immersions, with advantage.

Females suffering from *chlorosis* should also begin with sea water baths at a temperature of from 86° to 90° F., the duration of which will be for about a quarter of an hour to twenty minutes. These will be followed by the cold or ordinary sea baths, of very short duration. Reaction will be further favoured by warm pediluvia.

We must not look for an immediate restoration of the menses in chlorotic subjects during the first season of bathing. A foundation is laid, however, for this desired result, by an improvement in the digestive functions, and an abatement, if not removal of leucorrhœa. The arterial blowing and the impulse of the heart are, also, diminished: the bowels become regular, and the general strength and fulness of habit are increased. Following this amelioration

of the general health is a restoration of spirits, and a gaiety even which bespeaks happiness.

The following observations of Buchan exhibit another but less brilliant view of the subject: "But to females of a more languid and phlegmatic habit, who have a feeble pulse and a pale complexion, symptoms which are frequently accompanied with occasional slight œdematous swellings of the legs, bathing in the sea often does infinite mischief, and aggravates all their complaints. To these, however, it may afford some consolation to know, that such cases are almost always benefited by the use of the warm salt water bath; and that after this, bathing in the open sea, under due regulations, accompanied with exercise, and assisted, if necessary, by some appropriate remedies, may be employed with great advantage, in order to confirm the constitution."

M. Gaudet thinks that, during the season of bathing, chlorotic subjects may advantageously suspend the use of chalybeates, which they had previously been using. Recourse will be had to these medicines, with beneficial results, on the return of the invalids to their homes.

Exercise in all its varieties,—on foot and on horseback, or in a carriage, ought to be enjoined on chlorotic subjects during the season in which they take sea baths.

Menorrhagia, or inordinate menstruation, paradoxical as it may appear, considering what has just been said of the means of relief in obstructed or deficient menstruation, is arrested by sea bathing. M. Gaudet lays down the condition that this hemorrhagic effect shall be accompanied by general or local signs of debility. A remark of Floyer is cited,—that the cold bath arrests all discharges of blood; and the Germans, we learn, have recourse to cold bathing in passive hemorrhages of the uterus.

The good effect being obtained, it is a matter of less moment for us to be able to explain the *quomodo*. I believe that the operation of sea, like that of the common cold bath, is sedative, and that by its so promptly moderating the excessive action of the capillary and secretory vessels, it gives rise to a retention of blood in the organism, and to the effects termed tonic, of improved coloration of the skin, strength, &c. M. Gaudet, himself, almost constantly speaks of the sedative operation of sea baths.

The bath ought not to exceed five minutes in duration, and it should consist of a simple immersion without renewed dips or any muscular effort. Its effects ought, also, to be aided by a tonic medication, and correspondingly nutritive aliment.

In some general remarks on the influence of sea bathing in *menstruation*, M. Gaudet, avers, from his own observation, that a majority of the females who visit the sea shore and bathe, for causes irrespective of any uterine affection, have their menses accelerated by a period varying from three to eleven days.

It has happened that a chlorotic subject bathed during her scanty menstruation, and instead of suffering from this act, she had a more copious and properly sanguineous discharge. The same thing has happened to other females of a more healthy constitution. Similar results have been observed in the cases of males, subject to hemorrhoidal afflux and discharge.

Sometimes a result of quite an opposite character, being an evident retardation of the menstrual flux, has ensued from sea bathing. This was more particularly the case where the individual had previously suffered from violent headache, local irritation, or general debility, and where these states, were, respectively, aggravated by the bath.

In *Dysmenorrhœa*, the sedative operation of sea bathing (I use the language of M. Gaudet) has caused a disappearance of the associated nervous phenomena, and of uterine sensibility.

Amenorrhœa from accidental causes, such as a sudden emotion, exposure to cold,—or a morbid state of the uterus following child-birth, is often at once removed by a few sea baths. So, also, when menstruation has ceased, owing to advanced age, the consequences resulting from this, as manifested in undue determination to particular organs, or in hysteria, are, in many instances, removed, or at least greatly diminished in force by sea bathing.

The debility following child-birth and abortion is removed in a marked manner by sea bathing; and the latter is often prevented by the same means. *Leucorrhœa*, without any notable organic change or ulceration of the uterus or vagina, and this is the variety most frequently met with by M. Gaudet, is removed with considerable certainty by the

means now under consideration. In addition to the bath, he recommends douches on the pelvis and injections of sea water into the vagina. Sometimes the first effect of immersion, is an increase of the vaginal discharge.

Partial descent and *prolapsus*, also, *of the uterus*, are often surprisingly benefited by sea bathing. Patients thus affected have been sensible of a rising of the uterus, during the time of immersion in the water. Generally, those females who have a descent of the uterus, bear very well a somewhat prolonged stay in the water.

This class of invalids ought to be subjected to affusions as well as immersions. They ought also to use lavements, and injections or irrigations of cold water or of sea water into the vagina, and sometimes even the hip bath before retiring to bed.

Women suffering from uterine displacements are subject to constipation; and this is increased by sea bathing. They are also annoyed with cephalic congestion and general excitement from the same cause. The first is combated by lavements of sea water, the second by tepid baths of the same liquid.

The special hygiene for women with uterine displacements will consist in their retiring early to bed and rising late, and in their keeping, for several hours every day, to a recumbent posture.

Lesions of the neck of the uterus, manifested by pain, tumefaction, redness, and ulceration,—but not necessarily by all of these at once,—undergo the following changes under the operation of sea bathing: The engorgement and phlogosis are diminished, and lose their sensibility and redness; the ulcerations are cicatrized or changed in appearance, their granulated appearance being replaced by a smoother surface and a vermillion colour. As regards the general effects on the system, the patients acquire colour, strength, and vivacity.

The secondary curative effects of sea bathing in these cases are sometimes of a surprising nature. They who had left the sea shore without any amelioration of their symptoms have, after the expiration of a few months, become greatly benefited in their health, both generally and locally.

Although marked relief will follow a single season of

sea bathing in the lesions of tissue of the uterus, yet for obtaining a complete cure, recourse must be had to this remedy for a term of years, in regular succession.

Hysteralgia, or neuralgia of the uterus, is greatly benefited and its returns often prevented by sea bathing.

Equally efficacious is this remedy in cases of glandular engorgement and enlargement of the glands of the iliac fossæ and the groins, and also of the breasts.

M. Gaudet confirms the statements of English writers—that *sterility* is not seldom removed by sea bathing.

Dyspepsia, including that modification of it consisting in gastralgia, is relieved to a great extent by sea bathing.

Facial and cranial neuralgia, or *tic douloureux* and *hemicrania*, have, M. Gaudet asserts, yielded to no therapeutical means with the same facility as to sea bathing, by immersion and affusion.

CHAPTER XXXVII.

SEA BATHING (*concluded*)—IN HYPOCHONDRIASIS AND GASTRALGIA—IN ANAPHRODISIA—IN CEREBRAL AFFECTIONS—IN INSANITY—IN CERTAIN NEUROSES—AMAUROSIS—IN PARALYSIS—IN BRONCHIAL AFFECTIONS—IN APHONIA—SUMMER CATARRH—IN FEBRICULA—INTERMITTENT FEVER—IN DYSPEPSIA—IN BILIOUS DISORDER—IN RHEUMATISM AND NEURALGIA—IN SCROFULA AND SCROFULOUS ULCERS—IN CUTANEOUS DISEASES—IN PHLEGMASIA DOLENS—CIRCUMSTANCES CONTRA-INDICATING BATHING—SUBSTITUTES FOR SEA BATHING.

HAVING spoken of the diseases of children and of those of females, which are either greatly ameliorated or removed by sea bathing,—immersion and affusion,—I shall next offer some remarks on those peculiar to the male sex, which have been benefited by similar means. In these, the experience of M. Gaudet will be adduced with the same freedom as in the antecedent cases.

Hypochondriasis and *gastralgia*, forms of disease depending on neuroses of the ganglionic portion of the nervous

system, are often removed by sea bathing and a residence at the sea shore. Considering that hypochondriasis originates from forced and prolonged exercise of the brain in study, or from other modes of sedentary life, also from grief and anxiety, long confinement to the house, or vicious practices, we can readily understand how relief should be obtained by the change of life implied in a visit to the sea shore. It is not necessary that I should describe the various forms, most of them of a sombre hue, which this disease assumes. Not unfrequently it is paroxysmal,—an effect referable to atmospherical changes, particularly those marked by a cloudy and humid state of the air.

Gastralgia is not an unusual accompaniment of hypochondriasis. Oftener, still, are congestions of the brain, or of the liver or spleen, and pains in the region of the heart and in the intestinal canal complained of. In such cases it is advisable to prepare the patient for sea bathing by leeches over the epigastrium or to the anus, cool or tepid baths, saline laxatives, and a regulated regimen. Hypochondriacs dread the cold bath, and require, on this account, to be gradually prepared for its use by previous tepid or cool bathing. Affusions, with a view of relieving the cerebral congestion, must be associated with immersion in the sea. This union of the two modes, which M. Gaudet calls *rational* bathing, has, among other good effects, that of removing extreme susceptibility to cold of which hypochondriacs complain. In some instances of gastrodynia, the douche by irrigation on the epigastrium has accelerated the cure.

In what some call *nervous asthenia* or *debility*, marked by tremblings and uncertainty of muscular movements, with headache and great susceptibility to impressions of all kinds, sea bathing manifests decidedly restorative effects. This disorder has been most frequently seen in young men.

Allied to this state is one from which the studious and the meditative recluse suffers. It is marked by a feeling of habitual fatigue, weakness of the loins, paleness of the complexion, want of appetite, and melancholy. The subjects of this disorder, in a short time after the use of sea bathing by immersion and affusion, are often wonderfully renovated both in their looks and tone of spirits, and vivacity of movement.

Anaphrodisia, in various degrees, is much benefited by

sea bathing associated with douches of sea water, directed on the loins, perineum, the haunches, groins and insides of the thighs, and aided by a suitable regimen. This practice has been productive of much good, by a restoration both of the general health and of the particular function which had been so seriously weakened.

Spermatorrhœa, or seminal weakness, when occurring in young men, and without any marked nervous complication, is quite curable by sea bathing, preceded by a few tepid or warm baths. In that other variety, however, which presents itself in adult subjects, associated with much derangement of the nervous system, but little benefit is derived from this remedy.

The diseases common to both sexes for which sea bathing has been practiced, are divided by M. Gaudet, as follows:

1. Purely functional disorders, and also structural changes of the nervous centres and of the sensitive nerves.
2. Bronchial affections.
3. Chronic affections of the digestive organs.
4. Rheumatism, and neuralgias of the limbs.
5. Dermatoses, or cutaneous diseases.
6. Diseases which may be called *surgical*.
7. Various cases which have no obvious connection with each other.

Under what he calls *Nervous Anomalies of the Brain (Cerebropathy)*, M. Gaudet describes a series of symptoms which are of more frequent occurrence in young men than in aged ones, or in females. Sometimes the chief manifestation of disease is headache, with a sensation of continued heat in the summit of the head, and in the region at the root of the nose and above the eyes, extending sometimes behind the ears and to the occiput. In other cases, there is fixed pain of one side of the head, extending along the spine and penetrating into the precordial region, in which it is more troublesome than painful. In both these forms, the great angles of the eyes are permanently injected, to a degree corresponding with the pain of the cephalo-spinal organs.

Persons thus afflicted are unable to read or write understandingly, or to follow a train of thought, or to bear the least strain on their mind. Any effort of intellect or moral disturbance causes an inexpressible fatigue of head, which seems to reflect its pains along the spine into the limbs,

and causes a trembling of the hands, the only nervous symptom evident to another person.

The system of bathing practised in these cases consists in a few preliminary cool baths, then affusions from one to four at a time, followed soon by cold sea baths. Occasionally, two of these are given in the same day. Douches of sea water, directed on the back of the neck and along the spine, and on the upper limbs are also useful aids.

Another annoying form of these cerebral neuropathies shows itself in a giddiness, accompanied with more or less impediment in hearing, but most usually without any evidence of congestion. Persons thus affected are painfully susceptible to depression of temperature; and their state is aggravated by bloodletting and the common means of derivation, internal as well as external.

This class of patients must be treated in the same way as the preceding; viz., by affusions, progressively increased from day to day, with which, after a short time, are associated sea baths of very short duration. But, notwithstanding all the pains taken in carrying out a methodical treatment, this class of cases is seldom materially benefited by sea bathing.

Insanity, in its various forms, has been subjected to a course of sea bathing by M. Gaudet, with, as he assures us, quite a satisfactory result in some and amelioration of unpleasant symptoms in other cases. The essential condition for success consists in the union of affusions with immersions. The insane often display great toleration of cold; and hence they bear very soon baths of long duration, and even double ones in the same day, in order that they may obtain the requisite sedation.

Partial disorder of the intellect—melancholy without aberration, is little relieved by sea bathing.

“*Epilepsy*, when it occurs before the time of puberty, has been cured by sea bathing.” It is possible, that any remedy persevered in until this epoch of life, would obtain similar credit for that which is often due to a natural change in the relative vigour and to new sympathies of the functions of the animal economy.

Neuroses of Vision, sometimes characterized by a number of minute round bodies of a dark colour floating before the eyes, when the individual affected begins to read; some-

times by exalted sensibility of the retina, are amenable, in different instances, to sea bathing—immersions and affusions.

Partial amaurosis, as where one eye only was affected, has been notably benefited by immersion and affusion. The first and constant effect of this treatment was to produce a contraction of the previously dilated pupil, which lasted a part of the day after the bath. M. Gaudet has seen a complete cure of amaurosis brought about by three seasons of bathing.

Paralysis in different forms has been subjected to sea bathing, with results varying with the nature and extent of the structural lesion that gave rise to the disorder.

Hemiplegia, whether of apoplectic origin or coming on gradually, and referred to a chronic affection of the brain or spinal marrow, has been treated by sea bathing. Some cases of cure, after a protracted use of the remedy for several seasons, have been reported; but we know that by time alone, without any treatment whatever, recoveries sometimes take place. Sea bathing often restores the languid functions of assimilation, and carries off headache and pains of the affected limb or side, by what may be considered a decidedly sedative action.

Paraplegia, originating from rheumatism, brought on by damp lodgings, or from venereal excesses, the abuse of mercury, or imperfect alimentation, has yielded often to methodical sea bathing. It is desirable to begin the treatment by the use of warm salt water baths, and soon afterwards to associate cold douching along the spine and on the affected limbs with sea bathing. Paraplegics have, at first, a great dread of cold water; notwithstanding which, their system bears very well an immersion of from ten to twelve and even twenty minutes; and it is not uncommon for them to be allowed two baths in the course of the day. Douching of a low temperature is generally had recourse to in the latter part of the season.

One of the first evidences of the beneficial operation of sea bathing in paraplegia, is a beginning restoration of the contractile power of the bladder, which had been previously paralysed. After this we observe an amendment of the digestive functions, in better appetite, and more ready chymification, and defecation.

Paraplegics, after a season of sea bathing, often lose their hesitancy and want of associated action between the muscles, and recover the feeling of well being and the natural warmth of their limbs. Under the sedative influence of the bath, they are no longer tormented with pains of the loins and of the lower limbs, which often accompany rheumatic paraplegias: they recover, also, their sleep.

Paralysis of the Bladder alone, without that of the lower limbs, is not benefited by sea bathing to the same extent as when it is part of a more general disorder.

Bronchial Affections, so generally manifested by cough, are, in general, greatly relieved, and often entirely removed by sea bathing, when they are not dependent on hereditary causes, or a malformation of the chest or actual pulmonary lesion, such as inflammation or tubercle, and we may add, old age. In that variety of chronic catarrh associated with a very excitable skin, by which this surface is made to sweat under the least exertion, or increase of clothing otherwise required by prudential considerations, this remedy, as indeed the cool or the tepid bath of common water, is found to be quite efficient. Nervous subjects, in whom the cough would seem to be kept up by irritation of the nerves of the bronchiæ, are also greatly relieved by sea bathing, and by breathing a maritime air.

In spasmodic cough with chronic bronchitis, the use of warm sea water baths should precede ordinary sea bathing.

In the *second stage of hooping cough*, a visit to the sea shore, and recourse to daily exercise and bathing have produced the very best effects.

Asthma of a purely nervous kind is said not to be benefited by sea bathing. In other, and we may presume more frequent varieties of this disease, kept up by congestion of the pulmonary mucous membrane, and of a chronic nature, with a somewhat increased action of the pulse, sea bathing and sea air have given speedy and marked relief. But even these remedies will not be antidotes against the effects of crapulous indulgence by eating heavy meals of gross food, and especially shell fish, such as lobsters; or of a neglect of suitable clothing.

Aphonia, or loss of voice, has been completely removed by sea and cold bathing. There are two kinds of apho-

nia, or rather the loss of voice will proceed from two causes; one evidently nervous, another the effect of minute ulcerations and a relaxation of the palate and uvula, in which the larynx is also implicated (*chronic laryngitis*). In the first, the voice will be sometimes lost in the evening, and be restored next morning. At times, this disorder has been traced to certain odorous emanations, as of musk. It has been removed by a cold bath. The second, sometimes erroneously treated as a syphilitic affection, by administering mercury, and greatly aggravated by this means, has been cured by sea bathing. Odier relates a case of this nature, in which after the failure of a great variety of remedies, relief was obtained by frictions every morning over the whole body with ice and flannel alternately.

The following remarks of Buchan are so applicable to many persons in our own climate, that I shall transcribe them without comment: "There is a peculiar species of catarrhal affection which attacks many people, especially those who reside in great towns, towards the latter end of summer. This complaint is characterized by an increased secretion of the mucus in the bronchiæ, which the patient is perpetually endeavouring to bring up by a short hacking cough. This being a voluntary effort, it rarely occurs during the night. The pulse is quick and feeble, and the body becomes emaciated. This disease, which may be termed a chronic catarrh, appears to be the consequence of the heat of summer relaxing the vessels diffused over the internal surface of the lungs, so that they pour forth the fluids secreted by them in augmented quantity. Having myself experienced repeated attacks of this complaint, I may be permitted to state, that for my own case I could never discover any remedy but a change of air; and have generally found that, after having breathed the air of the sea for twenty-four hours, the cough has not even once recurred. And I can add with truth, that I have occasionally recommended the same plan to many others in a similar situation with equally salutary effects."

In the *febricula*, or slow fever, to which persons of a sedentary life are so subject, sea bathing displays the same beneficial effects attributed to the cold bath, in a preceding chapter. The fresh air of the shore, and freedom from the harassing cares of business or study, during the tem-

porary absence from home, contribute largely to the relief obtained by bathing.

What was said, also, of the cold bath, as affording protection against frequent returns of catarrh and rheumatism, will apply still more forcibly to sea bathing. The success of Antonius Musa, in curing Augustus Cæsar of a protracted catarrhal affection by these means, gave uncommon vogue to the cold bath among the Romans. As a mere variety in their luxurious life—something to renew their exhausted sensibilities and help them to pass off time, we cannot doubt that the wealthy patricians, whose edifices surrounded in a manner the bays of Baia and Cuma, and Naples (*Parthenope*), would indulge in the practice of sea bathing, even without the fashion being set by the Emperor, or its efficacy proclaimed by a celebrated physician.

At the present day, the Neapolitans of all classes indulge in sea bathing—from the young amphibious lazzaroni, who spend half their days paddling and swimming in the water, to the fat and brown titled dames, who drive down to the shore in their carriages, and who, when there, do not turn away their heads from the nude figures just mentioned, desporting themselves outside the baths. Indeed, the whole beach swarms so with these urchins, that a traveller or other visitor, without putting down his knife and fork may, while dining in one of the restaurants which open on the harbour, take lessons *gratis* on swimming, and sundry other marine gymnastic exercises.

If a person be attacked by a paroxysm of *intermittent fever* at the shore—he can with great safety and propriety avail himself of immersion in sea water, or affusion of this fluid over the body, during the hot stage. Except at this particular juncture, it is not advisable for an invalid to be in any great haste to bathe for some days after his arrival, and until he begins to experience the invigorating effects of sea air and moderate exercise, and discovers that the simple food, which he is presumed to use, is digested and contributes regularly to nutrition. Then, selecting the time when there is a slight febrile exacerbation, he may bathe with advantage, and be subjected to less restraint in the quality and quantity of nutritious aliment than before.

I would extend the advice so far as to say, that the slight fever and the heat of the palms of the hands and soles of the feet, and thirst, from which convalescents frequently suffer, even when they are gaining flesh and strength, will be greatly abated by sea bathing; and the undue feebleness from prior excitement will thus be prevented.

Diseases passing under the indefinite term of *bilious*, which are generally associated with indigestion, daily fever, some discoloration of the skin, or of the white of the eye, and a furred tongue, are not those in which sea or cold bathing displays its best effects.

But if this remedy be inadmissible, or of doubtful efficacy, it by no means follows, that visiting the sea shore should be injurious to the dyspeptic and the bilious. On the contrary, the most marked benefit often follows such a change, both to this description of persons and to those slowly convalescent from remittent and intermittent fever. This remark applies in a more peculiar manner to persons who live in low, marshy, or badly-ventilated districts of country—and who are either prone to be attacked by intermittent fever, or are actually labouring under the disease; or, finally, who are just recovering, but at the same time in perpetual fear of a relapse. To all such, young and old, I would freely recommend a residence, during a part of the summer, at the sea shore. They will, it is true, be liable to have a chill, the first easterly wind that blows, especially should rain accompany it, unless they be exceedingly careful to use warm clothing at the time; but the risk of such returns will become daily less and less, and a few doses of quinine will place the invalid in a state of composure and exemption from disease, which ten times the quantity would have failed to do at home.

Dyspepsia, *hypochondriasis*, and their numerous associated ailments, such as *sick headache*, and *palpitation of the heart*, to which we vaguely apply the epithet nervous, are benefited by sea bathing, when they have been mainly the effect of deficient exercise, late hours, and breathing a close impure air, and are accompanied by a hot and dry skin, and frequent pulse, or at least by daily paroxysms of this nature. We must be less sanguine of success when these diseases are kept up by chronic inflammation of the

stomach or liver, and attack persons advanced in life, whose constitutions have been broken down by early exposures or excesses. In any case, a regulated regimen must be insisted on.

Dyspepsia assumes a variety of forms,—partly owing to its seat, as, for example, whether it depends on lesions of the stomach, or the duodenum, or the colon, and partly owing to the temperament and constitutional peculiarities of the individual, and his habits and mode of life. Under these circumstances it must be difficult, not to say impossible, for any one remedy or mode of treatment even, to procure the desired relief in successive cases of this most troublesome and often painful disorder.*

Under the operation of sea bathing, some of the most annoying symptoms of dyspepsia are removed. The tongue becomes cleaner, the appetite more natural, the bowels, which had been either alternately constipated or loose, become regular, and there is decidedly greater ability to digest the food. The complexion is improved, and the features acquire a pleasanter expression. Invalids of this class ought to be cautioned against indulging their appetite to the full extent of its promptings, caused by the first few days of bathing. A relapse and even aggravation of the disease will be the penalty for their transgression.

In that *weakness of stomach* marked by loss of appetite and slowness of digestion, so readily aggravated by atmospheric distemperatures, and especially by cold and humidity, and in which there is, also, feebleness of the nervous system, slowness of thought and speech, and emaciation, relief is often obtained by immersion in the sea and affusions on the head,—as, indeed are to be all the affusions of antecedent recommendation.

Teachers of both sexes, clergymen, lawyers, and merchants, and also some artisans whose calling confines them to one posture in a close apartment, are the chief sufferers from this form of dyspepsia. They often digest made dishes, when they cannot manage the usual articles of food.

Gastralgia, one of the varieties of dyspepsia, has been already touched on, as it attacks females. When it shows

* Bell & Stokes's Lectures, vol. i.

itself in the other sex, it generally selects adults of a nervous temperament. The sufferer himself, and his physician, are but too familiar with the anomalous features of beating in the precordial region, which simulates aneurism of the heart, pulsations of the epigastrium, and pains passing from the stomach to the back,—sometimes coming on in fits at irregular times,—sometimes assuming a periodical character, and ending in diaphoresis. The countenance wears an expression of continual suffering.

Under the operation of sea bathing for very short periods, aided by cephalic affusions, the gastric pain and distress are gradually ameliorated, and the digestion is improved. A douche, of a single tube, directed on the spinal column, and another by irrigation on the epigastrium, has contributed to the abatement and removal of gastralgia.

Some of the forms of *intestinal disorder*, showing themselves at one time in diarrhœa, at another in tenderness of a particular spot with gastric disturbance, or in obstruction at the ileo-cæcal region,—are benefited by sea bathing, preceded by two to four baths, of a temperature varying from 88° to 92° F., of a quarter of an hour to twenty minutes' duration.

There are other varieties of intestinal derangement which are little affected by sea bathing. They consist in an extreme debility of the digestive functions, loss or capriciousness of appetite, habitual diarrhœa, headache, giddiness, muddy complexion,—sometimes slight œdema of the cheeks,—in fine, all the symptoms indicating what the ancient writers denominated cachexia. In such cases Celsus and Cælius Aurelianus recommended sea bathing. Celsus says, *cachecticos natatio maritima juvat*.

Sea bathing has long been celebrated in *rheumatism*, and, more recently, it has acquired reputation in neuralgia.

The great object in the prevention and cure of rheumatic not less than of catarrhal complaints is, to equalize the action of the skin in such a manner that it shall not sweat on the slightest exertion, nor retain its morbid susceptibility to be affected by every change of weather. Sea bathing contributes very much to so desirable an end, by diminishing the excitement of this surface, thereby lessening the frequency of perspirations, and by giving it a habit of bearing sudden vicissitudes of temperature. In

cases of rheumatism, where the skin is habitually cold and torpid, it will be proper to premise a short course of warm bathing, frictions of the skin, and as much exercise as the infirmity of limbs will admit of.

In those compound rheumatic and neuralgic affections of the head, so painful in their paroxysms, and involving so much distress and disturbance of the nervous and digestive systems, sea bathing, by short immersion and affusions, has exhibited powerful effects,—when preceded by warm baths.

Rheumatism *confined to particular muscles* is often removed by sea bathing. Equal success has attended the use of this remedy in *erratic* rheumatism. Another modification of this disorder, showing itself in one or other of the viscera, and produced by cold and dampness, is effectually relieved by the treatment indicated above; viz.. warm baths at first, then immersion for a very brief period, and affusions. Sometimes, after the bathing, a sensation of coldness in the affected muscle is spoken of.

Rheumatic metastasis, although apparently at first increased by sea bathing, is, M. Gaudet assures us, eventually, either abated or removed by perseverance in the treatment.

Sacro-sciatic neuralgia, or sciatica, as it is commonly called, when occurring in debilitated subjects, and of long duration, yields to what M. Gaudet calls the tonic and sedative effects of sea bathing. In other cases, again, in which the paroxysm is at its height, this remedy seems to exasperate the malady. I have used myself, and directed, in the cure of others, when suffering from sacro-iliac neuralgia, sponging of the parts with cold water, in which salt had been previously dissolved. The effect has been, for the most part, both agreeable and salutary.

English writers love to descant on the excellent effects of sea and cold bathing in general, in *scrofula*. Of late years, the French and Germans take equally favourable views of the practice. Whatever feelings of weakness may be experienced in the progress of this malady, it is not the less certain that it is associated with no little irritability of the functions, both of the senses and the brain, and of the internal organs of nutrition. There is inequality of temperature,

and frequent accessions of heat and flushing—thirst and disturbed digestion—often daily slight but evident paroxysms of fever. Although the more hideous forms of scrofula, in ulcers on various parts of the body, especially the neck, and distortions and swellings of the joints, with purulent inflammation of the eyes, are not near so frequently met with in the United States as in Great Britain, yet we are far from enjoying that entire exemption, which over zealous patriotism has led some to assert.

With the view of keeping down irritation and of procuring healthy digestion, simple food, pure air, and regular exercise, are to be especially insisted on. In aid of these means we have recourse, with benefit, to cold or tepid bathing, according to the excitement of the system and the extent and readiness of reaction. Sea bathing, for the reasons already given, is a less equivocal remedy in scrofula than the simple cold bath—and has, accordingly, been used with very marked advantage in this disease.

In our preventive and curative directions for scrofula, we must constantly bear in mind, that, however efficacious in particular circumstances sea bathing and sea air may be found, they are not, any more than other remedies, specific. Sometimes the disease prevails very extensively in places of maritime exposure, but which it must be said are low and damp. So far from benefit accruing to invalids visiting one of these places, such as Lynn is described to be by Dr. R. Hamilton, it would be to their interest to select some spot in the interior, on an elevated ground or hill, the air of which is pure and dry.

Change in this disease, is a great object; and to the inhabitants of a large and crowded city, who spend most of their time in close, ill-ventilated apartments, and deprive themselves of adequate exercise, a summer's residence at a well-chosen situation on the sea coast, in which the air has free course, and a judicious use of sea bathing, will greatly contribute to ward off an attack of scrofula, or to moderate and cure it when actually present. But, unless due attention be paid to the food, both as regards its simple quality, moderate quantity, and regular intervals of eating it; and to obtaining the due proportion of sleep within the proper period of the night, disappointment will be too often the fate of those who go to the sea shore

to obtain a cure of scrofula, or of any other malady whatever.

Benefit follows, in cases of swelled glands of the neck, from keeping linen cloths moistened with sea water, constantly applied to the parts. Frequently wetting the lips and nostrils, when these organs are much thickened in scrofulous habits, has also been found serviceable. Russel, in his "*Œconomy of Nature*," relates cases in which marine bathing and lotions of salt water, or compresses wet with this fluid, to the sores, were followed by the best effects, in strumous swellings of the nose and lip with ulcers in various parts of the body. Scrofulous ulceration of the borders of the eyelids, and æzema or purulent discharge from the nose, were treated in the same way with equal success. In other cases, again, the use of the sea water internally was associated with that by bathing and lotions. Sometimes the first effects of the bath were to increase the discharge from the scrofulous sores. *Ulcerations of the hairy scalp* are well treated by first shaving the hair off, and then frequently sponging the diseased surface with tepid sea water.

The following judicious observation of Dr. Buchan will very appropriately find its place here: "children," he says, "tainted with scrofula, frequently have a profusion of fine hair; though this may be reckoned an ornament, parents who consult the welfare of their offspring should not permit it to remain, for it is commonly observed, that children who have very long hair are in general pale and unhealthy." It is painful to find the cruel vanity of parents, in these, as in some other particulars which might be named, making them regardless of the urgent remonstrances of a physician, and of the obvious injury to the health of their children. Their hearts are gladdened by the sight of curling hair, and flowing flaxen tresses—but have they no sympathy for their little darlings, whose puny and pale faces, with often weak eyes and swellings along the sides of the neck, are at times a direct consequence of the hair being allowed to grow long.

In *scrofulous affections of the joints* accompanied with ulcerations outwardly, salt or sea water has always been a favourite local application. To heal the ulcers, even though ankylosis or immovable joint result, is a far pre-

ferable course to amputation, which in cases of decided scrofulous diathesis is of very equivocal if not injurious tendency.

In all these varieties of scrofula, as well as in *marasmus*, accompanied with slow fever and imperfect digestion, the internal use of sea water has been much extolled. On this point I can speak with more propriety, when treating professedly of mineral waters.

Diseases of the Skin, of an acute or sub-acute character, are often aggravated by sea water—hence, in acute herpetic eruptions, and scorbutic sores, and erysipelatous affections, this remedy is not admissible. In those, on the other hand, of a chronic character, with dry scurfy skin, sea bathing will give great relief, and, with suitable regimen, contribute largely to their cure. When we have doubts of the propriety of the application, on account of the subsequent heat, and irritation of the parts—these may be obviated by washing the skin with simple tepid water, after coming out from the sea. After pursuing this practice for awhile, it should be desisted from, and the sores are to be merely wet with simple water, or that slightly saline, and sea water with mild laxatives is to be taken internally.

For a proper appreciation of the remedial value of sea bathing in cutaneous diseases, we ought to be aware of the constitutional conditions on which they so generally depend, and of the change which is accomplished in the digestive and nutritive systems by the remedy in question. Sea bathing, in this sense, is good for preparing the organism to receive with advantage special therapeutical remedies.

Some eruptions are regarded in the light of *depuratory*, and as united with or dependent on a particular state of the constitution. Their suppression, particularly in children and in persons advanced in life, cannot be attempted with impunity by common repellent means. When brought about by sea bathing, the alterative effects of which are by this time known to the reader, we need not have the same apprehensions of sinister effects.

Cutaneous eruptions of what may be termed a humoral character, which assume a vesicular and pustular appearance, and dry into crusts, are at first excited and, as it were, renewed by sea bathing; but, after awhile, they gradually disappear by perseverance in its use.

Those eruptions, on the other hand, of a papular and scaly character, such as *purpura*, *ichthyosis*, *psoriasis*, and even *gutta rosea*, are, for the most part, intractable to sea bathing.

The German physicians place great reliance on this remedy in *chronic eczema*, and M. Gaudet, from his own experience, sanctions their good opinion. In children, when the eczema appears in isolated patches on a limb or the ears, &c., it is often speedily cured. In adults, in whom when it is connected with constitutional deterioration, it is often obstinate, a longer period of sea bathing is required; but, eventually, the disease is carried off by a prolonged use of the bath, aided by the internal use of sea water.

M. Gaudet enumerates cases of *herpes preputialis*, pustulous *mentagra*, *impetigo*, and *favus* cured by sea bathing and the internal use of sea water; and others of *pruritus vulvæ*, *erythema*, and *ichthyosis*, ameliorated by the same means.

Speed, in his "Commentary on Sea Water," adduces cases showing the curative power of sea bathing in *scabies* or itch; and of the relief afforded by this means in what he calls dry leprosy (*psoriasis*).

Among the *surgical diseases*, either cured or greatly benefited by sea bathing and douching, and sometimes the internal use of sea water, M. Gaudet specifies, sprains, indolent synovial swellings, chronic periostosis, abscesses with necrosis of the tibia, recent fractures leaving swelling at the part and weakness, and ankylosis of the phalanges.

Phlegmasia dolens was always favourably modified by sea bathing. The same success has followed its use in varicose veins, including varicocele, with or without tenderness of the testicles.

Among the cases not classed, M. Gaudet mentions, those marked by extreme languor and defective innervation, in which there is no pain nor lesion referable to any viscus. Sea bathing is often a restorative to persons thus affected.

Diseases consisting in morbid secretion from mucous surfaces, such as *gonorrhœa* and *leucorrhœa*, are also benefited, sometimes entirely removed by this treatment.

Circumstances Contra-indicating Sea Bathing.—After having indicated the diseases in which sea bathing will, with suitable precautions, be found serviceable, it is fit that

I should state the circumstances of bodily constitution or infirmity in which the practice is hazardous if not directly injurious.

Certain hereditary predispositions and physiological peculiarities forbid a recourse to sea bathing. Under this head we rank persons of very tender age, as during the first months of existence, also those in very advanced life, great prostration of the vital powers under any organic disease, pregnancy, nursing, pulmonary weakness in individuals whose parents were phthisical, general plethora, apoplectic tendency, internal aneurisms, acute gout, especially when it attacks the head; also acute rheumatism.

There are cases in which pregnant women have bathed with impunity; some even with advantage; but these are exceptions to a good rule. Abortion has sometimes been prevented by sea bathing, as it has by the common cold bath; and there are infirmities and disorders not connected with the state of pregnancy, nor growing out of uterine disease, which may be materially benefited by sea bathing, even though they may not imperatively require it. The objections to the practice during the period of gestation do not apply so much to the mere immersion in sea water as to its concomitants, the mechanical force of the waves striking against the body, the possibility of false or constrained attitudes, over exercise, and fright. It will be better, therefore, in view of the whole case, to substitute immersion in a bath-tub filled with sea water, or affusion of the same fluid, for a visit to the beach and open bathing in the sea, in pregnant females.

They who object to the prohibition of nursing mothers resorting to the shore to bathe, cite the cases of some of the female guides who give the breast to their children during the whole season, without any detriment either to their own health or to that of their offspring.

In inflammation of internal organs, as of the lungs, liver, or digestive canal, marked by pain and regular daily returns of fever, with a somewhat active and tense pulse, sea bathing is inadmissible—not that in its immediate effects it is so prejudicial, but in the reaction of the suffering organ, consequent on that of the skin, there is an increase of the phenomena of vascular injection, and fulness and pain.

The German physicians have specified the following causes for prohibiting the use of the sea bath: 1. A great degree of plethora. 2. An apoplectic et hydro-cephalic predisposition, congestions of the head and chest of all kinds, and certain but not specified headaches. 3. Internal aneurisms. 4. A cough accompanied with hemoptysis, or great weakness of the chest. 5. Indisposition accompanied by fever, during pregnancy. 6. Organic affections of the abdominal viscera, tender infancy, and advanced age. 7. An atonic and very sensitive state of the skin. 8. General debility and excessive exhaustion, with, at the same time, morbid excitement of the nervous system. 9. Morbid conditions of the blood. 10. Extreme dread of the sea. 11. Idiosyncrasies which are adverse to the use of cold bathing.

Even in the disease for which sea bathing has been generally alleged to be pre-eminently serviceable, doubts have been expressed by more than one writer of the wisdom of the practice. Thus, Sir Arthur Clarke tells us: "Its utility in scrofula is doubtful. Mr. Carmichael, in his very ingenious Treatise on Scrofula, corroborates my opinions on the effects of the cold bath in that disease. Respecting the inefficacy or rather injurious tendency of sea bathing, where the patient's vital powers are so deficient that reaction does not follow the immersion, he discards it altogether; but from the action of the *tepid salt water* on the vessels of the skin, he says it is an auxiliary that cannot fail of being serviceable, and from which he has witnessed the very best effects."

Dr. Clarke had just before remarked, and we must believe with a good deal of truth: "Sea bathing has frequently received the credit of a cure, which was entirely owing to a change of air; and many times, unsuspectedly, the gradual and permanent application of the cold bath has laid the foundation of chronic diseases and peculiarity of constitution."*

Warm Baths and Douches at the Sea Shore.—The frequent mention of tepid and warm bathing and of douching, as a part of the balneatory practices for the recovery of the health of invalids at the sea shore, in pre-

* A Essay on Warm, Cold, and Vapour Bathing.

ceding pages, point to the necessity of greater accommodations in these respects than are obtainable at our watering places. Many persons resort to the sea shore for the benefit of change of air, who do not like, or do not find it advantageous to their health, to bathe in the water of the ordinary temperature; but who would gladly use the warm bath, and especially the warm salt water one. Others, who are obliged, from various causes, to suspend for awhile the daily immersion in the sea, may still find it useful to have recourse to affusions, or to private baths of a warm temperature.

Both in a hygienic and therapeutical point of view, for pleasure and health and for the cure of disease, better arrangements ought to be made than are met with at present for the accommodation of visitors and invalids at the sea shore, or even yet thought of along our Atlantic coast.

Substitutes for Sea Bathing.—The following simple process has been recommended as a substitute for sea bathing, when it is not in a person's power to visit the sea shore. It is, to rub the skin, till it glows, with a coarse towel wrung out of salt water, and rendered nearly, but not quite dry by exposure to the rays of the sun; or, after bathing in spring or river water, to wipe the body with towels, which have been wet with water in which a considerable portion of common salt had been dissolved, and then dried.

Even at the sea shore, they who are so delicately constituted so as not to be able to bear the shock of immersion, may well have recourse to the practice of rubbing the surface with a sponge previously immersed in sea water, and afterwards pretty active friction with a dry coarse towel. I may here refer the reader to what has been already said respecting the topical or partial application of cold water by sponging, as a guide for his conduct in the use of sea water in the same way, and from which nearly the like results will be obtained as in the former case.

Still more complete than any substitute heretofore mentioned, but one, which to be enjoyed, requires a visit to the shore, is a *swimming bath*, like that at Brighton, in England. Using the language of Dr. Forbes (*Cyclop. Prac. Med.*): "From the great extent and airiness and the con-

stant renewal of the water, this bath certainly possesses many of the advantages of the open sea, and it has one superiority, that, namely, of being accessible in every kind of weather and at any time of the day.* We may add to these recommendations in its favour, greater safety, and facilities afforded for young persons to learn to swim,—as well as opportunities for quiet bathing by those invalids who cannot so well bear the shock of the tidal waves, and whose nervousness makes them alarmed at the sight of the open sea, and prone to exaggerate the risks of temporary and partial exposure by immersion in it.

CHAPTER XXXVIII.

THE WARM BATH—CAUSES OF MISCONCEPTIONS OF THE TRUE VALUE OF WARM BATHING—LIMITS OF THE WARM BATH—THE TEPID BATH—ITS RANGE—ITS EFFECTS RESEMBLE THOSE OF COLD BATH—ITS ADAPTATION TO GENERAL PUBLIC USE—TEPID BATHING IN FEVERS—CURRIE'S EXPERIENCE—M. HERVIEUX'S USE OF IT IN TYPHOID FEVER—ITS SALUTARY EFFECTS ON THE PULSE AND THE DIGESTIVE APPARATUS—IS USEFUL IN THE BRONCHITIC COMPLICATIONS—TEPID BATHING REMOVES THE ACRID HEAT OF THE SKIN—ABATES THE VIOLENCE OF THE ERUPTIONS IN TYPHOID FEVER—CALMS THE HEADACHE—BLOODLETTING IN AID OF TEPID BATHING, IN THIS FEVER—MEDIUM NUMBER OF BATHS — THE WARM BATH—ITS RESTORATIVE EFFECTS — GREEK TRADITIONS — HOMER'S DESCRIPTION — LORD BACON'S EXPLANATION OF THE TRADITION OF ÆSON'S REJUVENATION—DARWIN'S VIEW—FRANKLIN'S PRACTICE.

The warm bath, of which I am now to speak, has not been appreciated as it deserves to be, owing 1st, to false theory, regarding its operation and effects; and 2dly, to its being sometimes confounded with the tepid, and more often

* The swimming bath at Brighton is 53 feet in diameter, in depth from 3 feet 6 inches on one side to 5 feet 6 inches on the other.

with the hot bath. Erroneous views and practices in these respects are not, I regret to say, confined to persons out of the profession. Physicians in large numbers, not excepting even some who profess to be very explicit on the subject, have abundantly crude notions, both respecting the limits of the warm bath and its *modus operandi*. Some examples of this were placed before the reader in a former Chapter (p. 165-6), and they might, if necessary, be greatly multiplied. I may be asked,—what proof is there that your standard is better than the others to which you object? The reply is,—that immersion in water within certain limits of temperature indicated by the thermometer, will produce on all persons, no matter what climate they inhabit, or what may be their temperament, a feeling of agreeable warmth. We ought not to ask for any other standard than this, which is one of universal recognition,—as it ought to be of universal adoption. It cannot be represented by any one degree of the thermometer; but it is readily so by a short interval of a few degrees.

M. Londe* lays down a proposition, which is in the main correct; viz., that, taking our sensations as the guide, there are but two qualities in baths—the cold and the warm. I have admitted a third, or the hot, which though allied to the warm, comes out from it with, I think, more distinctness in the ascending scale, than does the tepid, or the cool from the cold in the descending. But the writer just mentioned, when he begins to specify, makes warm baths equivalent to what some call tepid, and others again temperate. The range designated by him for warm baths, is from 86° to 104° F., which, in fact, includes tepid, warm, and hot baths. Water at 86° produces, in many persons, it certainly does on me, a decided sensation of coldness.†

* Art. Bains. Dictionn. de Med. and de Chirurg. Prat.

† M. Levy (*op. cit.*), usually accurate and precise in his views and descriptions, speaks, under the general head of Warm Baths, first of *tepid or temperate baths*; and then of *too hot (trop chauds) baths*. This last he means to correspond with the warm and the very warm baths of some writers. His second is a division obviously the same as that of *hot baths* in the present volume, since he declares that it passes hygienic limits, and cannot be used without inconvenience and even danger.

The reader is referred to the division of baths in Chapter XIII. It is the same as that which I laid down in my former work, the accuracy of which subsequent observation and study have fully confirmed. The chapter on the warm bath opened as follows:—

The limits which I have assigned to the warm bath are, as already stated, 92° and 98° F.; the mean between which will be 95° . On immersion in water at this last degree, it is believed that most persons will feel a decided, yet pleasurable sensation of warmth; and obtain the good effects most generally attributed to this kind of bath. An approach to the upper limit, or that of 98° , will be most grateful to those persons who habitually, or from accidental circumstances, have a skin possessed of little activity, coldness of the hands and feet, and slow circulation — while the lower limit, or that at 92° , will be preferred by the sanguine and plethoric, with active circulation and hot skin.

I may refer to an antecedent chapter (XIII.), in the present volume, for some additional remarks on the limits of the warm bath.

The Tepid Bath.—Before describing the mode of operation, and the effects, physiological, hygienic, and therapeutical, of the warm bath, I shall bespeak the attention of the reader, for a brief space, to a few remarks on the tepid bath, in addition to those previously made (in Chap. XIII.).

Between 92° and 85° will be the range of that uncertain kind of temperature usually designated by the term tepid or milk warm. I say uncertain in reference to the sensations produced by immersion in it. Imparting less luxurious enjoyment, and not so susceptible of use in doubtful cases, and after extraordinary or exhausting bodily exertions, the tepid bath is, notwithstanding, that variety which is the best suited, as a means of public hygiene, for regular bathing, and ablution and purification.

A great many persons, even in vigorous health, cannot tolerate the cold bath for the shortest period. Still less can it be habitually used by children, or by adults, whose circulation is feeble. Even they who have accustomed themselves to it are in danger from the practice, if it be continued after any sudden diminution of vital

energy, by whatever cause produced. The tepid bath, on the other hand, is for the most part safe and serviceable to persons in health, including young children and delicate females; and is often exceedingly refreshing to those who are excited, and the temperature of whose skin, and the activity of whose pulse are augmented. Less sedative than the cold bath, the one in question is still capable of diminishing the excitement of the functions; while its immediately tranquillizing effects are followed by less marked and violent reaction, than ensue after immersion in cold water.

The general resemblance between the cold and tepid bath is such, that, in cases of fever with morbid heat of the skin and urgent thirst, but in which, from primary feebleness of constitution, or protracted duration of the malady, the functions are so much worn down as badly to bear the powerful sedation of the cold, the milder operation of the tepid bath may be obtained with safety and benefit.

The same principle guides us in selecting the temperature of aqueous *enemata* as of that of the bath.

After the fulness of detail in which I indulged when treating of the cold bath, it is needless to go over the same ground in the case of the tepid—now that the principle by which we shall be guided in the selection is stated. In all the forms of fever and nervous excitement in which cold bathing has been found serviceable, the tepid bath will be applicable; in the cases, more especially in which the heat of the skin and the frequency and force of the pulse are somewhat diminished, or not sustained with any uniformity.

When we recur to the experience of those writers who tell us that they have employed tepid baths in febrile diseases with advantage, we are not a little embarrassed by the vagueness of the idea attached by them to the word tepid. Thus, for example, Dr. Currie in the Chapter (X.) of his "Medical Reports," most of which he devotes to the subject "of the affusion of tepid water on the surface of the body in febrile disorders," begins by defining his application of the term tepid. It is to water warmed to between 87° and 97° F. This, as I have already pointed out (Division of Baths), brings, to within one degree, the warm bath in the limits of the tepid. M. Levy (*op. cit.*).

assigns, as we have seen, its range to be between 77° and 86°, the same as those of the temperate bath. Dr. Currie makes the admission that, according to his experience, the term may be applied to water some degrees colder than that which he had just designated.

Dr. Currie remarks, that, "in many cases, at least, the heat of the living body is lowered as speedily by the affusion of tepid water, as by the affusion of water that is cold :— if I mistake not, in some cases the heat is lowered more speedily by the tepid water." He explains this result, by the greater evaporation from the surface of the body, and the less reaction after the tepid than after the cold bath.

This writer thinks well of tepid affusions in the feverish affections of children ; and he has used the remedy also in various feverish disorders—in which the lungs were oppressed and the respiration laborious.

But, while he admits its applicableness to every case of fever in which the cold affusion is recommended, he does not believe its effects to be so permanent as those of the latter.

The most recent and confident attestation in favour of tepid bathing in fevers, is in a communication by M. Hervieux, in the *Archives Generales* (Sep^r 1848), showing the great utility of the remedy in typhoid fever.* As there is no specification of the temperature of the baths used, but merely an occasional use of the term tepid, we are left to infer that they were between 80° and 90° F.

The experimental observations of M. Hervieux in favour of tepid bathing in typhoid fever are deduced from forty-five cases. Under the influence of two or three baths, the pulse in the fever, from being small, hard, and contracted, became full and less resisting under pressure ; and where

* I say the remedy ; but it is really not easy to define it in this case with the requisite precision, as M. Hervieux is content to head his paper in the following style : "On the Employment of Baths, and of their utility in the Treatment of Typhoid Fever." In the course of his remarks we guess his meaning, as when he once or twice designates the baths to be tepid ; but in nowhere do we find their temperature, measured by a thermometer, specified. The perspicacity of the able editors of the valuable Journal in which the paper of M. Hervieux appears, has failed to supply his omission.

it had been small, weak, and tremulous, it acquired some volume and force. The number of its beats was also diminished.

- Although M. Hervieux believes in the salutary modifying influence of tepid bathing on the diarrhœa or constipation, as the case may be, in typhoid fever, yet the proofs of this influence were not so clear and positive as to amount to demonstration. Other symptoms, derived from the state of the digestive apparatus, viz., the abdominal pains, state of the buccal cavity, and thirst, are greatly ameliorated by the remedy in question.

The common complication of bronchitis with typhoid fever would seem to forbid the use of the tepid bath; but M. Hervieux assures us, and here he is in accordance with Dr. Currie (as may be inferred from the opinion of this latter already quoted), that, in twenty-eight cases of this complication, in which the bath was employed, he saw nothing sinister result from it. Precautions were taken to prevent the patient from catching cold on his coming out of the bath.

The thirst was greatly appeased, and the tongue lost its dry, dark, rough, and chapped appearance in the bath. The headache, so far as its intensity and duration were concerned, yielded to the same means. Not that it was entirely removed, but it became much milder.

The time when the power of the tepid bath was most advantageously felt in the cases of typhoid fever recorded by M. Hervieux, was at the height of the disease; the skin being of a burning and acrid heat, and covered with sudamina, lenticular spots, and petechiæ.

Bloodletting was associated with the use of the tepid bath. Never more than twice, and seldom more than once, was the former remedy had recourse to in any one case.

M. Rayer, who seems to have laid down the rules for the administration of the bath in this fever, rarely prescribed them beyond the second week, and most generally, ceased using them after the first. The interval between each bath was forty-eight, and in the severer cases twenty-four hours. The duration of the bath was from an hour to an hour and a half, if the strength of the patient permitted.

In order to prevent the patients from being exhausted by carrying them to any distance, the bathing-tub was placed at the bed side; and, at the same time, all proper precautions were taken to prevent the access of cold.

It will be readily understood, that, where the grade of excitement is very moderate, and the powers of reaction weak, even tepid bathing will be followed by too great an abstraction of caloric and feebleness of the system. Here it is that the *warm bath*, of which I now proceed to speak in a more particular manner, exerts a happy effect.

The Warm Bath—Its Restorative Effects.—A main cause of the prevalent misconception of the nature and effects of the warm bath, I have already stated to be, the confounding of warm with hot bathing, and assuming, as an effect of the former, the languor following increased excitement, which is no infrequent result of the latter.

The opinion of the ancients, on this point, was expressed with sufficient clearness, in the fact of warm springs and baths being dedicated to Hercules, as indicative of their restorative and invigorating powers. No cold spring was dedicated to him. The warm bath is uniformly spoken of by Homer as a means of refreshing the wearied traveller, and of preparing him for the repast and the enjoyment of other rites of hospitality; as we see in his account of the reception of Ulysses at the court of King Alcinous, and in which, after a minute detail of the whole process of heating the water, the poet describes the luxurious enjoyment, and the invigorating effects of the warm bath:*

Let us also bear in mind the fact of the *athletæ* seeking for refreshment, and renovation of their exhausted strength, in the warm bath.

In later times, but before the invention and use of the thermometer, the warm bath was often confounded with

* "The bath the king ascends;
Where, happy as the gods that range the sky,
He feasted ev'ry sense with ev'ry joy.
He bathes: the damsels, with officious toil,
Shed sweets, shed unguents, in a shower of oil.
Then o'er his limbs a gorgeous robe he spreads,
And to the feast magnificently treads."

Odyssey, B. VIII.

the hot bath, and was sometimes considered as heating, and sometimes relaxing. The latter idea, in part if not wholly, originated from regarding the changes in dead animal membranes, such as skin and parchment, produced by immersion in warm water, as analogous to the effects on the living tissues,—skin, nerves, and bloodvessels, when the human body was introduced into this medium. A prevalent and not unfounded opinion of the beneficial operation of warm bathing in retarding the approach of old age, has given further confirmation to this mechanical theory. It was said that the practice was useful by relaxing and softening the rigid and indurated fibres of old persons. Lord Bacon had hinted that the tradition of Æson being restored to youth by means of the medicated cauldron of Medea, was, in fact, an allegorical representation of the warm bath retarding the approach of old age. Darwin, adopting this idea, very properly adds, that the words *relaxing and bracing*, which are generally thought expressive of the effects of warm and cold bathing, are mechanical terms properly applied to drums or strings; but are only metaphors when applied to the effects of cold or warm bathing on animal bodies. He, shortly after, says: “to those who are past the meridian of life, and have dry skins, and begin to be emaciated, the warm bath, for half an hour twice a-week, I believe to be eminently serviceable in retarding the advances of age.” Acting on this principle, this learned physician relates that when Dr. Franklin was in England he recommended the latter to use a warm bath twice a-week, a practice which he afterwards continued till near his death.

“So early as the time of Homer an opinion seems to have prevailed of the utility of warm bathing in advanced life.*

* “When Ulysses, after his return to Ithaca, found his father Laertes reduced to great weakness, he advised him to use warm bathing, and to encourage him, told him he had seen one *whose case was exactly similar to his, worn down and emaciated with age*, who, by the use of warm baths, very quickly recovered his *appetite and rest*. He likewise adds, that its efficacy in such cases was well known, and that it was a *common custom among old men*.” *Odys. XXIV.*^a

^a Buchan, *op. cit.*

Marcard, in his excellent work (*On the Nature and Use of Baths*), examines with much ability the correctness of the reputed relaxing and heating effects of the warm bath; for both opinions have been held, and these, at times, by the same person. This author maintains the negative of both propositions, and, as we believe, with success. He cites cases, which occurred under his own eye, of recovered strength under the use of the warm bath; and he adduces Falconer's experience at Bath as identical with his own, in this respect. He also enumerates various instances of persons who resorted to the warm springs of Germany and Switzerland, spending many hours at a time in the bath, without any sensation of exhaustion on the one hand, or of excitement on the other.

CHAPTER XXXIX.

THE WARM BATH (*continued*) PHYSIOLOGICAL EFFECTS OF WARM BATHING—THE PULSE RENDERED SLOWER—DIFFERENTIAL PULSE—THE AUTHOR'S EXPERIMENT—MARCARD'S AND LOCKETTE'S EXPERIMENTS—RESPIRATION EASIER AND SLOWER—INCREASED EXHALATION AND ABSORPTION BY THE SKIN—ENTRANCE OF THE WATER OF THE WARM BATH INTO THE BLOOD—INCREASED ACTION OF THE KIDNEYS—SOMETIMES OF THE BOWELS—DETACHMENT OF THE CUTICLE IN THE WARM BATH—SOOTHING INFLUENCE OF THE BATH ON THE NERVOUS SYSTEM—HYGIENIC EFFECTS OF THE WARM BATH—THEY GIVE REST AND PREPARE THE BODY FOR EXERCISE AND LABOUR—THEY IMITATE SLEEP AND PROCURE THE REST FROM RECUMBENCY—PROPER IDEA OF A TONIC.

Physiological Effects of the Warm Bath.—Marcard asserts, and in this assertion he is supported by most other writers and experimenters, that immersion in a bath of a temperature under 96° F., diminishes the frequency of the *pulse*, whenever peculiar or anomalous causes are not opposed to this effect. The more frequent the pulse, and the more it deviates from the natural standard, the more

readily is its frequency diminished in the bath. That temperature, which to him seemed to exhibit this sedative power in the most marked manner, was between 96° and 85° Fahrenheit; though he acknowledges that he made few experiments on bathing in cool or cold water. What we know of the effects of this latter satisfies us, and I have furnished the reader with sufficient data to be himself persuaded of the fact, that there is a still greater diminution of the activity of the functions in a cold than a warm bath. This author himself admits explicitly in another part of his work, that the cold bath uniformly renders the pulse slower. The more the bathing is prolonged, the greater, according to Marcard, is its sedative power. He found in his own case that, after a stay in a bath of 89° F. for an hour and an half, his pulse fell from sixty-three to fifty four beats in a minute. Exceptions to these general results are, however, he admits, not infrequently met with; and he is disposed to refer them with much plausibility to an extreme mobility or irritability of the nervous and sanguiferous systems.

Differential Pulse.—Growing out of this remark is a caution of some importance to the experimenter on bathing. It is, to ascertain the irregularities of circulation; as well those caused by variations of posture as those occurring at different times of the day. In a person of much sensibility to the stimulating impressions of external heat and alimentary matters, or of habitual irritability of circulation, the pulse undergoes very great alterations, some of which might be erroneously attributed to immersion in a bath. The subjoined observations, in my own case, will be deemed apposite to the subject.*

* August 2d, 1830, my pulse, at half-past twelve in the day, when I placed myself in a recumbent posture (lying down), gave sixty-six beats in a minute. When I reclined against the back of a settee it gave seventy-four to seventy-six; when sitting up erect it was eighty to eighty-two; and when standing was eighty-six to eighty-seven. After making these observations I walked a short distance to a bath-room, reclining in which my pulse was seventy. On immersion in the bath, in water of 93° , the pulse was sixty: raised the temperature of the water to 98° Fahrenheit, after which the pulse was augmented to seventy-eight. In my own room, in half an hour

The range of temperature of water, on which Marcard experimented, includes my divisions of both the tepid and warm bath. Occasionally, the experiments of this author, and of others whom he cites, were varied, so that the water was gradually reduced to coolness. The effect was a still more signal diminution of the pulse's frequency.*

afterwards, the pulse, while I was sitting up, was seventy-eight; when in a recumbent posture it was sixty-two. Had I not previously ascertained the difference in the pulse caused by a recumbent posture, I should have been not a little surprised by comparing its beats, while I was standing, or sitting in a chair, with those while I was in the water. The difference was equivalent, in the case of standing, to twenty, and in that of sitting, to sixteen beats in a minute; all of which I should, as possibly some under similar states of circulation have done before me, have attributed to the sedative influence of the warm bath. Whereas, the real extent of change was not more than ten, comparing similar postures; the one in the bath room, the other in the bath itself; or six beats, comparing the recumbency in the water with the rather more complete prone posture in my room, during the first observations on the pulse. August 21st, half-past twelve in the day, temperature of the air 88°: I had been walking all the morning and suffered from some gastric uneasiness: my pulse, while I stood up in the bath-room, gave ninety-eight beats in a minute—sitting on a chair it was eighty-four—reclining on the floor it was seventy-two. I then, entered a warm bath of 94° F., and in five minutes my pulse gave sixty-seven to sixty-eight beats: after half an hour the same. On coming out of the bath, and after being partially dressed, and in a reclining posture, it was sixty-seven—sitting up in a chair, seventy-four—standing, ninety-two beats. This would seem to be a still more marked case of the great influence of the warm bath over the pulse, had I not made the suitable precautionary and qualifying observations in respect to posture.

* Thus, in the case given by Marteau of a man in health whose pulsations at the wrist were, at the time, eighty-six in a minute, it was found that after two minutes stay in a bath of the temperature of 68°, the pulsations were reduced to sixty-seven—in a quarter of an hour to sixty-six—and after an hour to sixty-one. In another, related by Marcard, the subject of the experiment, a healthy man accustomed to the cold bath, and whose radial pulsations were eighty in a minute, went into one of 60° F. After a lapse of fifteen minutes the pulse was eighty-two; but the bather was restless, and moved about greatly in the bath. On his keeping perfectly still, at the request of Marcard, the pulse fell, after the lapse of forty-five

Dr. Lockette, of Virginia,* made a number of experiments on the physiological effects of the warm bath, and particularly on the changes in the pulse. The result was, a uniform diminution of the frequency of the heart's contractions, after immersion in a bath at a temperature below 98° F. In some of the experiments, there was a slight acceleration of the pulse; but it was speedily reduced below the natural standard. Dr. Lockette found, in his own case, that on going into a bath of the temperature of 98° F., his pulse beating 80 strokes in a minute,—an immersion of half an hour was followed by a reduction to 74 strokes. His friend Mr. Mitchell, “a young man in perfect health, of a robust and athletic constitution,” whose radial pulsations were 79 in a minute, found these reduced to 64 by immersion for ten minutes in a warm bath of 94° F. This same gentleman, on another occasion, entered a bath of 90° F., in which, in the course of five minutes, his pulse, which previously was 80 in a minute, was reduced to 64 beats. As illustrative of the differences in results in different persons, we find that Dr. Lockette himself, with his pulse beating 83 in a minute, after being immersed five minutes in a bath of 90° F., had these beats reduced only to 79, and in ten minutes they were 80—showing a difference of only 3 beats. The change in Mr. Mitchell's circulation from the same exposure was 16 beats.

The *respiration* underwent, in the baths of which I have just been speaking, a retardation, correspondent with that of the circulation. Buchan seems inclined to admit more readily the former effect than the latter. Dr. Murray† says: When the heat (of the bath) is below 95°, the pulse and respiration become slower, almost in proportion to the

minutes, to seventy-two; between which and seventy-five it remained. After he came out of the bath, although there was reaction, so far as regarded the evolution of very evident heat, Marcard calls it burning of the skin, the pulse still kept at seventy-two beats in a minute.

* “Inaugural Dissertation on the Warm Bath,” for the degree of Doctor of Medicine in the University of Pennsylvania. 1801.

† A Dissertation on the Influence of Heat and Humidity, &c. By James Murray, M.D.

qq*

diminution of temperature, down to 88° . This author cites the opinion of Duncan respecting the effects of the warm bath, which in the main are so judicious that I shall give insertion to them here.

“The warm bath excites the sensation of warmth partly because our sensations are merely relative, and partly because its temperature, though less than that of the internal parts of the body, is greater than that of the extremities, which are the chief organs of touch. But as water is a much better conductor of caloric than air, and especially than confined air, as much caloric is abstracted from the body by water, which is only a few degrees lower than the internal temperature of the body, as by air of a much lower temperature. The warm bath diminishes the frequency of the pulse, especially when it has been greater than natural; and this effect is always in proportion to the time of immersion. It also renders the respiration slower, and lessens the temperature of the body, relaxes the muscular fibre, increases the bulk of the fluids by absorption, removes impurities from the surface, promotes desquamation and renewal of the cuticle, and softens the nails and indurations of the skin.”

Both the absorbing and exhaling functions of the skin are increased by the warm bath. In this respect, it contrasts with the cold bath, immersion in which prevents exhalation, and gives little scope to absorption, especially if the water be of a low temperature. Most of what was said in Chapter II. of the present volume, of the changes in the organic functions of the skin produced by the bath, apply to the warm.

The depurating offices of the skin are thus rendered more active by warm bathing,—at the same time that the blood, while parting with effete or deleterious substances, receives, by means of absorption, an augmentation of its aqueous element, and so far is diluted and rendered less stimulating. Probably, however, the temporary increase of volume of the blood, obtained by this means (we are supposing now a protracted stay in the bath), may compensate by the stimulus of distention for a dilution of the saline and other stimulating ingredients of this vital fluid.

One of the proofs and direct effects of aqueous absorption in the warm bath, and of the increased quantity of

water in the blood, in consequence, is the greater secretion from the kidneys of limpid urine, shortly after coming out of the bath.

In like manner may we explain another not infrequent, though far from uniform, effect of warm bathing, viz., an increased evacuation from the bowels. The water of the bath taken into the blood is freely given out by the secretors on the mucous surface of the intestines, and by this kind of lubrication the passage of their fecal contents is facilitated.

A pleasant evidence of the action of the warm bath on the skin is afforded in the readiness with which immersion in it aids to detach the cuticle or epidermis,—no small portions of which are seen floating on the surface of the water, if any time has been allowed to elapse since the last bath. This separation of the outer or scarf-skin, as the cuticle is often called, is due to two causes: its softening by the water, and its being thrown off by the increased fulness of the vessels of the true skin beneath.

That was an ingenious and by no means strained idea of a writer who compared the cuticle, which covers the whole surface of the body, to a tight shirt. To a person whose own habits are cleanly, a dirty cuticle will appear in the light of a dirty shirt.

A prolonged use of the warm bath, from day to day, for a considerable period, is followed by eruptions on the skin, similar to those on which the advocates of hydropathy lay so much stress, as critical, in the various diseases in which their practice has been tried. Marcard tells us, that they who are afflicted with diseases of the nerves, owing to what is believed to be acrid or foul humours, and who have strength enough to bear the treatment, are sent to Pfeffers; or Landecke, in Silesia, with a view of being subjected to the cure by prolonged warm bathing. Beginning with an hour or two, the period is gradually extended so as to include nearly the whole of the day. The patient is seated in the bath, so that about one-half of the body is immersed in the water. The other or upper part is but lightly covered with clothing, and is represented to be immersed in a dense vapour, and to be very sensitive to the impression of the air thus saturated. The eruption appears after a time, varying, in different subjects, from

three to four weeks ; and it then increases to a certain point, after which, although the baths are still continued, it gradually abates, and disappears entirely in from three to four weeks longer. The cure is then said to be completed. Experience points out, we are told, the danger of interrupting the treatment before the eruption has gone through its course.

The most unequivocal, and, at the same time, the most agreeable effects of the warm bath, are manifested in its operation on the nervous system. On one division of this system, that of organic or nutritive life, we infer its decided action, from the phenomena which have just been described to take place in the circulation and respiration, and in exhalation and absorption. Just now, however, I wish to direct the attention of the reader to the influence of warm bathing on the nervous system of animal life, or that of relation.

The impression made on the sentient nerves of the skin, and transmitted to the brain and spinal marrow from the encephalo-spinal centre, to the other senses and the voluntary muscles, is followed by sensations which are indistinct ; and because of their indistinctness, of a singularly soothing nature. A pleasing languor gradually and almost imperceptibly steals over the brain and senses, and produces a strong inclination to sleep, which, as I have repeatedly ascertained in my own person, may be yielded to in the bath, to one's great comfort and enjoyment. The aching and concomitant weariness caused by protracted or violent exercise or labour, are entirely removed by the warm bath, in virtue of its genial operation on the nervous system.

In like manner is a pathological condition, manifested by pain, cramps, or burning heat of the skin, removed or greatly mitigated ; and often the sufferer, after leaving the bath and retiring to his bed, enjoys a sound and refreshing sleep, to which he had been long a stranger. Even when the nervous system continues to be teased and irritated by a fixed inflammation or irritation of an internal organ, it will often obey the soothing and hypnotic influence of the warm bath, so far as to allow of sleep, or a period of almost equivalent, even though waking, calmness and repose.

Hygienic Effects of the Warm Bath.—A knowledge of the physiological action of the warm bath enables us

to appreciate the better its hygienic effects. The very exercise of the function of each organ, although necessary for its health, is accompanied with or implies the existence of an excitement which is itself a means of wearing out and exhausting the energies, strength we may call it, of the organism. The more, therefore, we can restrain the range and force of this excitement, short of interfering with that which is necessary for the functional exercise of the organs, the more do we husband the strength and prepare the general system for a renewal of exertions, and especially of those of the brain and muscles, in the processes of thought and locomotion. The most efficient means for procuring this desirable result are sleep and a recumbent posture. The warm bath implies the second of these as a matter of course; and it makes the nearest approach to sleep, if it does not actually procure it. In it the nervous and muscular systems enjoy repose and the refreshment following repose. The internal organs, and especially that great and ever-active hollow muscle the heart, and the muscles concerned in respiration, though not obtaining entire rest like the voluntary ones, or those of locomotion, are as little tasked as possible in the bath; and thus the general system is saved a great expenditure of excitement, and is prepared for subsequent renewed, and, if need be, violent exercise.

The more complete the repose or the approach to the lowest degree of excitement compatible with health, the greater will be the renovation of all the functions, and their ability to endure subsequent exertion and fatigue. Modern civilization, with its unceasing restlessness and fidgetiness, seems to have forgotten this wholesome principle of hygiene: it acts as if change of sensation, a continual lashing of the flagging faculties, by every variety of stimulus, diffusible and sensual, were the means of warding off and of removing fatigue when it does occur.

The dress and conventional postures of refined life are constrained and artificial, and are opposed to the easy play of respiration, and to the moderate action of the heart. The wild Indian and the wandering Arab of the desert, yielding to their instinct, which is but a modification of that of self-preservation, throw themselves prone on the ground, after the labour of the chase, or the day's journey through the

desert is over,—and even before they are overtaken by sleep: or if particular circumstances should prohibit this indulgence, they obtain refreshment from their fatigue by their very posture, which allows of the greatest rest to all the voluntary muscles, while, at the same time, it diminishes by many beats the contraction of the heart.

Even where civilization, so far at least as a formal ceremonial is concerned, becomes engrafted on the nomade life, we find all the ancient people of the East, and those who, from similarity in climate readily imbibed their practices, chose the recumbent or semi-recumbent posture, not only when alone but in their visits and festive meetings. Do we not see in their greetings of each other, and in their gestures of respect and devotion to their seniors and superiors, from the first graceful flexion of the head on the chest and folding of the arms to kneeling and entire prostration, modifications of the same primary instinct,—to cause as little strain as possible on the motor organs.

So far from admitting this instinct, which belongs to and is manifested by all animated beings, we who boast of our civilization stigmatize indulgence in it as indolence and effeminacy, and as opposed alike to the acquisition of strength and to its vigorous exhibition. The Indian is not less prepared to engage afresh in hunting the buffalo, or in the pursuit of an enemy, after he has reclined for a period under the shade of a spreading tree, or on the skins in his wigwam,—nor is the Tartar messenger less ready to renew his astonishing pedestrian feats, after his having stretched himself out for some hours on a divan or a pile of mattings and cushions, than if both of these persons had kept themselves stiff and erect on a strait-backed chair, or in training by a walk, or continual alternations of sitting and standing—in imitation of their more civilized instructors.

We have, it seems to me, both direct proof and the support of all the analogies of hygiene, in favour of a belief, that the entire repose of some organs and the diminished excitement of others, and the removal of irritation from all, as procured by warm bathing, are not only highly grateful to the feelings, but a powerful means of refreshment and invigoration.

The very natural question of Marcard, that, as there are

innumerable substances which have a stimulating action, why should there not be others whose action is directly the opposite of a stimulant, has been answered in the affirmative by Rasori and others of the modern Italian school. They, to save the paraphrase of Marcard, call the agents which he supposed might be found, *contra*, or counter-stimulants—substances the reverse of or opposed to stimulation. Among the articles of this class the warm bath is fully entitled to a place. Perhaps, although not entirely identical, and although still associated in the minds of many with the idea of narcotic depression, the more familiar term of sedative may still be used to indicate a mode of operation—a change in the vital actions if not in the vital texture—the reverse of stimulation. But I have spoken of the cold bath as also a sedative. There seems to be, however, this difference between the two—that while the cold bath depresses at once, and powerfully, the circulating and nervous systems, benumbing and rendering them torpid, it may be even unto death, or prepares for a violent and irregular reaction—tingling and glow—the warm bath is just in such a relation with the nervous system as to convey a sensation, soothing by its mildness and active by its diffusiveness. Blood is invited into the smaller vessels of the extremities, which were of a temperature less than the water, and thus an equal yet moderate fullness and action of these vessels is produced; an effect still further insured by the softened and diminished resistance of the external tegument, or cuticle. This equalized fulness of the cutaneous capillaries is doubtless sympathized in by the membranes generally, and thus the resistance to the heart's propulsive power is less, and its contractions are in consequence fewer, and at the same time more equable. Partly from the same cause respiration is easier and slower. Another cause is the diminished action and rest of the brain. In evidence of the warm bath exerting that pleasurable influence over the nervous system, on which its effects in a great measure depend, I have mentioned its tendency to produce sleep—a state alike removed from either class of sensations, the excitingly pleasurable or the excitingly painful; and a state which may be brought on by gentle friction with a smooth and soft body, such as the hand, over the skin—

the same surface on which the warm bath exerts its primary and chief influence. But it is not necessary to take sleep as the representative and final effect of the beneficial operation of the warm bath. Its soothing influence is clearly enough evinced in the pleasant rest enjoyed by the senses, the brain, and the muscular apparatus for voluntary movement, and in the diminished excitement, harmonized action, and balance of the internal or nutritive organs. If, in fine, to the warm bath be added the oriental accessory of gentle friction of the skin, the person subjected to these processes will more than realize all the boasted effects of animal magnetism.

Exerting such a marked influence over the entire nervous system, including the internal and external senses and the brain, and over the circulation and respiration—we cannot be surprised at the eulogies which have been lavished on the warm bath; nor find any difficulty in understanding how it should exert indirectly invigorating effects. A person, for example, after labour or a long journey in a hot day, suffers from feelings of heat, thirst, accelerated circulation, and excited senses, all of which are removed or allayed by warm bathing. The irritable and excited senses and brain are soothed, as well by the abstraction of the superfluous caloric as by the direct influence of the bath on the sentient portion of the skin. Hence, while strictly admitting the counter-stimulant, or sedative and tranquilizing action of the warm bath, we can understand how it should give feelings of renewed strength, by removing and quieting irritation and morbid excitement, which are, as we see in fever, inflammation, &c., so enfeebling and exhausting to the human frame.

By most persons, including even our professed teachers, a belief seems to be entertained that tone or tonic effect implies the addition of a new and active principle to the existing textures and organs of the living body. Whereas, in fact, a tonic merely acts by placing the functions in such a rhythmical condition as that the nutrition shall be more readily and completely performed; and that all the organs, in consequence, shall receive their full supply of duly elaborated blood. Another evidence of tonic effect will be a greater readiness of innervation, by which the senses are more quickly called into exercise, and the loco-

motive muscles into active contraction. Warm bathing complies with these requirements, and, in virtue of its sedative or contra-stimulant operation, procures tonic effects. If asked for proofs of this assertion, we point to the uniform tradition of Grecian mythology, to the uniform practice of entire nations, Asiatic and European, some of whom have been celebrated for their bodily strength and prowess in the field of battle; and, in fine, to the uniform testimony of all travellers.

CHAPTER XL.

THE WARM BATH (*continued*)—CIRCUMSTANCES FAVOURABLE TO THE USE OF THE WARM BATH—ANALOGY OF THE WARM TO THE COLD BATH, IN THE SUBSEQUENT REACTION—TIME FOR THE WARM BATH—COUNT RUMFORD'S EXPERIENCE—DURATION OF THE WARM BATH—BALNEATORY USAGES AT LEUK—DRINKING THE WATER AND BATHING—COLLATERAL ADVANTAGES FROM VISITING LEUK—POMME—BACHETTI.

Circumstances favourable to the Use of the Warm Bath.—After the fatigues of a journey, gymnastic exercises, or the chase, the warm bath is peculiarly fitted to renovate and refresh. Bruce, in his travels in Abyssinia, says explicitly, that when he felt an almost intolerable inward heat, and was so exhausted as to be ready to faint, a warm bath soon made him feel as much invigorated as on his rising from bed in the morning. "Some persons may tell me," he continues, "that the heat of the bath must weaken and enervate, but I can assure them that the reverse is the case." He afterwards, in speaking of the cold bath, says, it is an erroneous notion that this latter bath will act as a tonic in a very hot climate. He gives his own experience, as proving, that when overheated by violent bodily exercise, a warm bath cooled him and renewed his strength much better than a cold one of the same duration.

High vascular excitement, with nervous irritation, as marked by hot skin and the other symptoms already men-

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tioned, is often allayed by cold bathing: that vigorous state of health, in which there is excess of caloric and general vigour, will tolerate, and often be benefited by it. But a mixed state of excitement still persisting, after it has much exhausted the individual, together with internal heat and thirst and rather a cool skin, or the temperature of this surface unequal, will demand in a more peculiar manner the resource furnished by warm bathing. The habitually feeble and infirm, the nervous and excitable, and the cold and lymphatic constitution, ought all to use the warm rather than the cold bath. Persons advanced in life, whose functions preserve a tolerably equal rhythm, but who have little energy of reaction under depressing agencies, or, as expressed in popular language, little strength to throw away, must give the preference to the warm bath. They who are readily heated, and as readily cooled; who, though weak in their muscular movements, are prone to vascular or nervous excitement, and febrile movements from the least increase of mental or corporeal exercise and stimulation of the senses, should imitate the same practice. Warm bathing has been already spoken of as beneficial to persons in advanced life, by softening the cuticle, the increasing induration of which at this time has a tendency to obstruct perspiration.

There is a point of resemblance, not noticed by writers on the subject, between the cold and the warm bath, which I have frequently felt on my own person. It is a degree of reaction, or an approach to excitement, some time after coming out of the bath. The period that will elapse before this is felt varies from one to two, or three hours. The reaction, manifested by increase of heat of the skin, and especially of that of the head, and some thirst, is more apt to occur if no exercise has been taken after the bath; and also if the duration of this latter has been for a short period.

Time for the Warm Bath.—The proper time for using the warm bath, if had recourse to as an agent of hygiene, is when the stomach is empty, either before breakfast, or, what may be found still more conducive to comfort, before dinner. Some give the preference to the evening just before retiring to bed; and in certain constitutions, when a light and early dinner has been taken, it

may be used at this time with advantage. Remembering, however, that most invalids have a little increase of excitement in the evening, we must not be surprised if a warm bath, nearly at blood heat, should not be sufficient to abstract the superfluous caloric, nor to moderate the excitement at this time. In such a state of the system, the water should be used at a lower degree of temperature than would be required earlier in the day. But the case is different if the person have been engaged in active muscular exercise, protracted labour, a fatiguing journey, and the like. Then the bath should be of the warmth already indicated, viz : 95° F.

Illustrative of the best time for using the warm bath, is the account of his own experience in this matter, left by Count Rumford, on the occasion of a visit to Harrowgate for the sake of his health. He relates, that he at first took a bath of 96° F. every third evening, about ten o'clock, just before retiring to bed. Its duration was from ten to fifteen minutes. He pursued this practice for some time, but found himself feverish and restless after bathing. On mentioning the circumstance to an intelligent gentleman, a fellow-lodger, the latter advised the count to change his hour of bathing, and to stay longer in the bath, and above all to avoid going into a warm bed on coming out of it. The advice was followed : the bath was taken two hours before dinner, and the period of stay in it prolonged to half an hour. Instead of going to bed the count dressed himself in a morning gown, and amused himself walking up and down in his room, and reading and writing until dinner-time. Among the good effects of this practice on the narrator, were absence of feverish heats, and, at the same time, of chilly feelings, or increased sensibility to cold on coming out of the bath : but, on the contrary, he always found himself less sensible to cold after bathing than before. He had a better appetite and digestion, and better spirits on the days that he bathed than on those when he did not. The pleasing effects which resulted from the bathing continued for many hours, and "never was followed by any of that distressing languor which always succeeds to an artificial increase of circulation and momentary flow of spirits, which are produced by stimulating medicines."

Emboldened by the success of this change the count began to bathe every *second* day ; and soon afterwards *every* day,—for half an hour in a bath of 96° to 97° F., “during thirty-five days.” His concluding remarks are emphatic, and worthy of being repeated and remembered.

“The salutary effects of this experiment were perfectly evident to all those who were present, and saw the progress of it ; and the advantages I receive from it have been permanent. The good state of health which I have since enjoyed, I attribute to it entirely.”

But, although, as a general rule, the proper time for using the warm, and the same should be said of the cold bath also, is in the morning before breakfast, or before dinner—always on an empty stomach, yet persons of a sluggish circulation and lymphatic temperament, with habitually cool skin, and suffering often from cold extremities, may take the warm bath before retiring to bed. This permission must be understood to imply positively that an early and a light dinner has been taken several hours before hand ; or, if the principal meal, in the form of a supper, is still to be partaken of, that the bath shall precede it—as was the usage among the Romans.

In laying down the same hour for the warm as for the cold bath, I may add a slight qualification, that if we are to indicate any preference between the early morning and the anteprandial hour, we should incline to the latter in the case of the warm, and to the former in that of the cold bath.

Rumford very properly exposes the fallacy of that reasoning which would lead us to abstain from the use of the warm bath, for fear of its rendering us more liable to take cold. On this subject I have already expressed myself in detail, and shall not further dilate at this time. It has been justly said, that a person has, in fact, no more occasion to dread catching cold after having been in a warm bath, than he has from going into the open air, on a frosty morning, after leaving his room. If I may be allowed to cite my own personal experience on this question, I can freely declare, that, during the many winters in which I have used the warm bath, so far from my liability

to catch cold having been increased by it, I have actually suffered less than heretofore, in this way.

Duration of the Warm Bath.—This has been already stated under the head of “Hygiene of Bathing” (Chapter XIV.), to be from half an hour to an hour, for persons in health. In disease the period will vary, of course, according to the indications which the bath is intended to fulfil. If a decided impression is intended to be produced, the stay in it ought to be of some duration—much beyond that which is commonly directed by English and American physicians. Looking to the usages, in this respect, at the baths attached to the warm springs in continental Europe, we may take examples from them fruitful of clinical application.

In the chapter (XIV.) on “The Hygiene of Bathing,” mention was made of the fact of the frequenters of the baths at Pfeffers and Leuk or Loeche, passing many hours at a time in the water; and reference to the same practice has just been made in a preceding paragraph. Leuk is a small town of the Valais, ten leagues from Sion. The buildings for the baths are divided into four grand compartments, each capable of containing a large number of persons. At each angle of the compartments is a small cabinet, in which the bathers undress and dress, and from which there is a slight descent to the water. Two of them are kept at an elevated temperature by means of stoves. A pipe furnished with a cock supplies the water of the spring* either for the purposes of drink, or in order to keep up at a suitable temperature the water of the bath. Both sexes, suitably attired, bathe together. Many of the bathers have before them small floating tables on which are placed their breakfast, glass for water, handkerchief, books and newspapers. The tables are frequently decorated with bouquets of Alpine flowers, brought by Valaisian girls from the neighbourhood.

The dress of the bather consists of a large flannel gown, covering the whole body, and a tippet of the same to protect the shoulders from cold.

All the baths are emptied and filled every day. In four different ones, in which there were bathers at the time of

* The temperature of the several springs at Leuk is from 112° to 124° F.

Dr. Forbes's visit, the temperature was respectively 95°, 96°, 98° and 99° F.*

The bathing at Leuk begins at four or five o'clock in the morning; and so far, as in the case of the hydropathic treatment at Graefenberg, a good purpose is served in another way, by insuring early rising and its necessary preliminary, early retiring to rest. The bather remains in the water from one or two to five hours, to go in a second time in the afternoon; and remain from one to three hours,—making the daily stay in the bath from two to eight hours. There are eighteen or twenty large public baths, varying in size from 8 feet by 11 to 18 by 30, and each capable of containing from fifteen to thirty-five persons—smaller ones holding from four to six.

The ordinary period of bathing or *cure*, as it is called, is twenty-five days. Two or more seasons are often deemed requisite for a single cure.

The water is used internally as well as externally; sometimes in conjunction with the bath or sometimes by itself.

A course of drinking is only half as long as that of the bath, being about twelve or fifteen days, and consists of from two to ten glasses, taken in the morning fasting, with an interval of ten or fifteen minutes between each two.

As justly remarked by Dr. Forbes, whose description, substantially the same as that of so many tourists and physicians who have preceded him, I now substitute, in part, for that in my former work—the practice at Leuk is active enough to be powerful for good or for evil.

One cannot help being forcibly struck with the close resemblance between the double mode of using the warm water at Leuk, and the cold water at Graefenberg—viz., by bathing and by drinking, and of the lengthened period of its application in both places; as well as the similarity of physiological action, and through it of therapeutical effect, in the production of cutaneous eruptions. Considering that Landeck, in which these lengthened warm bathings and free warm water drinkings are carried on, is in the same province (Silesia) as Graefenberg; and

* A Physician's Holiday: Or a Month in Switzerland in the Summer of the year 1848.

that the knowledge of the aqueous regimen at the first of these two places must have been general among the people, it is easy to suppose that Pressnitz took not a few pregnant hints for his guidance in the cold water, from the usages in the warm water cure. He substituted not so much novelty of result as apparent difference in the means for procuring it.

In view of the extreme urksomeness, both from the constrained posture and the want of anything to amuse or interest in a common private bath, Dr. Forbes proposes an imitation of the Leukerbad, at the Bath Springs in England. Extending the suggestion, which I believe to be a good one, to our own country, we might wish that the Swiss and German fashion were followed in the United States, as it might easily be, at the Warm and Hot Springs in Virginia, North Carolina, and Arkansas.

The following remarks and reflections were made in my former work, and may be repeated here as apposite to the present occasion.

Leuk is in a valley which is studded with pasturage and cultivated fields, and furrowed with torrents. The glaciers extend thus far. It is even at the base of the glaciers—of mountains eternally frozen, that these thermal waters escape; exhibiting one of those contrasts so beautifully portrayed by Haller, in his fine poem on the Alps. What adds to the singularity of the scene is, that at the distance of some steps from one of the principal thermal springs, there rises a spring of cold water.

After all, whatever virtues we may concede to bathing in and drinking the waters at these springs, we cannot doubt that a bright cerulean sky, the variety of picturesque situations, and the extreme purity of the air at Leuk, contribute largely to those wonderful cures which have been narrated to us by physicians and travellers.

The Swiss practice is common at Laudecke, in Silesia, where, according to Burgort and Bach, six hours are passed daily in the water; and the cure is performed in from four to six weeks.

The reader has been already told, that at Aix-la-Chapelle, where Charlemagne spent a portion of his time, it was common for that celebrated man to hold his levee in the warm bath, which was supplied by one of the numerous thermal springs of that city.

After these accounts, we shall feel less surprised at the cases treated by Pomme, details of which will soon be placed before the reader: he kept his patients many hours a day in the bath, and continued the practice for several months, with the effect of curing the malady.

Bachetti, in his notices of the mineral springs of Porretta, states that he has seen the bath (warm) borne for two hours at a time, and repeated with incredible advantage. The persons who adopted this practice were, however, of the most juvenile and robust class—the aged and infirm could not have borne such a sedation as would have resulted from so long a detention in the bath.

CHAPTER XLI.

THE WARM BATH (*continued*)—THERAPEUTICAL EFFECTS OF WARM BATHING—IN CONVULSIONS—IN MENTAL DERANGEMENT—VAPOUROUS AFFECTIONS—POMME'S CASES—HYSTERICAL CONVULSIONS—PARALYTIC DISEASES—WARM BATHING IN BILIOUS COLIC—IN CHOLERA INFANTUM—IN DISEASES OF THE RESPIRATORY ORGANS—CROUP—OUTLINES OF ITS TREATMENT—CATARRH—IN NEPHRITIC AFFECTIONS—BRIGHT'S DISEASE—IN UTERINE DISEASES—AMENORRHOEA—CHRONIC METRITIS—CANCER UTERI—IN CUTANEOUS DISEASES—IN FEVERS—INTERMITTENT AND CONGESTIVE.

Therapeutical Effects of Warm Bathing.—From what has been said of the physiological operation and effects of the warm bath, we are prepared to state, in advance, the range of diseases in which it will exert a curative agency. In the first place, morbid exaltation of sensibility, acute pain, alone or accompanied with irregular and convulsive action of the muscles, will be greatly mitigated, and often removed by this remedy. Its use is particularly called for in the *convulsions* of children and the *hysterical affections* of females, as well as in the varieties of colic, from the simple spasmodic to the bilious and painter's (*colica pictorum*). We are not to forget, however, in these, as indeed in all other maladies marked by convulsive move

ments of the muscular system, the importance of removing the local irritant, and of mitigating by means directly applied to the part itself, the local irritation, on which we find the sympathetic and often alarming disturbances of the brain, muscles, and bloodvessels, delirium, convulsions, and fever, so frequently to depend. But, although we may not entirely cure or arrest the disease by warm bathing, we shall mitigate its violence, and gain time for the application of other remedies. The brain and heart are, in some persons, peculiarly responsive to the slightest deviation from the customary healthful excitement, as well as to the remains of irritation in disease. Warm bathing, under all these circumstances, is an excellent means of soothing the nervous and sanguiferous system, and of preventing a convulsive habit from being formed.

Children, more prone than adults to convulsions, are in a more especial manner benefited, in these cases, by warm bathing—owing, we may presume, to the sympathies of the skin with the brain, and indeed with all the important organs of the economy, being more active and diffusive in them than in adults. In cases of great determination of blood to the head, with throbbing temples and flushed cheeks, independently of other remedies, it may be proper to apply cloths wet with cold or iced water to the head while the patient is in a warm bath.

The same practice has been found to be eminently serviceable in *mania* and *mental derangement* generally, in which extreme wakefulness and dry skin are predominant symptoms. Esquirol orders the warm and more frequently still the tepid bath to be continued two hours, and sometimes eight hours daily, and never finds it to induce debility, if forty-eight hours are allowed to elapse before its repetition. Warm pediluvia, and the hip bath, are often used to soothe maniacal ravings. Esquirol, in advising very warm pediluvia at the same time with the cold douche, cautions against using water too warm at first; “it causes pain which reacts on the brain.”

In what Pomme (*op. cit.*) calls the vaporous affections of both sexes,—hysteria and hypochondriasis,—he employed the tepid approaching to the warm bath, or 91° F. (26° R.), with great freedom, and with very beneficial results. Unlike the common occasional prescription of this remedy for

momentarily soothing irritation, he made its use an important and sometimes the chief part of the treatment,—to be persisted in regularly for months. His patients remained in the bath,—some two and three hours,—others eight and ten hours, every day.

The subject of one of the cases recorded by this author had suffered from dyspepsia in various forms,—with great derangement of the nervous system, palpitations, singing in the ears, &c., for several years—for which he had at first been bled, vomited, and purged, and afterwards took opiates and antispasmodics, and a few domestic baths. Pomme directed this patient to use chicken-water for his common drink for a month. It was made by boiling, during a quarter of an hour, a young chicken in six pints of water; and it was then slightly flavoured with lemon-peel. After this, recourse was had to the warm bath, in which the patient remained three hours every day. His food consisted of poultry, lamb, mutton, and fish, boiled or fried; and his drink of pure water, which he took without stint at his meals, and several times during the day, and especially in the morning fasting. This is a pretty good example of the watery regimen, among the advocates of which Pomme has been cited in a former chapter of this volume.

This treatment, aided by the use of the waters of Yeuse, benefited the patient for awhile; but a relapse following, required a renewal of the course of bathing and regimen which eventually restored him to health.

The case of another patient, a lady forty-two years of age, who had been long a victim to violent convulsions, and who suffered, also, from paralysis of the right leg, furnished a still more memorable example of the curative powers of the warm, or, as it may be called, tepido-warm bath. The convulsions were periodical; coming on every Monday at six o'clock in the evening, and continuing all night and the following day: they left the patient in a state of stupor, and inability to swallow more than a few drops of water. The disease was attributed to *phlegmasia dolens*, or milk leg after child-birth, four years before. There was great soreness of the bowels, so that the slightest touch gave great pain.

The patient was put on the use of veal-water for her

ordinary drink, and directed to use the warm bath (91° F.). In the latter she was in the habit of remaining ten hours every day. Her food was chiefly rice, either plain or with milk, which was all that her stomach could bear. Under this course of treatment, the convulsions ceased, after six months. In ten months she regained some power over her hitherto-paralyzed leg, and in fifteen months she was able to walk.

Hysterical convulsions, associated with a fixed pain and burning heat of the pylorus, bulimia, irregular menstruation and hepatic obstruction, were removed, and the general health re-established by the tepido-warm bath, watery drinks, and all the other known "humectants." The period of the bath was increased, in this case, from four to eight hours daily. After several months of this kind of treatment, the bowels were freely acted on, and the liver and gall-bladder relieved of their presumed engorgement, by the passage of several biliary calculi. One of these, of a triangular form, wounded the mucous membrane in its passage, and hemorrhage was the consequence. Astringents were used at first to arrest this; but they proving unsuccessful, Pomme had recourse, with entire success, to a very different article—viz., gum arabic. Twice, the regular treatment was suspended by the occurrence of hemorrhage, and as often was the gum arabic adequate to check it. Pieces of membrane detached, as the author believed, from the duodenum, and gravel were passed at different times by this patient. The disease was supposed by Pomme to be a crispation (*racornissement*) of the duodenum. We may presume it to have been a case of duodenitis, with biliary calculi.

Pomme attributes much mischief, both in this and in many other cases which he records, to the use of irritating purgatives, against which and cordials, and stimulants generally, he had as great a horror as Broussais himself could have a generation later. Substituting the phraseology, tension of fibre, for *gastro-enterite*,—and the practice of the former was based on as sound a pathology as that of the latter,—in his withholding purgatives until the fibre had become relaxed—the *gastro-enteritis* removed, or the irritation abated.

In what Pomme calls *spasmodic hemiplegia*, the tepido-

warm bath was found to exert a very salutary effect on the disease. A case is related of a man of quality, aged thirty-two years, who had suffered for a long time from headache, from which he was relieved by the use of the bath and diluents. Neglect of the rules of prudence brought on a return of his disease, with, at last, insensibility and convulsive movements, followed by hemiplegia of the entire right side. The treatment of this case directed by Pomme, is summed up as follows: "A hundred and sixty tepid baths, as many broths of chicken or turtle, and numerous lavements of water, with the rawness taken off, and oftener cold, restored suppleness to the paralyzed limbs: exercise on horseback gave to these parts their freedom of movement,—so that the patient regained his former health, to the great astonishment of those who had declared him dead, because he had submitted to new trials."

Another and still more remarkable case of a lady, thirty-one years of age, who had suffered from hysterical convulsions, with paralysis of one leg, and loss of sight, induration of the small lobe of the liver, and renal calculi and dysury, is described by Pomme. During two months, the tepido-warm bath was employed eight hours every day, and five or six pints of chicken or veal-water drank, and cold lavements administered,—but without any perceptible advantage. In the third month, however, symptoms of improvement began to be manifested, in a restoration of the sight, which was preceded by violent pains in the posterior part of the orbits.

The paralyzed leg had become atrophied, and was bent upon the thigh, which was, in its turn, flexed on the pelvis. By persistence in the course of treatment already described, for many months more, the sensibility of the leg which, as well as its mobility, had been entirely lost, began to return at the expiration of twelve months. In addition to the general bath, the patient also used a warm *pediluvium* for the affected limb. The final result was a restoration of the use of the paralyzed and contracted limb, and of the general health.

In whatever light we may choose to regard this case, it is full of interest. They who are skeptical of the powers of the warm bath and the dilute regimen, will probably refer the salutary termination of the malady, or rather series

of maladies, to the recuperative powers of the animal economy, or of nature, as we commonly call it.

Hypochondriacs, who are wakeful at night, may take the warm bath for an hour, before going to bed,—with the effect of soothing their irritated nervous system, and of procuring sleep.

In *bilious colic*, the acuteness of pain is best allayed by the warm bath and a full dose of an opiate—immersion in the water to be continued for at least half an hour, and if need be an hour, or even longer. This is the treatment adapted more particularly to tranquilize the nervous and muscular systems, and if resorted to at the beginning may be sufficient: but after the disease has persisted until the membranes of the gastro-intestinal canal are injected, and the vascular system called into active and perturbing sympathy, then is free sanguineous depletion demanded, in addition to, we may say conjointly with, opium and warm bathing. In *colica pictorum*, these two last-mentioned remedies are of primary importance; and are more entitled to our confidence than in bilious colic or other *gastro-enterites*.

Infantile cholera, and *cholera morbus* as it attacks adults, often imperatively call for the use of the warm bath, where there is much coldness of the general surface, or of that of the extremities. This state is of more frequent occurrence in cholera morbus, in which, warm water, externally applied by immersion, and internally by enemata, will often be found of paramount importance.

Cholera infantum requires a bath, the temperature of which shall be in the inverse ratio of the heat of the skin:—the greater and more acrid the latter, the colder will be the water; while a cold skin, especially after the disease has been of some duration, will be most benefited by warm immersions or affusions. The same rule guides us in the temperature of drinks and enemata. And here I may remark, that, on the judicious application of this simple remedy, water, in the manner above stated, and the administration of mild diluent drinks, with the timely use of bloodletting, will mainly depend the practitioner's success in the infantile cholera, a disease often so rapid in its course and fatal in its termination in our cities. However unpalatable such an opinion may be to the pharmacologist,

it is one which I have arrived at after much and careful observation, and a range of experience, including both public and private practice, by no means limited.

With slight modifications the same remarks are applicable to the treatment of *dysentery* and *diarrhœa*, more particularly of the *chronic* kind. Frictions over the skin generally, and especially over the abdomen, will be found a useful adjunct to the warm bath in these forms of disease.

Warm bathing is a remedy adapted to all the *diseases of the respiratory passages*—due attention being paid to the stage and accompanying phenomena, and the peculiarities of constitution of the sick person.

In *croup* the remedy is one of undoubted power—but its reputation is often diminished, and, still worse, its utility marred, by inattention to the temperature of the water and to the duration of the bath—tepid being often used for warm water, and a few minutes in place of one or two hours' immersion being practised. When the extremities, and surface generally, are cold and pale, the bath may be nearly 98° F. Flushing of the face, with some symptoms of general excitement and fever, will demand that it should be two or three degrees lower.

Vomiting, warm bathing, and bloodletting, if had recourse to early in the disease, will rarely fail to give us a ready and entire control over croup. As it is not easy to tell the precise extent of organic change in the larynx and air-passages generally, nor to predict the successive changes which the mucous membrane undergoes, it will be safer to use that remedy which, while it causes free vomiting, shall also act as an antispasmodic and antiphlogistic or contra-stimulant. Tartar emetic, in an eminent degree, displays these effects, and produces a peculiarly active impression on the system of respiratory nerves. It is the medicine which I almost uniformly use in croup. It may produce, in some of the milder cases, unnecessary feebleness and languor; but, on the other hand, if the case should turn out to be a severe one, no other remedy will exert so controlling an influence—will so directly arrest the farther progress of the disease, or, failing to do this, will diminish the probability of inflammation extending to the bronchiæ and the lungs. Often and freely as I have

used the tartar emetic in croup and other diseases, I have never seen any sinister effect to result.

Failing to produce a ready emesis by the antimonial salt, the warm bath ought to be enlisted as an auxiliary. The patient should be immersed in water of the temperature of 95° F., and allowed to remain in it until free vomiting is brought on. The use of the bath may sometimes follow that of the emetic, when the latter has not entirely removed the croupal breathing and cough. It will, also, be an useful auxiliary to medicinal diaphoretics, when they are administered in the second or subdued stage of croup.

In the bath the patient will be bled with advantage, when the emetic either fails to operate or to produce the desired effects, by the removal of the urgent croupal symptoms.

I repeat : that, by the aid of these three remedies, an emetic, the warm bath, and bloodletting, a decided and early control over croup will generally be obtained. A physician once called to a case of this disease, will not leave it until he notes a marked mitigation, if not removal, of all the bad symptoms ; and if he avails himself of the mode of treatment just sketched, he will seldom be embarrassed by failure.*

On this, as well as on other occasions, when the warm bath is directed to be used in the sick-room, and no thermometer at hand, I advise the mother or nurse to immerse her own arm up to the elbow in the water. If she feel a grateful warmth in doing so, the temperature of the bath will be found to be that adapted to the feelings and wants of the patient. The common fashion of just touching the water with the fingers, gives no measure of the proper temperature of the bath. That which will be borne well enough by the hand of an assistant will parboil the patient.

Catarrh and *influenza*, whether incipient or chronic, are greatly mitigated, and at times cured by warm bathing—the selection of the temperature of the water, from 92° to

* For a detail of views of the author on the treatment and pathology of croup, the professional reader, and just now no other is addressed, may consult Bell & Stokes's Lectures, Vol. II.

98°, varying with the heat of the skin and evidences of febrile excitement. *Bronchitis*, especially of the sub-acute or chronic form, is benefited by the warm bath, which, placing the capillaries of the lungs in a state somewhat analogous to those of the skin, disposes the mucous membrane of the former organ to a free and copious expectoration. It is difficult to lay down with precision the circumstances under which this variety of bathing is proper in *pulmonary consumption*, but we are not allowed to doubt of its useful character in this disease, by its palliating many unpleasant symptoms, and keeping the skin clear of those accumulations and obstructions which frequent hectic sweats are so apt to produce. Dr. Armstrong speaks in favourable terms of tepid, by which he means warm affusions, in this disease.

Asthma, of the nervous or spasmodic kind, is greatly relieved by warm bathing. When the disease depends, however, on a turgid and injected state of the mucous membrane, and is aggravated by a dense clouded atmosphere, we are not to anticipate the same good result from this remedy.

Certain organic affections of the heart, of which asthma is sometimes a symptom, will be greatly relieved by the regular use of the warm bath; which is more especially serviceable if the disease have ensued on the disappearance of chronic cutaneous eruption, or ulcers. The varieties of cardiac disease the most likely to be benefited, are hypertrophy and valvular obstructions.

Inflammations of the liver, and particularly chronic affections of this organ, in which the skin is so often dry and rough, and impeded in its functions, are greatly relieved by warm bathing; without the regular use of which we shall be baffled in obtaining the desired effects from other remedies employed at the same time. Chlorine and nitro-muriatic baths have been extolled by different writers, in hepatic disorder. Admitting fully the benefits which have ensued from their administration, it is difficult, however, to say how far they have been dependent on the medicated bath; or whether they would not have resulted from regular immersion in simple warm water.

In *nephritic disorders* and *affections of the urinary organs* in general, warm bathing has long enjoyed great

and deserved reputation. It allays pain and irritation, and aids the passage of calculi through the ureters, in nephritis: by its beneficial action on the skin it mitigates the severity and sometimes carries off a paroxysm of that most distressing malady *catarrhus vesicæ*.

Bright's Disease, or *Albuminuria*, originating often from obstructed perspiration and prolonged interruption of the cutaneous function, by cold, filth, and deficient clothing, is greatly benefited by the regular and continued use of the warm bath. Conjoined with friction and moderate exercise, when the patient is yet able to take it, this remedy contributes much to preserve an active state of the cutaneous functions, on which both prevention and cure so mainly depend. I have made nearly a similar remark in the second chapter of this volume (p. 29), when speaking of the matters discharged from the skin, in its ordinary physiological state.

The reader has already learned the free use of the warm bath by Pomme in some of his cases, in which nephritis and calculous formations were met with.

The warm bath is an important auxiliary in the treatment of all the functional, and of some of the most serious organic diseases of the uterus. Thus, in *amenorrhœa*, after puberty, or that from suppression, both the general bath and, still more frequently, the hip-bath, of the temperature of 96° to 98°, either simple or strengthened with mustard, is a remedy of no inconsiderable power. But, in order to obtain its full effects, the patient ought to remain in it one or two hours, care being taken to keep up the temperature of the bath by the introduction, from time to time, of hot water.

In *dysmenorrhœa* and in *inflammatory leucorrhœa*, the same remedy proves very serviceable, especially when aided by relaxing doses of antimony and narcotics, in the first mentioned disease, and an antiphlogistic course in the second.

Pomme declares, that the most efficacious measures in leucorrhœa (*fleurs blanches*) are warm baths (91° F.), watery drinks, fomentations with emollient herbs, and oily and attenuating substances.

Chronic Metritis, and *Cancer of the Uterus* in its first stage, are materially benefited by the prolonged use of the

warm bath. Dr. Ashwell, who erroneously applies the term "hot" to a bath of the temperature of 96° to 98° F., speaks in high terms of its utility in the diseases in question. Many can join him in the remark: "Often have I heard patients declare that they owed their sleep, and freedom from pain, to the regularly-repeated nightly bath." He recommends its use morning and night, during an hour to an hour and a half each time. He adds: "If chilliness, faintness, sickness, increased leucorrhœa, diarrhœa, or prostration of sensation ensue, then it must be given up. The soothing effect of the bath is certainly increased by admitting the warm water into as complete contact as possible with the vagina and os uteri; a point easily accomplished by a common speculum tube of the proper size, perforated with numerous holes at its sides, which the patient soon learns to introduce for herself."

Suppression of the lochia has been treated by the warm bath; and in its stead, where prejudices or other causes prevent it, Pomme has directed, with good effect, cooling drinks, emollient fomentations, and cool or cold lavements.

In a case of threatened premature labour, this author advised the patient to use the bath of the temperature so often mentioned. She complied with his advice, and passed, for awhile, eight hours a-day in the bath, for a month preceding her delivery, which took place, at her own pressing instance, in the bath.

The warm bath, used in the fashion of Pomme, has produced excellent effects in cases of disorder accompanying the final suppression of the menses. Even hemorrhage was not deemed a counter-indication, for it disappeared under the use of the remedy.

In no class of diseases is the curative agency of warm bathing more evident than in those *affecting the skin*. Some of the most obstinate eruptions have yielded to this remedy, or to bathing in tepid water. Indeed it, in conjunction with a milk regimen, is often all powerful for the removal of these diseases, after the whole list of alteratives and depuratives had been gone through in vain. Where there is much heat and irritation by itching, the temperature of the bath should not at first exceed 90°. After a time it may be raised to 95°. On occasions, the parts ought to be fomented with a simple mucilage, or de-

coction of mallows, or of bran. Russell, in his "Œconomy of Nature," relates the cases of three persons tormented with moist herpes, the successful treatment of which consisted mainly, in directing this application; and I have myself obtained the like success in this form of eruption from the same remedy, after mercurials and antimonials had been tried in vain. Sea bathing aggravated the eruptions in Russell's patients. Marcard tells us of a course of warm bathing entirely curing an obstinate scabies of the head and face. This subject will be touched on again in the next chapter.

In the early or forming stage of *fevers*, as we generally understand the term, a warm bath frequently repeated would go far to arrest the malady, or at least singularly to mitigate its violence. In the convalescent period, when there is still, with great languor and feeling of exhaustion, a dry and rough skin, undue sensation of heat in the palms of the hands and the soles of the feet, and thirst disproportioned to the appetite for solid food, together with much irritability and wakefulness, this remedy may be employed with success.

In the *chill of intermittent fever*, or still better when the premonitory yawning and slight rigors appear, immersion in the bath, until the reaction is complete, will often prevent the coming on of the hot stage, and give rise in its stead to a mild perspiration. Some more vaguely recommend the patient to be immersed in the bath, raised to blood heat, on the day of the fit, and to remain in the water as long as his strength will allow.

In *congestive fever*, of the aggravated or pernicious remittent or intermittent form, and marked in its early and paroxysmal stage by great nervous irritation and constriction of the capillaries, both of the skin and other membranes, warm bathing will be had recourse to with great advantage. The same may be said of cholera morbus and epidemic cholera, although in these diseases there is, with high nervous irritation, a pouring out of fluids from the secreting vessels.

In both congestive fever and cholera, relief is obtained so soon as the capillary system is re-established in its functions by its receiving a full measure of blood, and transmitting it from the arteries to the veins in an equable stream.

Nothing contributes more to this than the soothing influence of the warm bath.

We can have some idea of the state of the nervous system of organic life in these forms of congestion, and of the manner in which the capillary system is affected at this time, by our noting what transpires under lesions of the nervous system of animal life; as after a wound, or bruise, or sprain. The individual thus suffering becomes pale, his pulse is small and frequent, skin cold or bedewed with a cold sweat, and he often falls into syncope. Friction and the warm bath will often, in addition to irritating the olfactories and the swallowing of some mild stimulant, restore him from this state of congestive depression, in which, as in congestive fever, the heart and the internal parenchymatous organs, the lungs and the liver, and also the spleen, are loaded with blood.

The warm bath is not adapted to that form of congestion in which the skin and the mucous membranes are hot and injected, and the circulation slow and oppressed, as in the more advanced stage of typhous fever and in typhoid pneumonia.

Often, however, in the diseases now under notice, the circulation is more promptly relieved by the capillaries of the skin being subjected to the double action of warm and cold affusions, in the manner already described, when speaking of the Galenical practice in this respect, and that recommended by Dr. Robert Jackson in fever, under the head of the cold bath, Chapter XXX.

At Wildbad and other Warm Baths in Germany, the resident physicians have noticed the salutary operation of the bath in those whose constitutions have been much weakened by a long residence in tropical climates. *Febri-cula*, associated with a torpid state of the liver and indigestion, has been more especially benefited by the remedy—methodically used and continued for a period of *cure*.

CHAPTER XLII.

THE WARM BATH (*concluded*)—ITS USE IN EXANTHEMATOUS DISEASES—INGOUT AND RHEUMATISM—IN MERCURIAL PAINS—IN PARALYTIC AFFECTIONS—IN NARCOTIC POISONING—DR GREGORY'S CASE—IN CHOREA—IN TETANUS—CRITICAL REACTION AFTER A COURSE OF WARM BATHING—SUMMARY OF THE CURATIVE POWERS OF WARM BATHING—OBSERVATIONS AT THE GERMAN SPRINGS—COUNTER-INDICATIONS TO THE USE OF THE WARM BATH—NATURAL WARM BATHS—MODE OF PREPARING A WARM BATH.

THE warm bath has long been a popular remedy in *exanthematous diseases*; but its use is, unfortunately, for the most part empirical. Regarded as a mere means of applying external warmth, it is, in consequence, often prescribed, alternately with thick and warm covering, and internal stimuli, to bring out the eruption, when this is slow in appearing, or has suddenly receded. Persons acting in this way would seem to be ignorant of the important fact, that, in acute eruptive fevers, the very violence of irritation will prevent the appearance of the eruption, in the same way that it does sweat; and that to bring out either we must mitigate the irritation by cooling applications. If the skin be very hot and acrid, cold affusions, or sponging with cold water is, as already mentioned, the appropriate remedy. If this surface be cool, or of a heat little exceeding the usual temperature, or what is more probable, the heat about the trunk very great, and the extremities cold, then will the warm bath, by general immersion, or partially, in the form of a pediluvium, be found eminently serviceable. After the eruption has appeared, sponging the skin with tepid or warm water is soothing, and especially applicable where the constitution is lymphatic and the sympathies between the skin and the digestive and respiratory surfaces not very energetic.

But, distinct from the indications furnished by the mere appearance or absence of the eruption, we shall derive no

small benefit from recourse to the warm bath, on the appearance of the premonitory symptoms, with a view of mitigating the violence of the fever during the first stage. Used at this time, the remedy will give relief to the internal organs, especially the respiratory and digestive ones, by exerting a moderate revulsion on the skin, in so far as preserving its entire capillary tissue of a proper degree of fulness shall contribute to this end. The internal organs and surfaces thus relieved will suffer less from irritation, and transmit it with less force to the skin; and hence the eruption will be milder, and go through its stages with diminished violence and danger. The whole intention, at this time, is to restore, or prevent from being lost, that equilibrium between the different surfaces and organs which exists in health.

If, under the above circumstances, before the excitement of the skin is regularly established, we have recourse to the cold bath, it will render this surface at first torpid, and through it the internal organs, and subsequently give rise to troublesome and irregular reaction—whilst, on the other hand, if the hot bath be resorted to, the consequent undue excitement of the skin will be transmitted to those organs, and from them reflected back on the skin, with the effect of causing painful irritation of this membrane, and excessive eruptions; or, if the excitement be still more intense, of substituting a general redness for the more distinct eruption.

In fine, by the employment of the warm bath in these, as in all other diseases in which its usefulness is recognized, we bring back as nearly as may be the functions to their natural rhythm; we simplify what would otherwise be complex; and we put ourselves, as careful observers, in the most advantageous position for availing of other resources to combat new or alarming symptoms, which may supervene in the progress of the malady. Some of these symptoms may be such as to require the cold bath; or others, though of more rare occurrence, such as to call for hot and vapour bathing. Of the first of these remedies I have already spoken in detail; of the last two I shall soon treat.

There are few tissues which so readily sympathize with the skin as the synovial and the fibrous; as we are sadly con-

vinced by our suffering from pains in the joints and limbs, after exposure to cold and moisture. We may add, that few diseases are so promptly and completely relieved as those are by the judicious use of the warm bath. In the more acute and atrocious pains of *gout and rheumatism*, this remedy brought down to its lower limit, or 92° F., will mitigate and soothe their severity; while those of the more chronic kind are often completely removed by a regular course of warm bathing, and suitable friction of the skin and shampooing. The state of the pulse and skin will guide us in the temperature of the water which we shall direct: if there be febrile action, with thirst and little or no appetite, the bath should be tepid; when there is little activity of the skin and circulation, immersion in warm water at nearly blood heat is preferable.

To those who have not frequently seen or experienced in their own persons the effects of warm bathing, when suffering from recent suppression of perspiration and pain in all the muscles and joints; as in the beginning of influenza and rheumatism, the surprising relief which it gives would seem to be marvellous. I have, myself, after a cold, been at times unable to walk without pain, at every step, in all the muscles of the limbs and trunk, and actually halted when going to the bath; but, after remaining in it at the temperature of 96°, for three-quarters of an hour or an hour, I have come out entirely free from pain, and returned to the house with feelings of entire comfort and a firm and easy step.

The morbid sensibility and pains in the limbs, which often follow a mercurial course, are very happily abated by the remedy now under consideration.

Paralytic affections, in which there is still some remains of that excitement which preceded the attack of paralysis, will bear very well a course of warm bathing. In this stage of the disease a hot bath would be prejudicial. Pomme's practice must be quite fresh in the reader's memory.

In *narcoting poisoning*, good effects have been obtained by the use of warm affusion,—but we cannot place the same reliance on this remedy that we do on the cold affusion and dash, under these circumstances.

Dr. Gregory, of Edinburgh, relates the case of a young

man who, by mistake, swallowed an ounce of laudanum, in place of the same quantity of tincture of rhubarb. Vomiting was induced by tartar emetic; but, at the end of half an hour from the first operation of this medicine, "the stomach became irritable, and debility and stupor increased upon him;"—"drowsiness, notwithstanding constant external impressions, was fast gaining ground: in this state, several gallons of *warm* water were poured on his naked body, which had the singular effect of removing entirely the drowsiness, for about ten minutes." In the efforts to keep him awake by constant shaking, the vomiting was renewed. "The *warm affusion* was repeated a second time, with the same effects as the first." After the use of the affusion for a third and last time, a very cold fit took place, with great tremor and faintness,—from which he soon recovered. "About nine hours after the accident, he was able to take sago, and he fell into a natural sleep.

The use of the warm water in this case was, in the first instance, accidental. Dr. Gregory had ordered the *tepid affusion*, but observing the water to be warm (probably 96° to 98° F.) as it flowed over the patient, and that a good effect was produced, it was continued of nearly the same temperature.

I might have mentioned, when speaking of the warm bath in convulsive diseases, its occasionally curative powers in *chorea*, in cases in which cold bathing, by immersion and shower, had failed to relieve.

Tetanus has been, as we learn from Sir Gilbert Blanc,* successfully treated by the administration of opium and the warm bath. In all of these, the patients were kept immersed from five to six hours.

It is the practice in Holland, as we learn from Sir Arthur Clarke (*op. cit.*), to immerse patients labouring under tetanus four times a-day in baths of broth, for half an hour at a time; after which, the whole body is rubbed over with mercurial ointment.

Critical Reaction after a Course of Warm Bathing.—At the German watering-places, they who have been using the warm bath for some time, are often affected with, what is called there the *Bad-Sturm* or Spa Fever, or

* Observations on the Diseases of Seamen.

Crisis. The fact is important, and a knowledge of it may allay needless apprehensions on the part both of the patients and their physicians, who were not previously acquainted with it. I shall, therefore, repeat the remarks of Dr. Heim, as they are given in Dr. Johnson's work (*Pilgrimages to the Spas, &c.*). The writer is speaking of the baths of Wildbad, the temperature of which is 96° to 98° F.

"It is to be remembered that a majority of the bathers experience the 'reaction fever' (fièvre de réaction) in the course of the treatment. The period of its occurrence is uncertain, and often it is so slight as to pass almost unobserved by the patient. This, however, is the critical moment precursory of the cure. This state of irritation seldom last more than a few days, and generally disappears without any internal medicine. This reaction is precisely that which ought to inspire the greatest hopes in the patient, as it announces a change in his constitution, and a victory over his malady. The disagreeable sensations, however, which he feels, often put him out of humour with the baths, especially if old pains and discomforts, that had ceased, now reappear, which they often do. He becomes impatient and morose, when he is re-visited by rheumatic pains, neuralgia, gout, hemorrhoids, &c., which he had thought to be extinct. Such reaction, however, is indispensable towards the victory of nature and the baths over the disease for which they were employed. The waters of Wildbad, indeed, are remarkable for this reproduction of old disorders, at the moment they are eradicating the more recent ones."

Similar effects have been noticed at other thermal baths in Germany. Among them, eruptions of the skin, were mentioned under the head of physiological effects of the warm bath. Mr. Lee* makes the following observations on the baths of Wisbaden, which are to the same purport as those related by Dr. Heim, of Wildbad:—

"The beneficial effects of the Wisbaden, and other mineral springs, are most evident during the time of their use, after the system has been for some time subjected to their action, and are not unfrequently consecutive to discharges, or eruptions of a critical nature, induced by the

* The Principal Baths of Germany.

water, which by perturbatory action, and exciting the vital energies, frequently brings diseases from the chronic to a more acute state, previous to their removal.—Hence a slight degree of feverishness, with increase of long-standing pains, etc., are frequently proofs of the beneficial action of the water, and precursors of a favourable change. In other instances, no perceptible effect, or amelioration takes place during the employment of the waters, but becomes apparent after they have been for some time discontinued.”

So, also, Dr. Heim warns the patient not to be discouraged, even if he leaves the waters unrelieved, or worse than when he commenced the course. The cure will often follow, when the individual has regained his home, weeks or months after leaving Wildbad.

The reaction, or *bad-sturm*, is most likely to occur if the thermal water be drunk at the same time. Analogous results are familiar to the gouty subjects who visit Bath, in England, and bathe in and drink the water, and on whom, in consequence, a fit of acute gout supervenes. The nearer the warm approaches to the hot bath, the more likely is the fever of reaction to occur; and hence, they who feel it coming on might measurably escape it by lowering the temperature of the bath, so as to bring it down to the lowest limit of the warm, or 92°, or even within the tepid range.

Summary of the Curative Powers of Warm Bathing.

—The best recapitulation of the curative powers of warm bathing is that of the recorded experience of those who have watched its effects for a term of years at the chief thermal springs in Europe. Thus, we learn that the baths of Wildbad and of Leuk have always maintained a great reputation in chronic rheumatism and indolent gout, scrofula, and cutaneous disorders. Dr. James Johnson (*op. cit.*) tells us, that Messrs. Fricker and Heim trace many cases of tic, vertigo, deafness, affections of the sight, asthmatic coughs, intermissions of pulse, tracheal and bronchial affections, &c., to suppressed gout, and rheumatism, as they are often removed by the baths and waters. The inference does not seem to me to be the most logical in the world.

Paralysis, both of the lower extremities, and of one side of the body, has been, in many cases, entirely removed by a course of bathing at Wildbad. Before any amelioration

takes place, the patient generally experiences some pricking pains and tinglings in the paralyzed parts, followed by a sense of heat, perspiration, and increase of feeling. To these symptoms succeed a gradual restoration of muscular power, accompanied by a sense of electrical shocks passing along the nerves.

Paralytic persons, of a full or plethoric habit, or whose circulation is active, should watch the first effects of the warm bath, and make but moderate use of it at first.

The baths at Wildbad are lauded for their remedial powers in affections of the joints—white swellings and contractions; and, also, in lumbago and sciatica.

Diseases of the skin are, in a more especial manner, overcome by these baths. Those specified are, herpes, prurigo, pityriasis, acme, inveterate itch, fetid perspirations, &c.

The baths at Wildbad, conjoined with the internal use of the water, at a temperature of 92° F., are efficacious in scrofula and chronic affections of the gland generally,—including enlargements of the liver, spleen, and mesenteric glands.

The water of Wildbad, like that of Wisbaden and Leuk, may be regarded as a pure thermal water.

In chlorosis and sterility, not depending on organic affections of the uterus or ovaries, the Wildbad baths have displayed excellent effects.

“The Wildbad baths are celebrated for the removal of those various pains and aches which not seldom attend old gunshot and other wounds. A case is related of an officer who had been wounded in the arm by a musket-ball in the late war, and who was harassed by pains in the site of the wound for many years afterwards. The use of the Wildbad baths re-opened the wound, from whence a piece of flannel was discharged, and the pains ceased.”*

Counter-indications to the Use of the Warm Bath.—From its effects in retarding the circulation, the warm bath is not adapted to the plethoric, nor to those suffering from active congestion of the great viscera, or from hemorrhage, which is so generally associated with congestion. Hence, its use is not proper for the apoplectically disposed, nor for

* Johnson.—Pilgrimages to the Spas, &c.

those who labour under cardiac aneurism, or a varicose state of the vessels generally. The habitually feeble, and they who have been weakened by violent disease, will, also, avoid the warm bath, unless they have, at the same time, a febricula or febrile irritation, which this remedy will remove. The tonic effects which I attribute to the warm bath are indirect, and depend on its abating excessive excitement or irritation,—and unless these states are present, its contra-stimulant action will only increase the existing debility.

In all cases of doubtful propriety, or in which a trial is about to be made of the warm bath as a means of cure, the immersion, at first, should be for a brief period—five to ten or fifteen minutes.

Natural Warm Baths.—The mineral springs at Caldas da Rainha, near Lisbon, averaging 92° F.; the cross bath at Bath, England, ranging from 92° to 94° F.—the mineral waters at Aix, Bagneres, Adour, Bareges, Bonnes, Cambo, Cauterets, Dax, La Maloux, St. Sauveur, Vichi, and others in France; of Wildbad, Wisbaden, Baden-Baden, Teplitz, Carlsbad, Landeck, Aix-la-Chapelle in Germany; and Leuk in Switzerland, &c.; those at Acqui, Pré St. Didier, Valdieri, of Piemont, St. Gervais and Aix, of Savoy, Ormitello and Citara, of the island of Ischia, at Lucca, at Montecatini of Tuscany, at Pisciarelli, and Pozzuoli near Naples, St. Julian near Pisa, Guitara of Corsica, in Italy, furnish natural warm baths of great efficacy, when employed either alone, or, what is most generally the case, conjointly with their internal use as a drink. At some of these places the thermal springs are numerous: temperature varies from 88° to 168°. When the spring is hot, it is directed into a basin of cold water, and rendered of a pleasant and salutary warmth—unless it is to be used in particular cases as a hot bath.

The Warm and the Hot Springs in Virginia, and in Arkansas, and the Warm Springs, in Buncombe county, North Carolina, furnish delightful natural baths for recreation and health.

The chief bath at the *Warm Springs*, Bath Court House, Virginia, is of an octagonal form, and thirty-eight feet in diameter, and between five and six feet deep in places, and no where less than four: the bottom is sand and gravel. The water of this bath is of the temperature of 96° to

98° F. ; it is clear and transparent and emits gas (chiefly nitrogen) in large quantities. Few feelings can be more pleasurable than those which are produced by bathing in this water. Here, one is like a native of the Sandwich Islands, who after a long absence from home is at last landed on his native shore. He plunges into the liquid element in which he had been wont to desport himself in his earlier days ; and by every variety of attitude and gesture endeavours to compensate himself for his past privations. After a few baths in the Warm Springs, gouty and rheumatic cripples begin to exercise those joints which were immovable as though "by ankylosis knit ;" and they soon enjoy entire exemption from pain. The more juvenile and healthy, who bathe for pleasure, have to be reminded of the lapse of time, and cautioned against the undue exercise in swimming, which, joined to a prolonged stay in the water, cause diaphoresis and some subsequent languor and debility.

Here, as at the German thermal springs, the good effects of the bathing may be increased by drinking of the water, which is slightly laxative and diuretic, and more evidently diaphoretic.

Making some allowances for a lively imagination, Dr. Granville's* account of his sensations in the bath at Wildbad, may very well be received as descriptive of those enjoyed by a bather in the Warm Springs of Virginia. He writes as follows : "After descending a few steps from the dressing-room into the bath-room, I walked over the warm soft sand to the farthest end of the bath, and I laid myself down upon it, near the principal spring, resting my head on a clean wooden pillow. The soothing effect of the water as it came over me, up to throat, transparent like the brightest gem or aqua-marine, soft, genially warm, and gently murmuring, I shall never forget. Millions of bubbles of gas rose from the sand, and played around me, quivering through the lucid water as they ascended, and bursting at the surface to be succeeded by others. The sensations produced by these, as many of them, with their tremulous motion, just *effleuraient* the surface of the body, like the much-vaunted effect of titillation in animal magnetism, is not to be described. *It partakes of tranquillity and exhilaration ; of*

* Spas of Germany.

the ecstatic state of a devotee, blended with the repose of an opium eater. The head is calm, the heart is calm, every sense is calm; yet there is neither drowsiness, stupefaction, nor numbness; for every feeling is fresher, and the memory of worldly pleasures keen and sharp. But the operations of the moral as well as physical man are under the spell of some powerfully tranquillizing agent. It is the human tempest lulled into all the delicious playings of the ocean's after-waves. From such a position I willingly would never have stirred. To prolong its delicious effects what would I not have given! but the bad-meister appeared at the top of the steps of the farther door, and warned me to eschew the danger of my situation; for there is danger even in such pleasures as these, if greatly prolonged.

"I looked at the watch and the thermometer before I quitted my station. The one told me I had passed a whole hour, in the few minutes I had spent according to my imagination; and the other marked $29\frac{1}{2}^{\circ}$ of Reaumur, or $98\frac{1}{4}^{\circ}$ of Fahrenheit. But I found the temperature warmer than that, whenever, with my hand, I dug into the bed of sand, as far down as the rock, and disengaged myriads of bubbles of heated air, which imparted to the skin a satiny softness not to be observed in the effects of ordinary warm baths."

Two hours at a time are allotted for the ladies to take the bath at the Warm Springs, and the same period for the gentlemen, and so on alternately through the day. A white flag is hoisted as a signal that it is occupied by the former.

The water can be let off at the end of every bathing; and so abundant is the supply that the basin is replenished by the gushing up of the springs from the gravelly bottom in the course of an hour.

The so much lauded King's bath and Queen's bath, at Bath, in England, after being emptied, cannot be refilled under eleven hours. It is true their joint capacity is greater than that of the Warm Spring bath. The dimensions of the first are sixty-six feet by forty-one: the second is a square of twenty-four feet. The depth of each is four feet six inches.

Small rooms, heated, when occasion requires it, open on

the great bath at the Warm Springs. Here the bathers undress and dress: and here an attendant is always in waiting.

Lower down the meadow, in which is the chief spring that supplies the bath just described, is another warm one, the water of which is reserved for internal use. Close to it is a hydrant from which cold chalybeate water is procured. Near to these is a warm spring bath similar in temperature and other properties to the first—but of smaller dimensions, and principally intended for the use of the more aged and infirm, and for children.

The *Hot Springs*, five miles from the *Warm*, are three in number. One of them is of the temperature of 96° F., and of a moderate depth, and sufficiently capacious for several persons to bathe at a time.

The Springs in Buncombe County are both warm and hot; the former is 94° F., the latter 104° F. The hot water gushes up within ten to fifteen feet of the French Broad River, which, in times of even moderate freshets, sometimes runs into and over the spring. It is evident, that, with a little pains-taking, an extensive series of warm baths, including a large warm piscina, might be constructed here.

The gas emitted is chiefly nitrogen. The taste of the water is insipid, and its mineral constituents are in small quantity.

Persons using the water, drink, as we learn, three to four quarts, and bathe twice a-day. A better system would probably divide both quantity and time. It is said that the water, after it is freely drunk for several days, has a brisk purgative action. It then ceases to produce any sensible effect.

The *Hot Springs*, of Arkansas, of which farther notice will be taken in a subsequent chapter, would furnish warm and hot baths to as great an extent as any others in the world.

A Mode of Preparing a Warm Bath.—The following simple and easy mode of preparing a warm bath might be adopted with advantage to the sick who are often deprived of the good effects of warm bathing by the difficulty and expense of procuring a bath.—An oblong case, of a size and form just sufficient to contain the human body, is constructed of deal. This is carried into the chamber of the patient, and there filled about one-third with water of the

requisite heat, for which purpose, half the quantity of boiling water is more than sufficient. A stout sheet is next laid over the aperture, and kept tight under the feet of assistants standing on each side. Upon this cloth the patient is placed, and, by slacking it, gently sunk into the water. After having remained a due time in the bath, he is, by means of the sheet, lifted out of the water, and, without any personal effort, put on a mattress or on the floor, whence, leaving the wet sheet behind, he can be readily replaced in bed, and, if necessary, rapidly rubbed with a dry napkin or towel.

CHAPTER XLIII.

THE HOT BATH—IMPORTANT DISTINCTION BETWEEN THE HOT AND THE WARM BATH—PHYSIOLOGICAL EFFECTS OF THE HOT BATH—EXPERIMENTS BY THE AUTHOR AND DR. LOCKETTE—HOT PEDILUVIA, A GENERAL STIMULANT—ZIMMERMAN'S OBSERVATIONS—HYGIENIC USE OF THE HOT BATH—ITS OCCASIONALLY DANGEROUS EFFECTS—THERAPEUTICAL EFFECTS OF THE HOT BATH—CAUTION IN PRESCRIBING IT—CASES BEST ADAPTED FOR ITS USE—HOT PEDILUVIUM.

I HAVE already taken some pains, and I hope not without success, to point out to the reader the important distinction between a warm and a hot bath—a distinction too often lost sight of, both in domestic practice with a view to the hygienic effects of bathing, as well as when advised by medical men in order to obtain its curative powers.

Distinction between a Hot and a Warm Bath.—By a hot bath, we are to understand that in which the water is of a heat exceeding 98° F. Making allowances for the torpor of certain lymphatic temperaments, we might extend the limit of the warm bath, in some cases, to 99° or 100° F., which, in many instances, is that of the animal heat. The hot bath is decidedly stimulating, and, in its often violent and marked effects on the human body, contrasts strongly with the more pleasurable impressions produced by the warm bath. This contrast

must convince us of the impropriety of including the two under a common head, and of confounding their different powers. The hot bath, by imparting to the system an excessive dose of caloric, strongly excites the circulation, and proves to be both a nervous and vascular irritant. The warm bath is soothing and sedative. The two are contrasted rather than analogous in their operation on the animal economy.

Physiological Effects of a Hot Bath.—In a hot bath, the skin becomes red, the pulse is accelerated, the vessels are turgid, and respiration is more frequent; a copious sweat soon bathes the face; the arteries of the neck beat with more frequency; the mind becomes obtuse and inattentive; and even vertigo and apoplexy may supervene. If the immersion be unduly prolonged, so great will be the quantity of perspirable matter secreted, that Le Mounier, in a bath of 111° to 113° F., lost, in the short space of eight minutes, a pound and a half of his weight; after which, he was obliged to abandon the bath, on account of the violent symptoms which he experienced, especially about the head (*Mem. de l'Acad. des Sciences*, 1747). Whether this loss was by cutaneous or pulmonary exhalation, or by both, it is not necessary to inquire: the practical deduction is the same.

In Chapter XIV. of this volume, under the head of the section,—*Transition Baths and Friction*, I related an experiment performed on myself,—in illustration of the effects of a cool, warm, and hot bath, in quick succession, on the pulse and functions generally. My pulse gave sixty beats in a bath of 84° F., and shortly after the temperature was raised to 106° F., it gave a hundred beats. On reducing the temperature of the bath to 84° F., the pulse fell, in two minutes, to eighty, and, in five minutes, to seventy-three beats in a minute. At the beginning of the experiment, my pulse gave seventy-eight beats.

Dr. Lockette, whose experiments on the warm bath have been already noticed, found the pulse to be increased in frequency by the use of the hot bath. In his own case, immersion in water of 108° raised the pulse, which was 77 in a warm bath of 98° F., to 119 in five minutes, and to 110° F. in ten minutes. When the temperature of the water was raised to 111° , the pulsations at the wrist in-

creased to 153. Similar results ensued in the experiments on his friends Mr. Mitchell and Mr. Lee.

Dr. Lockette describes the other effects caused by the hot bath in addition to its action on the heart. "It produced," he tells us, "confusion of thought, partial delirium, *tinnitus aurium*, an inability to speak, dimness of sight, an intolerable pain in my head with a most painful desire to make water. My sensations were precisely such as they are in a violent state of fever. There was a great redness of the skin and flushing of the face. On raising myself out of the water I almost swooned, and being now covered with blankets, sweated very profusely."

The appearance of the blood drawn from the arm is thus described: "In about a quarter of an hour, as I am informed (for I was too much affected by the experiment to observe it myself), a few ounces of blood were taken from my arm which exhibited the following appearances: It was highly oxygenated, and did not coagulate though there was on the top a thick tough inflammatory scum of a somewhat blueish colour. Many fiery particles stuck to the sides of the vessel. In fact, it exhibited all the appearances of dissolved blood to those who saw it."

Mr. Lee seems to have been less excitable than his friend. His pulse, after he was immersed in a bath of 110° F., increased to 130 beats in a minute; but he had no pain of the head. "In about five minutes after leaving the bath he was bled. The blood separated into crassamentum and serum, though there was not so much of the latter as is commonly observed. The serum was coloured red by the red globules, and a small quantity of blue inflammatory crust appeared on the surface."

On Mr. Mitchell, a bath of 107° F. "produced great redness of the skin, flushing of the face, and an inclination to sleep or drowsiness, with some difficulty of respiration: after awhile he sweated profusely, which in some measure relieved his drowsiness." He complained greatly of the heat of the bath, and said he could not bear it. His pulse, which gave 72 beats before immersion, was increased after fifteen minutes to a hundred and fifteen beats.

Marcard has noticed, and Dr. Lockette confirmed, the fact, that a pediluvium of hot water produces the same effects as the general bath. We have seen that a cold pediluvium

has identical effects with the cold bath by immersion, in arresting uterine hemorrhage, for example. These facts, while they confirm the view which I have taken of the consentaneous effects of the bath on the skin and internal membranes and organs, must greatly weaken the prevalent notions of the revulsive agency of warm and hot pediluvia. These latter stimulate the very sensitive nerves of the lower extremities, and through them the general nervous system, which, in its turn, calls into increased action the heart and bloodvessels. The common notion of revulsion, short of a new secretion equivalent to the addition of a new organ, as by vesication and issue, is faulty when tested either by a physiological or a pathological standard. It is derived from the mechanical ideas of the circulation, which would make the action of the heart and arteries similar to that of a hydraulic machine.

But we cannot better establish general principles on the effects and uses of hot baths, than by borrowing the language of the celebrated Zimmerman, who, in his valuable work, "On Experience in Medicine," thus expresses himself: "Hippocrates laid down a rule, the neglect of which has been the source of many diseases. He says, that a bath enfeebles every time that its heat exceeds that of the body immersed in it. Now, as my house is not more than a league distant from the baths of Hasburg or Schinznacher, I have had every possible opportunity of verifying the Hippocratic precept. The very hot bath of Schinznacher is pernicious to weak and delicate persons, notwithstanding that it strengthens in general those who, in using it, follow the above rule. Hence, it happens, that I have often observed spasms of the stomach, and tumefactions, the consequence of them, cured by these means, as also edema of the inferior extremities. Those ill with the gout have, from an inability to support themselves on their feet, recovered their strength so as to walk with freedom; and, at the baths of Hasburg, I have seen military officers, who, although healed of their wounds, continued weak in those parts, throw away their crutches, and in a short time depart entirely recovered. Hence, also, it often happens, that fluor albus is removed in some females and exasperated in others. These waters have, also, been found hurtful to rickety children, when used too hot, though they work

prodigies when we keep in view what Hippocrates advises." A great number of observations made by Marcard, and confirmed by Franceschi, are in accordance with the precept of the great Father of Medicine, because entirely founded on the most accurate investigations. We learn this much from the passage just quoted; that a bath excessively hot is intolerable to delicate subjects, being a stimulus disproportioned to their exquisite sensibility; and, also, that it is hurtful in asthenic diathesis, by the addition of the stimulus of caloric to the action of those powers which induced and maintain the excitement of the system at so exalted a grade. Indirect debility is the result.

Hygienic Use of the Hot Bath.—The few circumstances under which hot baths can be of any utility in a state of health, demand, at least, a certain degree of inertia on the part of the subject on whom they are tried, which may be either the accompaniment of a phlegmatic or lymphatic temperament, or the consequence of protracted disease, without which they can by no means be tolerated.

The objection to what may be called the violent exercise of the circulating organs—the heart and bloodvessels—by hot bathing is, that we cannot well say in advance how far it can be tolerated with impunity, nor to what extent we are to apply, subsequently, the quieting agency of cold. If this latter be in excess, debility ensues—if not enough, there will remain some feverish excitement. In an estimate, however, of the general effects of the hot bath, we must not overlook the great increase of both pulmonary and cutaneous transpiration which it produces, nor the consequent changes in the state of the skin and lungs, distinct from what would follow mere excitement of these parts.

Upon the whole, we may with great propriety caution the sanguineous, the robust, the plethoric, those with full large heads, and who are inclined to drowsiness after any little exertion or after a meal, or who are liable to hemorrhage, or whose skins are acutely sensible to heat in general, to avoid the hot bath. We should probably be still more correct and better understood, if we were to say that persons in health ought never to make use of the hot bath alone, without subsequent refrigeration.

It required the lymphatic constitution of Napoleon to

enable him to indulge as he did in the use of such excessively hot and prolonged bathing.

Dangerous Effects.—Fourcroy relates the case of an individual, who, being immersed in a bath of the immoderate heat of 66° degrees of Reaumur (180° of Fahrenheit), fell down apoplectic an hour after. Buchan acquaints us with the history of a patient who was seized with paralysis from having used a bath excessively hot. Peter Frank mentions the development of an inflammatory fever followed by the appearance of fourteen abscesses, after the application of such a bath. Venel saw at Balaruc, a sick person sink into a state of fatal debility by remaining too long in a hot bath; and the same author tells us, that, at Cauterets, a Spaniard died of hemorrhage from the same cause. Similar inconveniences and alarming effects are also noticed by Currie, to whom we are indebted for so many useful observations on the different species of baths.

Therapeutical Effects of the Hot Bath.—The hot bath is, on occasions, a useful remedy in the hands of a physician; but it requires great caution in prescribing it, and great discernment in ascertaining the circumstances under which it should be used, as well as the duration of the period of each bathing, and the precise temperature of the bath.

The cases to which this remedy is adapted are those of inertia, torpor, sluggish circulation, dry and cold skin, with feebleness of muscular movement and a low grade of sensation. But here let us avoid confounding the state of the system naturally feeble and phlegmatic, or worn down by age and protracted disease, with the languor which follows acute inflammation or pressure of blood on the brain, causing disinclination to motion, or in the lungs, giving rise to slow stertorous breathing or asthmatic panting. In the first class of cases, the hot bath would be serviceable; in the latter prejudicial. In suddenly suspended animation from sun-stroke, apoplexy, insensibility from inhaling noxious gases, or swallowing narcotic poisons, we should do great mischief if we attempted to rouse the system by the stimulus of high heat. The cavities of the body, the brain and lungs, and the heart and liver, are gorged with blood: all the capillaries are unduly distended at this time. Cold air and cold water are therefore the appropriate remedies.

which tend gradually to diminish the diameter of the capillaries: hot air or the hot bath would only augment the already too great vascular distension, and soon drive the parts into mortification.

The same result would ensue if hot water were applied locally to a frozen limb, or generally to the body in a state of suspended animation from intense cold. The change from inert to perfect living matter must be accomplished very gradually: first cold water and snow are to be rubbed over the parts frozen, then cool and afterwards tepid water, and if the skin recover its sensibilities but there still prevails much general debility and languid circulation, the warm bath may be used. In no instance, however, is the hot one to be had recourse to.

A different practice, however, is called for, where there is no apoplectic stupor nor asphyxia; but where, at the same time, there is such a retardation of function, together with cold skin and diminished sensibility, as to threaten a speedy extinction of life. Instances of this state are found associated with the bronchitis and pneumonia of old persons, who have been greatly exposed to atmospheric vicissitudes, badly fed and imperfectly clad, and who may at the same time have been intemperate, or in whom the pneumonic attack came on during a fit of intoxication. The skin of such persons will be found dry and cold, the exhaled breath also preternaturally cool, the expression of the face haggard, mind wandering, senses obtuse. Sometimes immediate recourse is had in these cases to stimuli given internally, and on occasions with advantage; but, considering the state of the stomachs of such patients, the effect of their prior habits, and the imperfect manner in which the rest of their system sympathizes with this organ, we cannot always say whether there will ensue prompt general reaction, or an increase of the inflammation under which it may have previously laboured. It is here that we derive good effect from the warm bath and frictions of the extremities; and the sensibility of this surface still failing to be restored, we shall have recourse to the hot bath and frictions. The thermometer in hand, we gradually increase the temperature of the bath until it begins to display a marked operation on the skin, and through it on the internal functions, by rousing sensibility and restoring the cutaneous and pulmonary transpiration.

The inert state of the skin and its greater induration in old people, together with their feebleness of calorification, justify our employing, in these maladies, a bath of a higher heat than common. They who, in the congestions of the thoracic or abdominal viscera of this class of persons, should lay much stress on the relief to be obtained by the counter-irritation of sinapisms and blisters, will find reason to be disappointed, if these applications be resorted to before the skin has partially recovered its sensibility. Even then their effects will not correspond with the anticipations formed; for, in aged persons, irritation of one part of the cutaneous surface is not always, as in young and adult subjects, diffused by continuous sympathy over the whole, and a practitioner may have the mortification of seeing a blister cause inflammation and ulceration of portions of the extremities, with very little accompanying or prior excitement of the system at large.

In situations where a warm or hot bath cannot be conveniently prepared, a pediluvium of the desired temperature will often be found a good substitute. The exhaustion of the patient not allowing of the use of this, a bladder filled with hot water should be applied to the soles of the feet, especially in the hollows towards the inner ankle, and also along the inside of the legs and thighs, and over the stomach. Bladders filled with warm or hot water, according to the nature of the case and the degree of stimulation required, over the region of the stomach, is one of the best means of restoring vital warmth to a prostrated and torpid system.

In Dr. Lockette's experiments on hot pediluvia, he found, in his own case, that immersion of his feet in water of 110° F. raised the beats of his pulse from 77 to 89 in eighteen minutes; and to 92 in thirty-two minutes. The veins of the feet and legs were considerably enlarged. "A small pain of the head" was felt. A hot pediluvium of 113°, used by his friend Mr. Lee, raised the pulse from 60 to 105 in five minutes. There was redness of his feet and legs "and *flushing in the face*," but no pain of the head.

CHAPTER XLIV.

THE HOT BATH (*concluded*)—ITS USE IN CROUP—IN CHOLERA MORBUS AND CHOLERA INFANTUM—IN CHRONIC AFFECTIONS OF THE SKIN—IN GOUT AND RHEUMATISM—RECAPITULATION—CLINICAL RESULTS AT THE WISBADEN AND TEPLITZ BATHS—IN NEURALGIA—ABDOMINAL PLETHORA—PARALYSIS—EXPERIENCE AT THE BATH HOSPITAL—HYPOCHONDRIASIS—IRREGULAR MENSTRUATION—FEVER OF REACTION—HOT DOUCHES—MANNER OF PREPARING THEM—WHEN INDICATED—IN ASTHENIC STATES OF THE SYSTEM—TUMEFACTIONS OF THE VISCERA—PARALYSIS—UTERINE DISEASES—CHRONIC AFFECTIONS OF THE JOINTS—SCIATICA—AMAUROSIS—CHRONIC DEAFNESS.

Not alone are the old, when nearly exanimate by diseases of the respiratory apparatus, restored to life and health by the hot bath. A different class of subjects, the infantile, require, at times, the same remedy. In some of these, when attacked with croup, there is almost a torpor of the whole capillary system, evinced in the coldness of the skin and want of susceptibility of the digestive mucous surface to therapeutical agents. Neither emetics nor purgatives in the largest doses have any effect; the breath is also cold, and the respiration hurried and laboured. The first and most important indication in such a case is, to restore the deadened sensibilities; and this is most safely and effectually accomplished by the hot bath, continued until there is complete reaction, and restored susceptibility to other remedial agents. Often, the stimulation of the capillary vessels in the bath is such as to cause a copious perspiration from the skin, and exhalation and mucous secretion from the bronchiæ; and in this way entire relief, at least for the time, is obtained.

The chief caution in such cases of *croup*, or even *bronchitis*, is to not let the reaction go too far; but to watch the flushed face and other evidences of excitement, in order that we may desist from the use of the bath, for fear inflam-

mation should supervene on the torpor of the membranes. If we are afraid that the action of the skin will not be kept up, out of the bath, and we find that perspiration is not yet copious, we can reduce the temperature of the water from hot to warm, and thus obtain with less risk all the effects desired. In a great number of cases, this is done at once by the use of the *warm* bath alone, as indicated in a former chapter.

One great advantage in the use of this external over any internal remedy, is the facility with which we can regulate the activity of the bath, and moderate at once any little excess into which we may have been led by prescribing it too hot. The stimulation of the cutaneous surface brought about by the hot bath, or its full, natural vascularity produced by the warm, and, in either case, sympathized with by the internal organs and their membranes, is also of a safer character than that effected on the stomach and intestines by medicines directly applied to them, whether for the purposes of vomiting and purging, or as narcotics and tonics. There is less risk of local inflammation and irregular determination and congestion of blood, in the case of cutaneous than of gastro-enteric medication.

If, in the diseases of the respiratory apparatus, reaction continue too powerful after the hot bath, and if it be not moderated by a bath of a less reduced temperature; and there is, together with dry, hot skin, determination to the head, with flushed face and giddiness, or to the lungs, with full pulse and hurried breathing, we have a ready resource in the abstraction of blood, either from the arm by the lancet, or from the temples and chest by leeches or cups.

There are cases in which the system is, in a short time, so completely depressed by an attack of *cholera morbus*, that the skin, particularly of the extremities, is of an icy coldness, the pulse small and fluttering, features shrunk, and all the symptoms of approaching dissolution present themselves. Here no time is to be lost in applying the diffusible stimulus of even high heat, by immersion of the body in a hot bath; to be continued until the collapse has been succeeded by reaction and the commoner phenomena of a febrile exacerbation. This remedy and warm enemata are our chief reliance in that stage of the disease,

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in which the stomach either rejects whatsoever is swallowed, or displays little sensibility even to what it retains.

Cholera infantum differs from the cholera in adults just noticed, in its being usually ushered in with symptoms of increased action, some fever, and morbid heat of the skin, especially of that covering the abdomen. But in a late stage of this disease, the skin is habitually cold, and either dry or of a clammy moisture; the circulation is feeble and worn down by continued irritation: many of the evidences of gastro-enteritis have disappeared, the tongue being now moist, and often, together with the mouth, covered with aphthæ. The warm bath is here the chief remedy; and if failing to restore the heat and the functions of the skin, we may with propriety resort to hot bathing.

The advantages of the hot bath in *chronic affections of the skin* have been recognized by physicians. But, great nicety is required in the selection of cases; and no little attention is necessary to see that the skin be not overstimulated, and a chronic converted into a sub-acute disease. For the most part, the warm and vapour baths will be found a safer and more efficacious remedy. In indolent herpes, and squamous alterations of the skin, such as psoriasis, the hot bath is serviceable; more particularly if the subjects of the disease be of a cold, phlegmatic temperament.

The rule of paramount importance to guide us in the selection of the hot bath is, that there shall be but little activity of the circulation, and nearly an entire absence of gastric irritation, at any rate of heat or tenderness of this organ, and of thirst, as also of dry and furred tongue. In brief, when the disease is restricted entirely to the skin, without any active sympathy with the heart and stomach, we may push the operation of the warm bath to its maximum degree, or even of the hot bath itself.

This is the principle which ought to regulate us in the use of hot bathing in all cases of stiffness and rigidity of the joints, whether they be the effects of sprains, or of *rheumatism and gout*. Hot is the last application of the series, of which cold water was the first. From the cold we pass on to tepid and warm, according to the changes in the disease, from swelling, heat, and throbbing pain of the parts

with fever, to mere indolent tumefaction and stiffness, without any febrile action.

Recapitulation.—We may recapitulate the therapeutic effects of hot bathing, by a reference to the clinical records of the celebrated Wisbaden and Teplitz baths. Some writers are disposed to attribute additional virtues to these latter, on the score of their mineral and chiefly saline impregnation; but these are too inconsiderable to merit a notice, or to create any material difference between the waters at the places just mentioned, or at Leuk and Bath, and a simple thermal water.

Mr. Lee (*op. cit.*), who seems to have made personal observations, to some extent, on the remedial value of many of the German Spas, and who has, also, gleaned information from the native writers and practitioners, speaks very highly of the effects of the hot baths at Wisbaden. His opinions may be summed up, briefly, as follows:

In chronic gout and rheumatism of the atonic kind, and in neuralgia, the greatest relief, and often entire removal of the disease, are procured by the Wisbaden baths. So, also, we learn, that “the varieties of chronic rheumatism—lumbago, sciatica, and tic douloureux—are treated with considerable success at Bath, by bathing, pumping, and friction.”*

“The state of abdominal plethora, with congestion of the liver, and obstruction in the circulation of the vena portæ, termed by the Germans *Unterleibsvollblütigkeit*, with its consequences, as impaired digestion, deficient or vitiated biliary secretion, piles, etc.,—occurring for the most part in persons about or beyond the middle period of their life, who have been addicted to the pleasures of the table, and marked by more or less protuberance of the abdomen, with diminished muscular and nervous energy,—is one well calculated to be relieved by the use of the Wisbaden waters internally and externally employed.”

“In hemorrhoidal affections, especially, Dr. Peez and Richter speak in very high terms of the effects of the Wisbaden springs; indeed the former of these physicians attributes to them a regulating and controlling power in these affections.”

The same eulogy may be passed on hot baths in hypo-

* Dr. James Johnson.—Excursions to the English Spas.

chondriasis, in males, and of irregular menstruation in females, especially if connected with a congested state of the abdominal or pelvic viscera.

Paralysis, unaccompanied by cerebral congestion or plethora, often yields to the operation of the Wisbaden baths.

Considering the increasing facilities of access to the thermal waters in Virginia, North Carolina, and Arkansas, and the consequently greater concourse of invalids to them, I take every opportunity of pointing out the forms of disease which experience has shown to be benefited or cured by the external use of similar thermal waters in Europe. With this view, I shall repeat what Dr. Johnson† says of the effects of hot bathing at Bath, in England, in paralysis. The temperature of the water is upwards of 100° F.

“ We have only to take a tour round the BATH HOSPITAL, where nine-tenths of the patients are paralytic—most of them paraplegiacs—to be convinced that this is a disease for which the Bath Waters are renowned *per totum orbem*, and perhaps much beyond those confines, if spirits are permitted to tell their dolorous tales in the realms *above*, or compare them with those which they suffered in the regions below. Dr. Summers, who expressly wrote on the benefit of bathing in paralytic disorders, makes the following observations :

“ We have a great variety of paralytic patients, and upon exactly examining the books from the first opening the Hospital to the present time, I find the account to be as follows: Admitted in nine years, 310. Cured and much better, 208; no better and dead, 99; remain in the house, 3. From hence it appears, that more than two-thirds were either cured or received great benefit, and that only twelve died in the space of nine years. All these patients were bathed twice a-week, and many of them three times. And what is very remarkable is, that of those who were cured or discharged much better, about thirty were more than forty years old, fifteen of whom were turned of fifty, and five were sixty and upwards. Now let appearances have their force, conjecture hesitate, and reason judge. And when I add, that the generality of our patients come as incurables from other hospitals, where there are physicians of the first character, and consequently

† *Op. cit.*

where the best means are used, how strong in favour of bathing (with such obstacles) must be the above account !'

"Dr. Spry remarks on this passage thus :—

'Looking with an impartial eye at this strong body of evidence, which could never have been brought forward in private practice, with what confidence and well-grounded hope will the paralytic patient resort to these springs for relief, if he has but the patience and perseverance to adhere to the mode of treatment chalked out for him.'

"Upon inquiry at the Bath Hospital, a very intelligent house-surgeon, with whom we visited the wards, informed us, that the external use of the Bath Waters—bathing, pumping, shampooing, &c.,—were almost the only modes of their administration. The baths, in cases of paraplegia, are used at a high temperature."

Both at the German Thermal Springs, and still more, perhaps, at Bath, the internal use of the water, as a drink, is commonly associated with bathing. The exciting effects of the latter are considerably increased by drinking the water. Most, if not all of these, so far as its introduction into the stomach is concerned, really depend on temperature and dilution; and they may be obtained at all our own thermal springs, or even by the drinking of hot water at home, in conjunction with a course of warm or hot bathing, respectively, according to the circumstances of the case.

Fever of Reaction.—In some instances, during the cure by hot bathing at Wisbaden, "there will be constipation, loaded tongue, loss of appetite, oppression about the chest, feebleness of the limbs, nervous irritability, disturbed sleep, perspiration, palpitations, and eruptions on the skin." These, if continued, or occurring in sanguine and irritable subjects will require a suspension of the bath for two or three days; and if need be, recourse to tepid bathing.

Hot Douches, as an important variety of the hot bath, and as adding greatly to the effects of ordinary immersion, next claim our attention.

Douching with hot water is principally had recourse to in diseases of an asthenic nature, and which from their duration acquire the name of chronic.

I shall be the more minute in describing the process of douching, and the states of the system and nature of the diseases in which experience has proved its efficacy, as it is a method of bathing on which the English physicians, out of Bath, have laid little stress; but which the almost concurrent testimony of the most enlightened continental ones to its singular power and utility ought to lead us to adopt, and to apply to a circle of local and general diseases of a very untractable character. The only natural hot spout bath, or douche, which I have seen in the United States, is at the Hot Springs, in Virginia. It is of the temperature of 103° F. But it is very evident that this mode may be practised with very little trouble or expense in the houses of individuals, as well as all public establishments for bathing. A common tea-kettle filled with hot water, may be made to answer the purpose; or if the spout bath is to be long continued, a boiler, such as is used in wash-houses, may be very readily fitted up, so as to give a proper supply and fall of the warm or hot water on the body of the individual, or any required part of it. When, however, I point out the facility with which every head of a family can provide a proper apparatus for this purpose, let me not be understood, for a moment, as intimating the propriety of the general or indiscriminate use of the remedy, without professional advice and superintendence. The very activity of this agent is sufficiently indicative of its pernicious effects, when its use is not properly timed and regulated.

The more complete apparatus for douching, will consist of a cistern or other reservoir, placed at a suitable height, from which the water is conveyed by means of a flexible tube or hose, of a prescribed diameter, varying from a sixth of an inch to an inch. The tube is fastened by means of a screw to the lower part of the vessel, and has a stop-cock to allow of the discharge or stoppage of the douche, as may be necessary. The other end may be simply tubular, or in the fashion of a rose, like the head of a watering-pot, so as to allow of irrigation.

Douching is, also, safely and easily performed by a kind of pump and hose, by which the warm or hot water is directed against any part of the body, and with any degree of force. This is the fashion of using the douche at Bath.

and on account of its being directed on particular parts without the rest of the body being exposed to the water, the process is called by the somewhat equivocal term of *dry pumping*.

In the great reservoir, at Bath, called the King's bath, there is a sub-aqueous douche or pump for directing a stream of water to any particular part of the body in the bath. This is called the *wet-pump*, or douche, in contradistinction to that which is applied to any part of the body not immersed in the bath. Its temperature is 116° F., although, when the water of the spring becomes diffused in the reservoir, and a large surface is exposed to the air, its heat is little above 98° F.*

If we except the ascending douches, adapted chiefly to asthenic uterine, or intestinal affections, and which ought never to exceed 98° F., and that which we use to stimulate the brain and medulla spinalis, as in hemiplegia, by applying it to the cervix, along the spine or the os sacrum, and which should not be more than 100° F.; we can

* The ascending douche is chiefly applied to the rectum, vagina, and perineum. The tube conducting the water is terminated by a spout with one or more openings. The patient being seated in a suitable manner, the tube is introduced into the rectum, or what is thought better, is brought to within a short distance of its orifice. In this case the column of fluid acts with sufficient impetus to overcome the resistance of the sphincter of the anus, and enter even some way into the intestine. An application like this of warm or even hot temperature to the perineum would be worthy of trial, in cases of stricture of the urethra and enlargement of the prostate gland.

When the descending douche is applied to the abdomen, the muscles covering its viscera ought to be as much relaxed as possible. With this view the patient is to recline on a straw mattress covered with oil cloth, or, if able, he is to be placed in a bath-tub; his head a little raised and inclining forwards, the legs half bent on the thighs, and the arms extended along the body without effort.

If the back or loins are to be douched, the invalid lies with his face downwards: if the douche is to be applied to the nape of the neck, the person should kneel on a cushion, and lean his head on a chair, with his forehead resting on his hands. If we are to douche the head or shoulders, or knees, the posture is to be a sitting one: the same for the hands, which are to be extended on the knees.

never have a hot douche of much efficacy if it be not from 106° to 112° F. (33° to 35° R.). This degree of heat, which cannot fail to produce the greatest derangement in the parts above-mentioned, in sthenic subjects, agreeably to the opinion of Galen, *calidarum aquarum usum noxium esse capitibus natura calidis*, is found to be indispensable when we want to overcome morbid congestions in the abdominal viscera, and to revive the languid action of the stomach and intestines. It is also called for in all those local affections that require, either the detersion of an indolent ulcer, or the exfoliation of bones attacked by necrosis, or the resolution of any engorgement that may have its seat in the glandular system.

The maxim that hot douches ought only to be employed in asthenic diseases, or to correct or heal hyposthenic local complaints, has been generally recognized.

If we inquire into the hour best adapted to the use of this remedy, and the duration of its employment, we are told that, excepting the douche applied to the head, and that to the various digestive organs, which latter should only be used when the stomach is clear of food, it may be had recourse to at any hour of the day. We must be aware, however, of the general excitement which follows this local application, and hence we ought not to advise it soon after a meal. If a choice can conveniently be made, the morning will be found the best time, as that in which the system is endowed with the largest share of susceptibility to the impression of different stimuli. Experience teaches that the internal douche may be used even in the afternoon, without any injury resulting. The same may be said of spout bathing to other parts.

The period during which the douche may be used will depend on the condition of the patient, and the nature of the disease itself. The most usual lapse of time is from twenty to thirty days; but we often meet with diseases, which, not having yielded to the number of douches indicated, were finally overcome by a more protracted perseverance in their use.

The duration of each douche may be from a quarter of an hour to an hour, daily, depending entirely on the respective constitutions of the patients and the sum of their strength. They who prolong it beyond measure, are often

liable to asphyxia, vertigo, and other inconveniences, which commonly vanish with a suspension of the remedy, or by simple exposure to the open air. In general, when we use hot douches, the time of desisting from them ought to be that in which perspiration, being converted into a copious sweat, inundates the whole surface of the body, and trickles in large drops from the forehead.

On discontinuing the douche, especially after it has been applied to the abdomen, great benefit is derived from entering a warm bath, to moderate, in some measure, the excess of heat which occasionally produces for some time a disagreeable sensation in the affected parts.

I shall conclude this chapter by a specification of the different maladies in which hot douches have been found singularly efficacious.

In *tumefactions* of the viscera, without fever or pain, they may be freely applied over the affected part. In simple *physconia*, whether produced by enlargements of the liver or spleen, without phlogosis, the remedy often entirely relieves, especially if alternated with warm bathing. It is also highly proper, indeed necessary, to begin with the administration of some purgative medicine, and repeat the same after a few days of spout bathing. In that state of the body termed cachectic, the consequence of derangement of the stomach, liver, and spleen, among the residents of marshy countries, and distinguished by a pale or sallow complexion, puffy skin, swelled extremities, languor, and disinclination to motion of any kind, this kind of bath often acts like a charm. It may be used on different parts of the abdomen, or occasionally on the chest and along the back.

In *paralysis*, when we have reason to believe that there is little alteration in the structure of the brain or spinal marrow, and when the patient thus afflicted is not of a plethoric habit, nor liable to great determination of blood to the head, the hot douche applied, alternately, to the head, nape of the neck, and along the spine, is often our main resource. In nervous exhaustion and debility, where torpidity has taken the place of *erethism*, or morbid sensibility, this remedy is one of great avail.

In diseases of the *uterus*, depending on atony of that organ, as in *fluor albus*, unaccompanied by heat, *pruritus*,

or tumescence of the affected parts, but simply characterized by languid circulation, pallid and cold skin, and universal languor, we have much to hope from the hot douche, either descending and applied to the os sacrum and over the hypogastric region, or ascending and directed into the vagina and to the *os tincæ*. *Chlorosis* might, under proper restrictions, be materially benefited by the same remedy, applied in the same way.

In chronic metritis and indurations of the neck of the uterus, the *warm* douche will be found a useful aid to other remedial means. Chronic ulcerations, with engorgement of this organ, will sometimes require the hot douche. Of whatever temperature the douche may be, in these cases, the following advice of Lisfranc* must be constantly borne in mind :

“If, at the termination of the douche, the patient experience a sense of heat and slight pains, lasting, however, for five or six minutes only, the excitement has reached a suitable point, and its use may be persevered in without fear ; but if the pain continue for a longer time, it indicates an excess of sensibility, and proves, quite generally, that the disease is as yet too acute ; the douche must, therefore, be more gentle, and even milder means substituted.

“Care should be taken to prevent the bed or couch from being soaked. They should be covered by an oiled cloth, so disposed as to turn the water into a basin ; and when the douche is made into the vagina, a flat vessel with a rounded edge is to be placed under the perinæum. In short, the physician will employ all the means at his disposal to effect this object.”

Similar advice may be given in reference to the *mucous* and *muco-sanguineous* discharges, of a chronic nature, from the intestines, and to *hepatic* and *nephritic* colics. The douche in such cases is to be applied alternately to the abdomen or lumbar region, and in the form of enema.

In the *Dictionnaire des Sciences Medicales*, under the article *Douches*, which is somewhat meagre in its details and contradictory in its positions, we read of a case in which an ascending douche of simple warm water was

* Diseases of the Uterus.—Edited by H. Pauly, M.D.

eminently serviceable. The subject had abscess of the liver, which, owing to adhesions to the colon and ulcerations of this intestine, was discharged by the natural outlet. He was thought to have entirely recovered: but after awhile he began to suffer daily, about four or five hours after a meal, from colicky pains, followed by purulent discharges. With these were associated every evening a slight chill and fever. He was cured by the means just mentioned in the course of eight or ten days.

In swelling of the joints, without redness and pain, whether rheumatic, gouty, or scrofulous, after the subsidence of fever; and suitable attention having been given to the digestive passages, no remedy can compete with the hot douche, including that by vapour, perseveringly used for a length of time, and alternating with friction.

In sciatica and other varieties of neuralgia, hot douching directed along the course of the nerve is a remedy of great power.

Good may be expected from this kind of douche in incipient amaurosis, after suitable depletion, by directing a jet of hot water on the temporal and orbital branches of the fifth pair; and in chronic deafness, by a similar application to the mastoid process, and in front of the outer ear just above the zygomatic arch.

The use of the hot douche is counter-indicated, and ought to be abstained from, during the menstrual or hemorrhoidal discharges, and in all hemorrhages; or in persons prone to sanguineous discharges, whether owing to a sanguineous temperament, plethoric habit, or other causes. In fine, all diseases of an inflammatory character will be aggravated by the use of the hot douche.

The *warm* douche is often resorted to with good effect in all the forms of disease in which the hot douche is used; and with less reserve on the score of its stimulating operation.

Except in particular cases in which a cold semicupium is directed, at the same time that a hot or warm douche is applied to the head or upper part of the body, the patient ought to be in a bath-tub, partially immersed, or seated, or kneeling, as the case may be, in warm water, during the administration of this kind of douche.

CHAPTER XLV.

VAPOUR BATHS—RANGE OF TEMPERATURE OF A SIMPLE VAPOUR BATH—VAPOUR EVOLVED FROM HOT SPRINGS—CAUTION RESPECTING THERMAL SPRINGS NEAR NAPLES—IN THE ISLAND OF ISCHIA—BATHS OF NERO—PHYSIOLOGICAL EFFECTS OF VAPOUR BATHING—DIFFERENCE BETWEEN THE DRY AND THE MOIST VAPOUR BATH—EFFECTS ON THE CIRCULATION—DIFFERENCE FROM HORIZONTAL POSTURE—ALSO, ACCORDING AS THE HEAD IS INCLUDED OR NOT—EFFECTS OF A MILD VAPOUR BATH ON THE FUNCTIONS GENERALLY.

UNDER the head of vapour bathing we include immersion of the body, in whole or in part, in a medium consisting of air in which water is suspended, or of dry air simply heated. The first is called a *moist*, the second a *dry vapour* bath. Either of these may hold in a state of suspension, or be impregnated with, various substances, volatilized or dissolved; and it is then called a *medicated* vapour bath.

The temperature of a simple vapour bath, the product of warm or hot water, will vary from 90° to 150° of F., according to the heat of the water, or the space through which it is allowed to be diffused, and the time which has elapsed since the first formation of the vapour. The heat of a Russian vapour bath is commonly from 122° to 133° F. Sometimes, as in their private baths, it is as low as 100° or even 98° F. (See Chap. XV.) That for which the people of the north are indebted to art is prepared by Nature herself in many places, by means of vapours which issue from hot mineral springs, as at Aix-la-Chapelle, Baden (in the duchy of), Balaruc, Burscheid, Carlsbad, Pfeffers, Plombieres, Lucca, Island of Ischia, Chaudes Aigues, Ouachita in the State of Arkansas, &c.

The use of both moist and dry vapour, for the purposes of hygiene as well as for the treatment of disease, was known to the ancients. Hippocrates recommended fumigations—

sometimes simple watery vapour—sometimes the vapour of vinegar: on occasions he used various gum resins, and at others emollient herbs, through which the vapour from water was made to pass. Among writers of a subsequent date might be mentioned Aretæus, who distinctly describes as the best, the method by which the patient has his head out of the bath and breathes the common air, whilst the rest of the body is exposed to the vapour.

The *laconicum* of the ancient Romans was a dry sudatory, or dry vapour bath, which, by taking the cover off one of their cauldrons, or a *calidarium*, could soon be converted into a moist vapour bath. By them, the sudatories, both dry and moist, seem to have been used as a means of luxurious enjoyment, and perhaps, also, with a view to its preservative powers, more than with any very definite notions of its therapeutical operation. Celsus, indeed, speaks of sulphur fumigations in paralysis, as an efficacious remedy.*

Boerhaave had recommended, long before Mudge introduced his inhaler to the notice of the profession, the employment of the vapour of water distilled over elder-flowers, in pulmonary catarrh. Gaubius speaks of fumigating boxes, or domestic vapour baths, in which the whole body, naked, was inclosed, except the head.

The people of northern Europe, among whom the vapour bath has been in habitual and extensive use, have not been remarkable for their additions to the general stock of either professional or scientific information. In southern Europe, and especially in Naples and Sicily, where vapour baths, both moist and dry, have always been in use, because always readily provided by the hot springs and the volcanic soil of those countries, much valuable information on the subject has been collected. In France, more attention has been paid to the subject than in Germany and Great Britain. It has been sketched, but not fully treated, by the writers of the two last-named countries. By none of them is the subject treated with the same fulness as by M. Rapou, to whose work I shall soon have occasion to refer with some frequency. In the United States, vapour bathing has been chiefly in the hands of empirics, known

* Lib. III., Cap. 27.

under the popular title of "Steam Doctors;" whose practice consists, for the most part, in the use of hot vapour externally, and of capsicum, lobelia, &c., internally—with results too often corresponding to the ignorance and effrontery of these easily-taught prescribers.

Among Italian writers and physicians, Assalini has the most fully investigated the effects of all the varieties of vapour bathing, by artificial processes and apparatus, many of which are of his own invention. After he had made Naples his home, he enlarged the sphere of his experiments and inquiries begun at Munich, and gave them to the public in a work professedly on the subject.*

The best examples that can be furnished of the aqueous vapour bath, are obtained from a study of the effects on the animal economy of the watery vapour disengaged from hot springs, and confined in apartments constructed for the purpose, or in such a way as to admit of its being applied to particular parts of the body.

An analysis of a natural vapour bath ought, however, to precede its use. In some instances, as at Carlsbad, it contains a certain quantity of carbonic acid, enough to preclude its use by an immersion of the head and its consequent application to the pulmonary mucous surface.

Andria, in the second part of his work,† gives a detailed description of the locality of the different hot springs, and also of the natural vapour baths (*stufe*) of the island of Ischia, in the bay of Naples. It was generally believed that the vapour given out from the crevices of the rocks and natural grottoes of the island, held in solution sulphur and sulphuret of mercury (cinnabar); and hence, according to this opinion, the good effects of the *stufe* in various diseases.

Andria dispelled these illusions, and showed by experiments, that the vapour was simply water elevated by the extreme subterranean heat. He selected, as more particularly the subject of his observations, the *stufa* of San Lorenzo, the temperature of the vapour of which is 124° F.

* *Ricerche Mediche su i Bagni a Vapore e di Calorico e sulle Fumigazioni di Sostanze Ammoniacali e Balsamiche, di Zolfo, di Mercurio, &c., &c.* Del Dott. Paolo Assalini. Napoli, Tom. I. 1820.

† *Trattato delle Acque Minerali.* Napoli.

Flame was not altered by it, nor was respiration impeded; small animals confined in the fissures from which the vapour escaped, did not suffer in the least; the leaves of the few plants in the spot were not at all discoloured, nor their growth stunted; introduction of the head, with the eyes kept open, was not attended with any irritation; no peculiar odour was experienced; no incrustation was formed on the sides of the fissures or walls of the rooms in which the vapour was received; nor was the lustre of metals altered by exposure to it unless from humidity, nor any change produced on various chemical reagents.

The temperature of the different natural vapour baths of the island of Ischia are as follows: The *Stufa* of *San Lorenzo* is 124° F.; that of *Castiglione* 133° F.; of *Cacciotti* 156° F.; of *Citara* 167° F. One alone, the *stufa* of Testaccio, was of simple hot air, of the temperature of 112° F.

At these *stufes*, there are, in addition to the regular rooms for entire bathing,—boxes and various openings, so made as to allow of the application of vapour to a particular portion of the body, as for a seat or hip bath, or a box to inclose a joint, &c.

Near the shore of the bay of Baia are the baths of *Tritoli*, or of Nero, as they are called in the guide books. The Romans had erected on this spot a large edifice consisting of numerous rooms, into which the vapour from the spring beneath was conducted by appropriate tubes: all of which are in ruins. The only accessible passage to the hot spring now communicates directly with the open air. It is about a hundred and thirty yards long, and is quite narrow; and filled as it is with hot vapour, offers no little obstruction to a person who should desire to traverse it. With more curiosity than prudence I accompanied the guide to the spring. It is customary for him to go down to it and bring up a bucketfull of its water, in which, in order to show its high heat, an egg is dropped and cooked. The heat was very oppressive, and it was with great difficulty that, by following the guide's direction to stoop, and thus breathe the air least heated and oppressive, I was enabled to persevere in bearing him company. This kind of extemporaneous vapour bathing produced in me, for the next twenty-four hours, a feeling of languor and pain

in the limbs and head, no doubt increased by subsequent exposure to the sun, in our boating excursion round the bay of Naples and a visit to Ischia, Procida, and Capri.* The heat of the water at the *Tritoli* spring is stated to be 167° F. Dr. James makes its vapour to be 122° F.

In the neighbourhood of Pozzuoli, and within a few miles of Naples, are the thermal springs of Pisciarelli, or, as they are called in general, of Solfaterra; from which issue abundant watery and sulphurous vapours, which might, with little trouble, be introduced and retained in appropriate chambers. The heat of the Pisciarelli water at one of its sources is 167° F. In Pozzuoli itself there are several thermal springs: the highest temperature is of that of the temple of Serapis; it being from 102° to 106° F. We may reasonably presume that the ancient occupants of this temple, the priests, knew how to turn to account the curative properties of these springs in favour of their assumed power of working miraculous cures, by promised intercession with their presiding deity, Jupiter Serapis.

Physiological Effects of Vapour Bathing.—These differ according as the immersion is in a dry or a moist vapour. Both, at an elevated temperature, have the common property of imparting caloric to the body, and even, after awhile, of increasing the heat of the blood itself. The heat thus acquired may last for some time after a change of medium; and in this fact we find an explanation, in addition to the excitement of the nervous system, of the ability to endure great cold with impunity by those who have recently made use of the vapour bath.

The arterial blood of animals subjected to a vapour bath of a high heat, becomes dark, like venous blood; it is not red-dened on exposure to the air, and it loses its property of coagulating. This last phenomenon indicates a tendency to extravasation; and, accordingly, animals exposed, as above, show echymoses simulating those of purpura and scurvy.

Among other differences of effects there is greater rapidity of evaporation in the dry than in the moist vapour. In the first, or dry and hot air, the evaporation is proportionate to the stay in this medium rather than

* This was in July, 1817.

to its heat. Thus, for example, ten minutes passed in a dry vapour bath of 122° F. and one of 212° F. gives rise to the same loss by evaporation; and this in a constant proportion. In moist vapour there is no loss, but rather a gain of weight; and if we admit that still there has been evaporation, this must have been more than made up for by absorption.

We can readily understand the difference in the sensation of the persons exposed to the two kinds of vapour, as relates to their thirst. That of the one who has left the moist vapour bath gradually subsides, in proportion as he loses his excess of caloric; while that of the other who has left the dry sudatory, and who has lost a great deal of the aqueous portion of his blood, cannot be appeased until he has drunk largely of water.

The toleration of dry heat is much greater than that of moist heat. Dr. James was almost suffocated in the vapour of Nero's bath, at a temperature of 122° F.,* while in the dry sudatory of Testaccio, of 176° F., he felt but a slight uneasiness. In the bathing establishment at Paris, known by the title of the *Neothermes*, the moist vapour beyond 114° F. is borne with difficulty. M. Londe could not remain in the apparatus of M. Monroy, when the heat was above 122° F. What a contrast between this intolerance and the ability to bear the heat of an oven of 280° F., evinced by the baker's girl on whom Tillet and Duhamel experimented. The reader has been already told (p. 37) that Chabert was in the habit of entering an oven, the temperature of which was 400° F., and in some instances 600° F.

In prescribing vapour baths we must, therefore, bear in mind the differences in physiological effects between the two kinds—the dry and the moist. In the first, the sweat so abundantly secreted is soon evaporated, and the skin is thrown into a state of erethism or vasculo-nervous irritation. In the latter, the vapour is condensed on the surface of the body, from which evaporation might take place, both of this vapour and of the sweat that is exhaled, but for the saturation of the air with moisture. The caloric, in consequence, accumulates in the body.

Contrary to what might at first be supposed, we learn,

* Andria makes it only 112° F.

from the experiments of M. Magendie, that exposure of the skin in a vapour bath, from which the head is excluded, is not so well borne as immersion of the head alone, the rest of the body being external to the bath. The inference is, that the pulmonary mucous surface bears heat better than the cutaneous surface.

The effects of a vapour bath on the circulation are analogous to those of warm and hot water baths of a lower temperature, owing to the elastic vapour being a less powerful conductor of heat than water. Thus, for instance, a moist vapour bath, at 100° F., is but equal in its stimulating effects to a tepid water bath of 90° F., and one of the former kind at 122° F. is only equal to one of the latter at 100° F.

The pressure of a body of water, in the common bath, is sometimes a cause of considerable distress to certain weak and nervous persons. In the vapour bath they are exempt from this annoyance.

M. Londe, on entering a moist vapour bath (in the month of January), of the temperature of 100° F., experienced the sensations that would be imparted by an ordinary tepid bath. On increasing the temperature of the vapour to 122° F., his pulse, which at first gave seventy beats in a minute now gave one hundred in the same time, and his forehead was bedewed with sweat. The heat of the bath, raised to 128° F., accelerated the pulse to 120 beats. There was, at the same time, great palpitation, and hurried breathing. At 136° F. the experiment, which lasted three-quarters of an hour, was terminated by inability to continue it any longer. After coming out of the bath, M. Londe could stand with difficulty; he experienced beatings of the carotids, and buzzing in the ears, and was bedewed with a copious sweat. After the expiration of an hour, the pulse still beat 95 strokes in a minute.

In a horizontal posture, M. Londe was able to bear a higher degree of heat. In a bath of 133° F. the pulse was but 93; and in one of 153° F. it was 98; and when the heat was increased to 187° F. the pulse did not exceed 112; and it was only when this extreme was reached after 35 minutes from the beginning of the immersion, that M. Londe experienced any palpitations.*

* Dictionn. de Med. et de Chirurg. Pratique. Art. Bain.

In the above experiments which were made in the vapour bath of M. Monroy, the head was external to the bath.

M. James could not count his pulse in the baths of Nero, and it was with great difficulty that he could escape from the *frightful furnace*, as he calls it. On escaping into the open air, he nearly fainted; he suffered from vertigo, and his pulse beat 154 strokes in a minute. Epistaxis supervened, most timely, to relieve him of cerebral congestion. In the evening, the pulse was 100; he felt agitated and bewildered, and had singing in the ears, together with a sensation of creeping in his limbs. On the following day he still felt fatigue, and exhibited injection of the conjunctiva.

Allowance must be made for differences in the excitability of different individuals. My own feelings, on a similar exposure to that of M. James, have been already alluded to. They were not of that distressing kind described by this gentleman; although certainly they indicated great temporary derangement of the organism.

A much lower degree of heat will suffice to produce the same effects, when both the head and the rest of the body are immersed in the vapour—and, consequently, when it acts both on the skin and the pulmonary mucous membrane.

The effects of the sudatory, whether dry or moist, on the animal economy will vary according as the whole body is immersed, or only the trunk, so as to exclude the head and allow of the access of the common atmospheric air for breathing. The partial application of vapour arising from hot water exerts nearly the same effect as a fomentation of the surface to which it is applied.

When the whole body, or only part of it, the head being free, is surrounded with vapour exceeding the animal temperature, a portion of the water thus elevated and suspended by caloric, is introduced into the system through the absorbent vessels, and the remainder, losing part of its caloric by contact with a body of a lower temperature, is condensed into drops which trickle down the skin. After awhile, the heat is diffused over the entire surface, whence even the most remote parts become red and covered with a profuse sweat. And here it is worthy of remark, that

the avidity of the absorbents for seizing the watery vapour is so great at the commencement that they take it all up; nor does it flow on the body until the vessels themselves are entirely filled, as was remarked by Mascagni and Franceschi, when the former made use of the vapour baths established by the latter at the Lucchese *thermæ*.

If the head be also exposed to the vapour, so that this latter is inhaled, the stimulating effects of the bath are increased, and the amount of fluid absorbed very greatly augmented. The imbibition by the pulmonary veins is considerable, and so far serves to moderate the hurried respiration which the caloric of the vapour naturally tends to produce. This increased fulness of the cutaneous and pulmonary capillaries, accompanied also by increased exhalation, is not without its effect on the circulation; the pulse acquires volume together with some additional frequency; the brain, participating by its membranes in the state of the lungs and skin, is fuller of blood than usual, and there is a tendency to sleep, or at least a general feeling of languor, and an indisposition to bodily exercise.

When the dose of the caloric is not great, its stimulating action will be mitigated by the influence of the moisture, which may even predominate and give rise to soothing and sedative effects. Thus, the aqueous portion of vapour applied to the epidermis or outer scarf-skin penetrates and softens it more completely than simple immersion in warm water would do. This very softening of the hard and resisting cuticle and epidermis, and even of the dermoid tissue itself, allows of a greater expansion of the vessels of the skin proper, and diminishes in consequence the state of tension to which the nervous papillæ might have been subjected. The simple watery fluid condensed on the skin or penetrating the epidermis is largely absorbed, and by its mildness and blandness is an agreeable diluent of the more stimulating fluid which may have been in the vessels previously: the nerves also are pleasantly affected, as in the instance of the warm bath, by this mild vapour applied to their extremities. Hence we can understand how, even although the caloric of the vapour should invite a greater afflux of blood and fluids to the minute vessels of the skin, the entire effects of this kind of bath should be of a soothing and sedative, rather than stimulating

or irritating character. But we must also take into account, at this time, the increased secretion from the skin in the form of sweat, and which, when not excessive, is often salutary. It is not so much, however, by simply restoring and exciting perspiration that this remedy is so serviceable, as by its restoring the due proportion between the secreting and absorbent vessels—accelerating their circle of functions, and without undue heat or excitation causing a renewal, as it were, of the cutaneous system; that is, of the tissues which compose it. Hence the old cuticle, after the regular use of the vapour bath, peels off, and new is formed; the complexion and colour of the skin are improved by the removal of the darker and discoloured pigment or *rete mucosum*, and the substitution of a new deposit. The inert and partially collapsed capillary vessels of the true skin acquire more vitality and fulness from the afflux of blood to them, in consequence of the heat of the vapour, and they are more ready to supply the secretion of sweat. There is, at the same time, a large imbibition of moisture, and consequently augmented size of the lymphatic and venous absorbents. We have then two conditions, viz., fulness of the arterial capillaries by afflux of blood, and fulness of the absorbents by the watery fluid introduced, which give a plumpness and roundness to the skin and cellular tissue, observed in those who have just left the bath.

The above description is presumed to be characteristic of the effect of vapour slightly above animal heat, and in which the body has not been long immersed.

It will enable us to appreciate the physiological operation of the vapour bath on the skin, and through this latter on the animal economy in general. The higher the heat, the more decidedly stimulating will be the vapour—and of course the greater will be the cutaneous excitement and duration of the heat of the system, even to the extent of simulating a febrile paroxysm. Nearly analogous effects to those produced by the moist vapour bath will ensue on exposure to a dry vapour, or air of a room heated by flues, as in the Asiatic baths; and the application subsequently to the skin of water, either by affusion or by aspersion and sponging.

An eruption, sometimes of a miliary appearance, some-

times in the shape of minute pimples, often shows itself after the vapour bath, but more especially when sulphurous fumigations have been used.

CHAPTER XLVI.

VAPOUR BATHS (*continued*)—HYGIENIC EFFECTS OF VAPOUR BATHS—ON THE SKIN AND THE FUNCTIONS GENERALLY—THE HEAT WHICH CAUSES MOST ABUNDANT PERSPIRATION—VAPOUR BATHING ADAPTED TO ALL AGES—SEASONS FOR ITS USE—DURATION OF THE BATH—NUMBER OF BATHS—HOUR FOR THE BATH—OTHER HYGIENIC CONSIDERATIONS—TABLE OF COMPARATIVE HEATING OPERATION OF WATER AND VAPOUR.

Hygienic Effects of Vapour Bathing.—These have been observed on a large scale, as when both dry and moist air baths (*laconicum* and *vaporarium*) were used by the Romans, the dry air ones by the Turks and other people of the East, and the moist vapour by the Russians. Refreshment and invigoration—removal of the lassitude and aches incident to long travel and fatiguing exercises, and ability for fresh efforts—are common effects of vapour baths, when of a temperature corresponding with that of the warm water bath, and more especially when they are succeeded by cold or tepid affusions. This was the common practice of the ancient Romans, who used to pass from the *caldarium*, which was sometimes an apartment for dry and sometimes for moist vapour, into the *frigidarium* with its cold bath, or into the basin for swimming (*piscina natatalis*). It is that, also, of the Turks and Egyptians of the present day;—and in a still more remarkable manner; of the Russians—as the reader has fully learned in preceding chapters of this volume.

Worthy of especial notice, also, is the additional exercise which the skin and subjacent muscles, and the circulatory apparatus receives by the auxiliary processes of friction, strigillation, shampooing or massage, and flagellation with the twigs of birch, &c., after the vapour bath.

The extreme softness and suppleness of the skin, one of the hygienic effects of this kind of bath, result from the detachment of the outer epidermic scales, which peel off in quantities surprising to those who perhaps but a short time previously had subjected themselves to thorough ablation and cleansing in the warm water bath.

The reader has been told, in former chapters, how much the internal membranes and organs sympathize with the skin, both in its healthy and morbid states. Of course, it can easily be understood how the vapour bath, which places the skin in the very plenitude of its functional activity, should exert such agreeable hygienic effects on the entire organism—the nutritive, sensitive, and locomotive apparatus—and impart both mental and bodily vivacity and strength.

Incalculable benefits might be enjoyed by both the young and the aged, in whom nutrition is not well performed, and whose skins are dry and harsh, and digestive functions sluggish, by the use of vapour bathing.

Inequalities of growth of particular parts or regions, by undue development of some and weakness of others, might be greatly corrected,—especially if appropriate gymnastic exercises be resorted to contemporaneously with the vapour bath.

Irregularity of certain functions, as of menstruation, and derangements incidental to this state, whether at the age of puberty, or later in life, at what is called the critical age in females, would be removed by the means now under notice. It has also its value in certain cases of pregnancy, in which the female suffers from nervous disorder and irritability of the vascular system; and also, after child-birth, where the lochia are defective, and the secretion of milk tardy.

Predominance of the lymphatic system, amounting to a kind of plethora, measured by fulness and yet softness and puffiness of the sub-cutaneous tissues, and engorgement of the lymphatic glands of the neck, associated too often with a similar condition of the bronchial and the mesenteric glands, calls for vapour bathing.

The preventive or preservative operation of the vapour bath is often manifest, when it is resorted to by those who have been chilled by recent exposure to extreme cold,

or to cold and moisture, and who, in consequence, are in imminent danger of violent inflammation—pleurisy, pneumonia, bronchitis, rheumatism, &c.—supervening.

The more general and extended prophylactic powers of this agent may be readily understood from a knowledge of its physiological effects. Its judicious employment will go far to ward off hysterical and other convulsions, and varieties of nervous disorder. Equally efficacious in this way is the vapour bath against rheumatism and various forms of neuralgia, catarrh, &c.

In recommending the vapour bath under the circumstances just specified, I must be understood to have reference to the moist vapour, except in the instances of lymphatic plethora, and a predominance of the lymphatic temperament,—or when the skin is habitually cold, and lacks activity of circulation. In these cases, the hot dry air sudatory will be preferred. Whenever we have to do with persons of great sensibility, and whose systems are in a state of almost continual irritability,—the moist vapour will be chosen for its soothing effects. When, on the other hand, we desire to stimulate and to increase the activity of the circulation of the skin and mucous membranes, we should direct the use of the hot air bath.

Some additional considerations, connected with *the hygienic and therapeutical use of vapour bathing*, may properly be introduced in this place.

M. Rapou asserts, that the most abundant perspiration is produced in a moist vapour bath, of a temperature between 106° to 112° F., and in a dry or hot air one, between 122° and 156° F.; but for ordinary hygienic purposes the bather should begin with vapour of a lower degree of heat than either of these; nor will it be necessary for him, in common, to be subjected to the high standard of either. A knowledge of the perspiratory point is more available in therapeutics than in hygiene.

Under the latter aspect, an English writer,* who has had considerable experience in the effects of dry vapour, or hot air bathing, assures us, that he found the most profuse sweating to take place when the air was only of the

* Dr. Gowen, *Auxiliaries to Medicine*.

temperature of 85° F. Dr. Forbes (*Cyclop. Prac. Med.*) judiciously remarks on this averment: "We have, however, found that very copious perspiration may be excited by a temperature not greatly above this; viz., from 90° to 100°; and we are of opinion, that even when we use this bath, more with the view to stimulate this surface than to excite perspiration, it will seldom be requisite to elevate the temperature beyond 120°, or at most 130°."

Dr. Green* tells us, that he is in the habit of administering the hot air bath to patients at first, at the temperature of 98° F., and raising it gradually, in the course of from fifteen to twenty minutes, to 110°, and if the full effect of the bath is not obtained, to 120°, and even 130° F.

The reader has been already apprised that, in inflammation of the throat and air-passages, and in other phlegmasiæ, Assalini used vapour of the low temperature of 90° F. Where the excitement was less and the malady of a chronic nature, he raised the heat to nearly 100° F. (30° R.). In general, we may agree with Marcard that vapour baths under 96° F. have not much activity. We are not, however, to take our sensations in a hot water bath as a measure of the manner in which a vapour one of the same temperature would affect us. The heat is much more promptly imparted to the body by the denser medium of water than of vapour, and hence the former at 92° would feel as warm as the latter at 104°.

In the vapour baths of Basil Cochrane at Portman Square, London, on a large scale, and adjoining his own residence, the temperature at which they have been used with advantage by many persons suffering under chronic rheumatism, catarrh, gout, gravel, and ophthalmia, was as high as 120°. We have not learned whether the application of the vapour in these cases was local and partial, or general.

When perspiration is prevented by excess of heat, or of excitement in a hot air bath, this effect is often readily obtained by a light douching of the body of the bather with moist vapour, or by sponging him with cold water.

The use of vapour bathing is not restricted to any particular period of life. It may be used by the infant and by the very aged.

* A Practical Compendium of the Diseases of the Skin, &c.

As relates to the *seasons* of the year when it may be best applied for hygienic purposes, physiological teaching and popular opinion are at variance with each other. The former will point to the dry state of the skin and its impeded perspiratory function in cold and damp weather, and will find in these circumstances an indication for the use of the vapour bath. The latter will tell of open pores, and the danger from suddenly checked perspiration, by exposure to a cold air after the use of the bath.

On this point we may safely trust to the course pointed out by physiology, sanctioned, as it has been, on a large scale, and for a length of time, by the uniform practice of the people of different countries—Russians, Turks, &c.,—not to speak of the Romans of old.

If we are allowed a choice, the hot air or dry vapour bath should be taken in preference to the moist one, during the winter months. For myself, however, I have no apprehensions of injurious effects from the employment of the moist vapour bath, at this season, provided it be taken of a sufficiently high temperature to produce an evident excitement of the skin and general system,—manifested by some redness and augmented heat of the former, and a slight acceleration of pulse. In this state of body, one is safe from subsequent temporary exposure to the sedative influence of cold, or of cold and moisture.

The *duration* of a vapour bath will vary from ten minutes to two hours, according as it is general or partial, and the purposes, hygienic or therapeutical, for which it is used. Temperament and habit will, also, exact differences in this respect. Dr. Green (*op. cit.*) remarks on this point: "After the perspiration has appeared about five or six minutes on the forehead, the full effect of the bath has been obtained, and the patient should immediately quit the apparatus. If the stimulus be continued longer, it is at the expense of the agreeable feelings first induced: a degree of languor and exhaustion succeeds to these, and patients then feel drowsy and disposed to sleep. But if the bath be quitted when the effects are at their height, a comfortable degree of warmth is experienced for some hours afterwards, and the activity of the body and the elasticity of the mind, far from being diminished, are, on the contrary, very much increased."

The *number* of baths and the *entire period* during which they should be used as a remedy in any one disease, cannot be arbitrarily designated in advance. In acute diseases, a few baths, during a period, at the most, of five or six days, is all that is required. Twenty to thirty will constitute a course usually sufficient for most chronic affections.

If relief be procured by the remedy, after a course of bathing, but the patient complains of fatigue from its prolonged use, it will be well to suspend the treatment for a month or so, and then resume it.

The best hour for the vapour bath is that recommended in other kinds of bathing, viz., in the early part of the day, before breakfast or before dinner, and when the stomach is not loaded with food. If two baths are to be taken in the same day, the first should be before breakfast, and the second before supper,—supposing this meal or some equivalent evening repast to be partaken of; and, also, that a moderate and not late dinner has been eaten.

Very young and feeble adults may take, with some advantage, during the process of bathing, a bowl of light soup, or well-flavoured gruel, sago, &c.

After the vapour bath, invalids, and the sick generally, should recline in bed or on a couch, and be covered with suitable clothing, so as to allow opportunity for, and encourage sleep and perspiration. They who enjoy their ordinary health, will, on the other hand, if they crave food, make a slight repast, and then take moderate exercise.

Unless the vapour bath be used at a very low temperature, and the bather finds himself refreshed without being heated by its use, the better plan will be, to receive a dash, by shower, of cold water on the body before he emerges from the bath. If he be in a box or case too small to allow of the cold shower, he can sponge his skin all over, and, more especially, his face, temples, and neck, with cold water, so as to establish an agreeable and pleasant temperature of the organism.

The following table, showing the comparative heating operation of water and watery vapour on the human body, ought to have been inserted when the physiological effects of the vapour bath were described, and this very topic was discussed:

	WATER.	VAPOUR.	
		Not breathed.	Breathed.
Tepid bath . . .	85°—92°	96°—106°	90°—100°
Warm bath . . .	92—98	106—120	100—110
Hot bath . . .	98—106	120—160	110—130

Reference has, I believe, been made to another important difference between water and vapour baths; viz., in the pressure from the former which is wanting in the latter. This is so great in the common water bath by immersion, in some cases, especially of nervous and delicate subjects, that they complain excessively of weight on the chest and epigastrium, and for this cause refuse to bathe at all.

CHAPTER XLVII.

VAPOUR BATHS (*continued*)—THERAPEUTICAL EFFECTS OF VAPOUR BATHS—SOFTENING OF THE SKIN AND RELAXATION OF INFLAMED PARTS—VAPOUR DIRECTLY APPLIED TO INFLAMED ORGANS—USE OF VAPOUR FOR THE SICK POOR OF NAPLES—APPLICATION OF VAPOUR BATHING, MOIST AND DRY, IN FEVERS—RAPOU'S, ARMSTRONG'S, AND TWEEDIE'S EXPERIENCE—USE OF THIS REMEDY IN THE PHLEGMASIÆ—IN PUERPERAL PERITONITIS—IN CHRONIC GLANDULAR INFLAMMATIONS—CASE OF CHRONIC CATARRH—IN ERUPTIVE FEVERS—IN RHEUMATISM AND GOUT—IN SCROFULA.

Therapeutical Effects of Vapour Baths.—Without joining Sanchez in his extravagant eulogy in favour of the remedial power of vapour bathing, we cannot fail to admit that it is susceptible of far more frequent and diversified application than it commonly receives in medical practice.

Independently of the differences in therapeutical results growing out of dryness or moisture, the modifications produced by the temperature of the bath must be taken into account.

Before I proceed to enumerate, with any method, the

several diseases and their stages in which vapour bathing is beneficial, I shall give the general outlines of the subject, as furnished by Assalini and Andria.

Among the first indications to be fulfilled by the use of the vapour bath (and in future, unless otherwise specified, I must be understood as referring to that of moist vapour),* Assalini enumerates the restoring of suppressed perspiration. This is a desideratum in many diseases, and it is often attempted to be obtained by stimulating diaphoretics, which more or less excite the stomach, often unpleasantly and morbidly.

The next general effect of vapour medically applied is, according to Assalini, the softening of the cutaneous tissue and relaxation of inflamed parts. In such cases, he tells us, that, if we cause evaporation from water below animal heat, or about 90° F., the vapour applied on the affected part and gradually absorbing its caloric, will become emollient and relaxing. For accomplishing this end he sometimes used sulphurous waters; at other times simple water with althea or mallows, or poppies, or the like emollient and sedative matters infused in it. The vapour thence evolved was applied, by means of his apparatus, to the fauces in *angina*, to the nostrils in *coryza*, to the eyes in *ophthalmia*, to the ears in *otitis*, to the teeth in *odontitis*, to the lungs in *pneumonia*, to the mammæ in *inflammation of those parts*, to the abdomen in *flatulent and rheumatic cholic*, and to the uterus in *irritation and inflammation of that organ*: thus advantageously substituting this remedy for common bathing, fomentations with flannels and the like, and cataplasms of various kinds.

He has found this practice of vapour bathing of the part very valuable in discussing engorged mammæ, in milk fever and chronic diseases of these glands. Semicupia of vapour, that is baths for the lower half of the body, are extolled by him in abdominal and other affections following exposure by getting the feet cold and wet, such as suppression of the lochia, menses, &c.

In admitting, with Assalini, the sedative effects of vapour

* The term, vapour, is not applicable, strictly speaking, to dry air heated, or the hot air bath, although by conventional admission it is so spoken of.

baths at a low temperature, and the consequent usefulness of the remedy in morbid sensibility and irregular and spasmodic movements of the limbs, we may be allowed to doubt whether its efficacy is so greatly increased, as he intimates it to be, by the addition to the water of what are called various antispasmodic substances, such as camphor, assafœtida, oil of amber, and empyreumatic oils. The very minute proportion of such matters volatilized by vapour of a low temperature, and their limited absorption by the skin should prevent our anticipating much from their use in this way; at least so long as the vapour is applied to the skin alone.

An argument in favour of the inhalation of the vapour, in addition to its epidermic application, is found in the great readiness of pulmonary, or rather of trachea-bronchial, compared with cutaneous absorption.

The poor from the hospitals of Naples, whose diseases seem to require such a remedy, are sent to the island of Ischia, and the means supplied to them of making use of warm, hot, and vapour baths. Such an arrangement is highly creditable to a government which for the most part does little to elicit eulogy. As medical agents, the vapour baths of Ischia are declared by Andria to be useful for softening the skin, promoting perspiration, and resolving lymphatic engorgements. They gently stimulate the nervous and muscular systems, and remove indurations and concretions in the locomotive apparatus generally, especially about the joints; and of course they are beneficial in gouty and rheumatic diseases of a chronic character, and in stiffness and incipient ankylosis, sometimes the consequence of these diseases. Chronic catarrhs, and affections of the mucous system generally, will be greatly benefited by vapour bathing.

Andria prefers the *stufa* of San Lorenzo to the others; and he thinks that, on account of its more moderate heat it is better adapted to insure the good effects just indicated. He cautions against subjecting the naturally feeble, or those become so by age or adventitious causes, to the vapour bath of a high heat—but on this point he speaks with the same vagueness which marks the language of most writers on bathing. Feebleness, associated with irritative fever, sub-acute or acute phlegmasia and great nervous susceptibility,

constitute a state of the system in which high heat, whether conveyed by vapour or water, could not well fail to be prejudicial. But, in that feebleness, associated with an anemic constitution, pale and cold skin, flabby flesh, slow circulation and little sensibility, or which has resulted from protracted disease and accompanies the subsidence of fever or inflammation, and engorgements or tumefaction, then will vapour baths of an elevated temperature be not only well borne but very serviceable.

Let us now inquire into the general or constitutional effects of the vapour bath, in various diseases.

In the treatment of *Fevers*, our leading object is to save the organs from congestion and often coincident inflammation, and to remove nervous irritation and its accompanying phenomena of disorders of mind and sense. The vapour bath, by contributing to restore the suspended function of the skin, acts on all the membranes and their tributary glands; and in this way it restores the suspended secretions, abates the trouble of the circulation, and consequent tendency to congestion and inflammation, and soothes, at the same time, nervous irritation.

If there be evidences of great determination to a particular organ, and much vascular excitement, bloodletting will advantageously precede the use of the vapour bath. The good effects of this latter may be anticipated with more confidence, also, after the stomach and bowels are relieved of indigestible and fecal matters by which they had been oppressed, and cardiac and nervous irritation kept up.

There are three periods in which the vapour bath may be had recourse to in fevers. In the first, or forming stage; in the second, increase or culmination; and in the third, the decline. The temperature of the bath will vary in each of these three periods; being in the first and third higher,—as the intention is to stimulate the skin,—than in the second or middle period, in which the vapour ought not to be more than merely warm, and, as such, soothing and sedative, inviting rather than forcing the skin to secrete sweat, and thus relieve the overloaded capillaries and oppressed, one might say engorged, viscera.

To meet the indications at the beginning and decline of fever, the temperature of the bath need not exceed 110° F.; while, in the height of the fever, that of 90° to 95° F. will

suffice. The duration of the bath will be from fifteen to thirty minutes, according as it is borne by the patient, in reference to sensations of fulness about the head, or to vertigo, and to the state of the respiration.

M. Rapou* relates cases of intermittent fever cured by the vapour bath, in some of which Peruvian bark and astringents had been tried in vain. Eleven cases of tertian fever were cured by this remedy; in one the paroxysm was prevented from recurring by a single bath. The longest period of treatment of any one case was twenty days. Four cases of quartan fever are recorded, in which M. Rapou accomplished a cure by the vapour bath, after the most methodical treatment by the usual means had entirely failed.

This remedy has been employed, also, in typhous and typhoid fever with alleged benefit. It is well calculated to remove that dryness and acrid heat of the skin, which, although part of the disease, reacts with morbid force on the internal organs, and especially the mucous membranes. Hence it is, that both the cold and the vapour bath, by abating this irritation of the skin, produce such a soothing and tranquillizing effect on the entire organism.

In the *congestive* forms of fever, especially in the stage of depression and collapse, much benefit may be expected, has indeed been derived, from the vapour bath, and still more from the hot air bath.

Dr. Armstrong† relates his successful use of the hot air bath, in cases of what he terms common congestive fever, and in which the indications are to rouse the system to reaction by stimuli. Some of these cases, as described by him, are akin to typhous fever, others to cholera morbus.

After the use of diffusible stimuli, hot drinks and warm stimulating enemata, Dr. Armstrong directed the application of the hot air bath—in a manner, and with results which are best described in his own words:

“The simple apparatus used in applying the hot air bath consists of a frame of basket work, of an arched shape, open at one end, and about six feet in length. The patient

* *Traité De la Methode Fumigatoire, ou Del'Emploi Medicale Des Bains et Douches de Vapeurs.*

† *Lectures on the Morbid Anatomy, Nature, and Treatment of Acute and Chronic Diseases.*

having been laid on a warm blanket, this basket is to be placed over him, and covered with one or two blankets (two are generally best), which are to be tucked under his chin. At the opposite and closed end of the frame is attached a tin tube, communicating with the interior of the frame; and at the lower end of the tube is to be placed a spirit-lamp lighted. As the tube is very apt to get hot, you must take care that the blankets do not touch it, or they will be burned. If the heat become uncomfortable to the feelings of the patient, you may remove the spirit lamp for a short time, and then apply it again. The apparatus may be made more portable by having the basket made in three pieces.

“The application of the hot air bath is one of the most powerful means I know of for the removal of the urgent symptoms of common congestive fever.

“The fatigue produced by the use of the hot water bath is frequently fatal; but, on the contrary, the hot air bath does not at all fatigue the patient, and it restores the natural degree of heat to the surface more suddenly than the water bath. In about half an hour it will bring pounds of blood on the surface of the body, which were previously suffocating some internal organ; it will produce a general perspiration; in short, it will restore the balance of the circulation sooner than any other means I know of.

“Bontius, in his work on the diseases of the East Indies, mentions the great utility of a hot sand bath in cases of the common congestive fever in hot countries, though he was entirely ignorant of the pathology of those diseases. He observes that in the cholera morbus of India those patients who were put into hot sand recovered; and many persons have observed that in the same affection nothing is so useful as wrapping the patient in warm blankets, and laying him before a large fire. But the hot air bath is the best; and next to it would be the vapour bath—the patient being wrapped in oil silk, and surrounded by the vapour of hot water.

“If neither a hot air bath nor a vapour bath be at hand, wrap the patient in warm blankets, and lay him before a large fire: apply bottles of hot water to his feet, and bladder of hot water to the region of the stomach.”

The two following cases, also related by Dr. Armstrong,

would pass now for those of epidemic cholera. They occurred and were described before the appearance of this disease in Europe :

“I saw a gentleman one morning who had an attack of the extreme form of common congestive fever. His surface was universally pale and cold ; he had an intoxicated expression of countenance ; when lifted, he dragged his limbs after him as if they were paralytic ; his lip and cheek, together with the state of the respiration, showed an extreme congestion in the lungs and bronchial lining ; he had also copious purging and vomiting ; in short, he had congestion in the brain, in the bronchial lining, in the lungs, and in the liver ; and laboured under what would be called an attack of cholera morbus. The attack came on at seven o'clock, and I saw him at eight ; and I am confident he would have died in an hour or two more. All the ordinary means had failed to create excitement : brandy, opium, and so on, had been tried ; and then I sent for a hot air bath. In half an hour after its application the surface became universally warm, and he was perfectly convalescent.

“I attended a young lady who was attacked with giddiness, universal and oppressive debility, vomiting, and diarrhœa. When I saw her she looked like a person intoxicated : the tunica conjunctiva was blanched, the face pallid, the surface of the body cold, the respiration weak and impeded, and the lips were blue ; she had no muscular power—the head rested on her shoulder, and the hands were by her sides. I placed bottles of hot water to the feet, a bladder of hot water to the stomach, and gave her hot water and opium internally. Nothing, however, was of benefit, and it was apparent that she was rapidly sinking. In this case I sent for a hot air bath, which was immediately applied ; and in half an hour the pulse rose and was bounding, her countenance became animated, and she was nearly convalescent. Nothing further was required but the exhibition of slight calomel purges. This, according to our nosologists, would be called cholera morbus, but it was a case of congestive fever ; and in these cases, if assistance be not promptly rendered, death will be the consequence ; the blood will coagulate in the interior of the body.”

Bearing on this subject, the pathology and treatment of congestive fever, which is always one of deep interest to the American practitioner, are the following remarks of Dr. Tweedie. I find them recorded by Dr. Forbes in his article on Bathing (*op. cit.*).

"It sometimes happens that the febrile poison is so intense, and the living power so depressed by it, that, the subsequent efforts of the system to bring on reaction being ineffectual, the patient is suddenly placed in great danger, and often dies in a few hours after the first appearance of the symptoms. Under these circumstances the surface feels cold and damp, more especially on those parts which are at a distance from the centre of the circulation; the pulse is feeble and compressible; the functions of the brain are disturbed; the breathing is anxious and hurried, and the lips are livid. All these symptoms depend on the peculiar operation of the febrile poison on the nervous system, and on the irregular distribution of blood consequent to this. This fluid, probably changed also in its properties, recedes from the surface, and accumulates in the internal organs. In other instances, sudden collapse supervenes in the more advanced stages of fever, and similar symptoms make their appearance. In such embarrassing circumstances, much judgment is requisite to rescue the individual from the danger in which he is plunged. Some writers have recommended bloodletting with the view of relieving the congestion which is supposed to have taken place in the internal organs. This treatment may, in some instances, have been beneficial, though it appears to me that it can only be adopted when the circulation, though oppressed, is still carried on with some degree of vigour; because, should blood be abstracted when the heart's action is weak, fatal syncope may be induced. It should be remembered that, though the heart's action is, in such cases, oppressed by the accumulation of blood which it is unable to propel, this want of power in the heart is primarily induced by the peculiar action of the febrile poison on the whole nervous system. In this debility the heart, of course, participates. In this state of things, more benefit certainly results from the exhibition of diffusible stimulants, while at the same time efforts are made to determine the blood to the surface by

the application of the warm air bath. In cases of collapse coming on in the later stages of fever, bleeding is out of the question: the patient, already exhausted, is thrown into a species of continued syncope; and from this he is to be roused by the cautious administration of stimulants, and the application of the hot air bath. The exhibition of stimulants is only to be continued while the pulse continues feeble and soft; they are to be immediately withdrawn, or given at more distant intervals, when reaction has taken place."

The application of these views and practice to epidemic cholera is too obvious to require additional commentary or enforcement in this place.

In the treatment of the *phlegmasiæ* generally, the indications to be fulfilled are not materially different from those in fever. To save the suffering organ from farther morbidly increased determination of blood, and to relieve it from the existing accumulation of this fluid and the associated nervous irritation, are the objects which we chiefly propose to ourselves. We do this by bloodletting, general or local, and sometimes by both, and by sedatives and anodynes. We also have recourse to derivative means, such as purgatives and diaphoretics, to act on the system at large, and counter-irritants, whose operation is supposed to be to relieve more immediately the suffering organ.

The vapour bath will not be a substitute for bloodletting except in some cases in which this operation may be deemed of doubtful propriety. Nor can its use advantageously take the place of purgatives, although under its use these may be administered much more sparingly than where it is withheld. But, as a diaphoretic and revulsive,—the vapour bath will prove to be a therapeutical agent preferable both by its efficiency and its mildness, to the long list of diaphoretics derived from pharmacology, and of counter-irritants, such as blisters, tartar emetic, croton oil, &c. It procures that free sweating which is attempted to be procured by drugs, whose force is often spent on the stomach, which is irritated, and by its irritation increases the disorders of the functions generally, if it does not actually aggravate the inflammation—wherever this may be situated. It displays, also, a sedative and anodyne operation.

Several cases of visceral inflammation successfully treated by the vapour bath, are related in M. Rapou's volume. Of the acute forms, he specifies pneumonia, hepatitis, pleurisy, peritonitis, simple and puerperal pulmonary catarrh, gastritis, enteritis, gastro-enteritis, and *catarrhus vesicæ*. It is not to be supposed that his sole or early reliance was on the vapour bath alone in these cases. On the contrary, bloodletting, anodynes, revulsives, &c., were used prior to or in connection with the bath. All that is claimed is, that an obviously favourable turn was given to the disease after the use of that remedy, which was not evinced antecedently.

In a case of catarrh of the bladder, for instance, when the patient, who had been subjected to an active preliminary treatment, was put in the vapour bath up to his middle, M. Rapou directed, at the same time, the application to his knees of cataplasms of mustard-flour, and barley-meal. A few baths relieved him of pain. The cure was completed by moist sulphur baths, and aromatic douches to the sacrum.

The duration of the bath in these cases, as well as in those of intermittent fever, varied from one to two hours. The head was external to the bath.

We have the favourable testimony of Chaussier to the remedial power of vapour bathing in *puerperal peritonitis* and other maladies which occur during and after delivery, such as pain of the bowels, serous diarrhœa, oppressed breathing, &c. He observed, on these occasions, that the pulse, which was commonly small, contracted, and very frequent, often lost, while the patient was exposed to the vapour bath, these characters of irritation, and became full, soft, and *sudoral*.

Equal success attended the use of vapour baths, under the direction of M. Rapou, in chronic inflammations of the several viscera. He frequently used the dry and sulphur, and sometimes oil of amber fumigations, after the moist vapour baths. He, also, sometimes began with what he calls Oriental bathing, viz., exposure of the patient, while reclining on a couch of split cane, to a simple moist vapour, or to one charged with the essential principles of aromatic herbs. He afterwards had recourse to the bath by encasement, or in a box, in which the head was free.

In a case of chronic pneumonia, the patient used twenty-four vapour baths in sixteen days. The treatment of a case of chronic metritis occupied seven weeks; but, in addition, the patient, as a matter of precaution, took for a fortnight longer a bath every second day. One of the immediate effects of the remedy in this case was a pustular eruption, which M. Rapou was at some pains to increase by means of irritating fumigations.

As itself, instructive in a clinical point of view, and as a good reply to the fears of those who object to the remedy on the score of its making the person who uses it more susceptible to catch cold, I subjoin, in a note, an account of a case of *chronic catarrh*, treated successfully by the vapour bath. It is related by Dr. Kentish (*op. cit.*)*

* "*Case of Chronic Catarrh, from the change of a warm to a colder climate.*—Master P——, a young gentleman from the island of Jamaica, aged 11, has been in England three years for his education. The first winter he was much subject to coughs and colds, which did not leave him until the summer advanced, although he had every medical attention; the second year his complaints were more severe, nor did they leave him so perfectly as in the preceding year. He never seemed perfectly well; his growth was checked; and he carried the appearance of an animal which had been starved with cold, and ill-fed (which was not the case, though it is in some schools). Very early in the third autumn (1795), his former complaints were aggravated, his winter cough returned, and the defluxion from the chest was very great: to have looked at him, you would have taken him for a little old man; his surface was dry and shivelled, notwithstanding he wore flannel next his skin. He had, during the former winters, gone through the whole series of means, which similar complaints yield to, in children of a healthier class. In the first inflammatory attack, antimonials, with demulcents, occasional emetics, anodynes, and squills, were administered, but nothing relieved him except the approach of summer. His expectoration was much tinged with blood; he was hot and feverish after eating, with a quickened circulation: so that there was every appearance of this local distress of the chest being likely to undermine the constitution, by forming hectic fever. It was then only October; the poor little fellow had therefore a melancholy prospect, if he were not to get relief until the following spring, or rather summer. Having myself seen the result of former means to relieve him, I was induced to add the vapour bath to the other remedies employed: for the first three or four times of its use, a great

In asthma, entire relief has been obtained by the use of the vapour bath. Kentish mentions a case in which this remedy was directed in alternation with a Bruxton bath (82° F.), the temperature of this latter being gradually lowered until it was a cold bath. A perseverance in this course for six weeks was followed by entire relief, and subsequent exemption from the disease.

When there is but little vascular excitement, in cases of engorged, or of chronically inflamed viscera, the vapour bath may be rendered more stimulating, either by a more elevated temperature, if of the moist variety, or by its being made the bearer of various aromatic substances, or by volatilizing some of them in a dry hot air. The heat of the moist vapour may be gradually increased, under these circumstances, to 100° and 110° F., and the dry sudatory or hot air bath, to 120° and even 140° F.

In *eruptive fevers* (*exanthemata*), vapour bathing has been practiced with considerable benefit—the temperature and duration of the bath being modified according to the stage of the disease, as in fevers generally. Much relief has been obtained from this remedy in the edematous swelling so common after scarlet fever, and occasionally after measles also. The reader will remember the method of Rhazes, to bring out a benign eruption in small-pox and measles, part of which consisted in exposing the body of the patient to the vapour of warm water (p. 201).

Erysipelas, erythema, urticaria, and pemphigus, have also been treated with success by the employment of the vapour bath.

Rheumatism and gout, in their chronic forms, have long quantity of dry scurfy indurated cuticle was thrown off; by the time he had used it once a-day for a week, this ceased; and the bath being used of a moderate heat, the natural secretion of the skin was restored. It is astonishing with what rapidity he recovered by these means: his expectoration gradually ceased; his appetite and spirits improved; in short, he seemed to be new created; both his body and mind acquired increased vigour:—by continuing its use occasionally he was perfectly recovered. Instead of making him tender, it, on the contrary, by restoring equal action, gave him such vigour as enabled him to bear the winter's cold, and participate in the out-door amusements of his school-fellows: of which his former state of health had rendered him incapable."

been adduced, as diseases in which the greatest relief has been obtained by vapour baths—both of the moist and dry kinds. M. Rapou speaks with a confidence of the remedial powers of this agent, derived from his large experience of its effects in rheumatism, of which, he assures us, he has met with upwards of eight hundred cases in three years. Well may he describe this disease as endemic in Lyons, the city in which he erected his fine establishment for vapour bathing, and in which he noted the cases that furnished him with his clinic.

This writer refers to the early and wide-spread use of this variety of bathing, for the cure of rheumatism, in northern Europe—Russia, and Finland, and even in England, and especially at Nottingham Hospital,—and also in Germany and Italy, and more particularly in Naples.

The absence of extreme and extravagant expectations from the exclusive use of this remedy, in the hands of M. Rapou, may be inferred from the following judicious remarks of this author:

“Most commonly we obtain, from the use of vapour baths alone, methodically directed, the effects which were promised; but it sometimes happens that we are obliged to associate with them certain auxiliary means of more or less energy, which add to or modify their action and increase their efficacy. Thus, for example, by means of general bloodletting and leeches, simple or medicated frictions, shampooing, flagellation, or even internal remedies appropriately administered, either preparatory to or conjointly with the vapour, I have succeeded in curing a great many diseases which would have proved intractable to these various means separately employed.”*

These observations furnish a practical commentary on the absurd and mischievous exclusivism of those pretenders to the healing art, who place their sole reliance, for the cure of all diseases, on one remedy or therapeutical agent, whether it be the vapour bath or hydropathy.

M. Rapou, after having recourse to preliminary evacuations, when he deemed them advisable, subjected his rheumatic patients, first to the Oriental bath, as he terms it, or moist vapour aromatized, while they were in a recum-

* *Traité, &c., Tome 1^{re}, p. 318–19.*

bent posture, and then to dry sulphur vapour, in a case in which the body, up to the neck, was inclosed. He relates a case of rheumatism of the head in a lady, in which he tried emollient, sedative, and aromatic vapour, and Oriental baths, and douches to the head, without any relief. He then devised another course. He directed leeches to the anus, and diluent drinks, after which the patient was placed in a sulphur bath up to her waist,—the vapour being introduced near her feet. During the whole time of the fumigation, the head was covered with a bladder half filled with ice, which was renewed every ten minutes. A perseverance in this treatment for three weeks, was productive of entire success.

Syphilitic rheumatism has been treated with marked benefit by means of the vapour bath. So, also, has been gouty rheumatism, and rheumatism in which metastasis occurs.

Gout, both acute and chronic, has been greatly relieved by the remedy in question. In the acute form, M. Rapou directs leeches to the inflamed joint, and other sedative means, before he has recourse to the bath.*

Scrofula, in its various forms, finds a valuable remedy in the vapour bath. Tumefactions of the lymphatic glands,

* Dr. Meyers, in a letter addressed to the Honourable Basil Cochrane (June, 1809), gives the following account of the benefit derived from the vapour bath in his own case: "After eighteen weeks' painful confinement to my chamber, by a most unrelenting fit of the gout, I was induced by your invitation, and the persuasion of several of my medical friends, to be put into my carriage to inspect your vapour bath. I saw it, approved it, and immediately used it—and repeated it for eight times, about the heat of 120 degrees on Fahrenheit's thermometer, and continued its operation each time twenty minutes. On my first trial, I was directly solaced and eased from pain, and am now enabled to pursue my wonted and professional occupations with ease and comfort. I can now, without assistance, get in and out of my carriage, though, on my first visit to you, I was unable to do the one or the other without much help; and it was with difficulty, and by the use of crutch-sticks, I got through your hall. My general health, since my first visit to you, has much improved: the exercise, the variety that has since engaged my mind, the change of air, from close confinement, has conjoined to restore me, under heaven, completely."

especially those of a scrofulous nature, along the neck, have been discussed by the vapour from salt water. Assalini, who speaks of this kind of treatment, does not seem to be aware that the vapour thus arising is simple moisture which has no marine salt in solution. If condensed, as in the process of distillation, it would furnish fresh water.

Kentish gives several cases of scrofula in different forms, in its affecting the throat, skin, eyes, and mesenteric glands, cured or greatly relieved by a general vapour bath—sometimes alone, sometimes in combination with alteratives; and sometimes in alternation with the cold bath. For the most part, the vapour bath was used every other day, and the cold bath once or twice a-week.

This practice might be advantageously extended so as to make the alternation in successive seasons; the vapour bath being used during the winter months, and sea bathing during the summer ones. By this means, not only would the invalid be subjected to a variety of impressions fitted to remove obstructions and engorgements, and to renew the activity of the functions, but, also, be accustomed to changes of temperature, and be enabled to bear with impunity atmospheric extremes and vicissitudes, so as to enjoy exercise in the open air at all seasons.

In the complications of *scrofula with syphilis*, a condition of things more common than is generally supposed, and which is singularly difficult to treat, vapour bathing, especially by dry and sulphurous fumigations, is unrivalled by any other remedy,—as I shall soon have occasion to remark.

Schirrous engorgements, both of the mammary glands and the testicles, have been resolved by vapour douches, at first of the moist, and then of the stimulating or the sulphurous variety,—venesection or leeching of the part having been premised. Similar success is claimed for Oriental bathing, frictions, and douching, in indolent or *white swelling* of the joints, and in *coxalgia*, also in rickets and incipient *spinal curvature*.

Sudden stoppage of the process of lactation has been removed by vapour bathing. In fact, we may say the same of the remedy in all the most serious derangements of function, and the diseases incidental to the maternal state, such as suppression of the lochia, peritonitis, and metro-peritonitis.

CHAPTER XLVIII.

VAPOUR BATHS (*continued*)—THERAPEUTICAL EFFECTS IN DROPSY—IN CUTANEOUS DISEASES—CHIEF CONDITIONS FOR THE USE OF VAPOUR BATHING IN THESE DISEASES—MOIST VAPOUR PREPARATORY TO OTHER VAPOURS—REMARKABLE CURE BY CURZIO—COMMON EXPLANATION OF THE MODUS OPERANDI OF VAPOUR BATHING, CONTROVERTED—VAPOUR BATH BY GENERAL IMMERSION—IN INCIPIENT PHTHISIS—IN DYSPEPSIA.

Dropsy, in its different varieties, has been treated with success by vapour baths. From whatever cause this disease, or rather this effect of prior disease, may have originated, and however sustained, the functions of the skin are generally, if not universally impeded; and on their restoration and greater activity will depend much of the relief to be obtained by therapeutical treatment. In having recourse to vapour baths, we, of course, cannot be unmindful of the necessity of calling in the aid of other additional means for the removal of the phlegmasia or chronic engorgement of the organ, which so frequently gives rise to dropsy.

Kentish (*op. cit.*) relates a case of hydrothorax successfully treated by the vapour bath. This was used every day for a week, —then every other day for the same period; and afterwards once a-week. The cold bath was used twice a-week during this latter period.

Cases of anasarca, and even of hydrocephalus, cured by this remedy, are related in M. Rapou's work. Sir Arthur Clarke, on this point, is more precise than in his other notices of the use of the vapour bath in diseases. He instances ten cases of dropsy which occurred in the course of three months' practice in 1817, six of which were cured, and four considerably relieved by the practice which he lays down. This consists in bloodletting, other evacuations, vapour bathing, and the exhibition

of tonics without stimulating, and a light nourishing diet.*

Vapour baths have been used in the large class of *neuroses* with varied success. M. Rapou relates cases showing the efficacy of moist vapour in neuralgia, chorea, convulsions not dependent on cerebral disease, spasms so called, hysteria, and hypochondriasis. In *chlorosis*, good effects have been obtained from this remedy.

Dr. Marsh, in the Dublin Hospital Reports, Vol. IV., states his having employed this remedy in *tetanus* with

* The following are four of the cases recorded by Sir A. Clarke:

"Mrs. M——, of Dorset street, applied to me on the 22d of June: she had laboured under dropsy of the belly for nearly three months, which was cured by three bloodlettings, eight vapour baths, twenty-four blue pills, combined with James's Powders, one every night, and a *Baume de vie* draught every morning.

"Lieutenant A——, a retired marine officer, consulted me on the 26th of June for dropsy, which he had laboured under for six weeks. He had suffered from repeated attacks of the liver in tropical climates; his emaciation and debility were great. He was bled five times, used the vapour bath every second day, took a pill containing calomel, James's powders, and cathartic extract every night. At the end of four weeks the dropsical symptoms disappeared, but there remained an induration in the liver, for which I directed him to go through a steady course of mercury, and warm bathing in the country. He left town on the 28th of July, considerably relieved, and has had no return of his dropsy since.

"Mrs K——, South George's street, had dropsical symptoms for two months: she consulted me on the 4th of July. She was bled twice, took a vapour bath every second day for a fortnight, a blue pill every night, and a *Baume de vie* draught occasionally. She was cured in five weeks.

"C—— K——, Esq., from the country, applied to me on the 14th of August. He had been afflicted with dropsy for upwards of six months. I took blood from him every third day, and put him into a vapour bath the intermediate days for a month; when the symptoms of an inflammatory diathesis disappeared, I put him through a course of blue pills, with James's powders, till his mouth was affected, after which, with a light nourishing diet, warm bathing, and *Cascarilla* draughts with Epsom salts, &c. He returned to the country in three months perfectly cured."

success. Of three cases subjected to the vapour bath of a low temperature 90° F., two recovered. In one of these, calomel and opium, in succession, had failed to produce any effect; and in the other pyalism, induced by the two medicines conjoined, failed to mitigate the disease. These were the two recovered cases. In the first, croton oil internally, and belladonna and oil of amber along the spine, were used at the same time with the vapour bath. The patients were kept in it four and even eight hours at a time. Other cases of similarly beneficial result from this remedy are on record.*

I omitted to speak, in the appropriate place, of the powerful, and in some instances curative effects of the cold bath, especially by affusion and dash, in tetanus, both idiopathic and traumatic. The immediate effect, in some cases, is to produce fainting.†

In *lead colic*, and in the paralysis following it, the vapour bath has been productive of very beneficial results.

This remedy is of marked efficacy in various cases of muscular rigidity. On this account it has been successfully employed in tedious labours.

Both Chaussier and Sir A. Clarke recommend the vapour bath in cases of *suspended animation*. Its effects are explicable by the direct sympathy between the cutaneous and pulmonary capillary systems, in addition to the stimulus of heat applied to the nervous or sentient expansion of the skin, and through it to the nervous system at large. Chaussier proposes a very simple apparatus by which moist vapour is conveyed directly from the boiler on the fire, through a tube, on the body of the person asphyxied, or otherwise invalid, and retained under the bed-clothes.

Sir A. Clarke and Dr. Gibney seem to prefer the dry vapour heated by a spirits-of-wine lamp, and conveyed through a suitable tube. This plan had been adopted by the humane societies in England: but long after a nearly analogous one had been practised in hospitals on the continent, and among others, in one at Frankfort on the Maine.

In *cutaneous diseases* vapour bathing is unquestionably of great value. The cases in which the efficacy of the

* See Curling on Tetanus.

† Curling, *op. cit.*

moist vapour is most marked, are those of dry and squamous eruptions in sanguine temperaments—the same in which emollient fomentations, by decoctions of marsh mallow or flaxseed, are found so useful. Persons with a more sluggish circulation and phlegmatic habit, and in whom an ichorous discharge accompanies the eruption, find great benefit from dry or sulphurous fumigations.

The remarks which I have made, in another place, on the use of the moist vapour bath, as a preliminary measure, are apposite to our present theme :

“ Preparatory to the systematic and prolonged employment of stimulating baths, it will be proper to subject the patient for some time to the use of the simple warm water, or the vapour bath ; both as a means of removing any remaining excitement of the cutaneous system, and as an aid to diagnosis, by revealing more completely the physiognomy of the disease. The real state of the dermis may be masked by the white branny scales covering its diseased regions, as in the *squamæ*, or by dry scabs, as in *favus* and *impetigo*. These removed, we often find active dermoid inflammation, requiring a soothing and sedative treatment in place of the stimulating applications, that seemed to be indicated by superficial signs of an indolent state of the parts. Plumbe, (p. 41, *Am. Edit.*), points out the difficulty of diagnosis in many cases of scalled head of pauper females, in which, he had to deal with masses of scabs, and scales interwoven and matted with the hair of these parts, requiring for their removal ointment and the use of soap and warm water, before an opportunity was offered of examining the diseased cutis. In all chronic affections of the skin, a sponge dipped in warm water should be rubbed over a part at least of the diseased surface, and the slightly adherent cuticle removed, so as to allow of the real state of the dermoid tissue being seen.”*

Generally speaking, whatever keeps up or originates a dry and parched skin, will be apt to bring on or cause a return of various eruptions, and hence the occasional use of the warm and vapour bath is an excellent preventive in habits peculiarly predisposed to such relapses, as well as

* “ Outlines of the Pathology and Remedial Treatment of Diseases of the Skin ;” being part of the “ Preliminary Considerations ” to the great work of Rayer. Carey and Hart, — 1845.

an admirable auxiliary to other remedies, when such are thought necessary during the existence of the disease itself.

Among the various domestic prescriptions, given for the purpose of preserving a due degree of softness and pliancy of the skin, there are few if any equal to that favourite of the ladies, cold cream. Exception might perhaps be made in favour of the more homely flaxseed mucilage, made by immersing a little bag of flaxseed in hot water until the fluid has a semi-gelatinous consistence. Were either of these cheap and readily obtained cosmetics to be used, to the entire exclusion of the oils, powders, washes, and pigments recommended with such unblushing effrontery to remedy roughness and eruption of the skin, we should have more smooth faces, better complexions, and what is of still more consequence, we should not hear or read so frequently of dyspepsia, diseased liver, consumption, affections of the heart, dropsy, and insanity itself, severally coming on after cutaneous eruptions repelled by such means.

The following case of obstinate disease of the skin cured by the vapour bath will set this remedy, if possible, in a still more advantageous point of view. It is related by Curzio, a Neapolitan physician, in a letter to the celebrated abbé Nollet.* A young woman seventeen years of age, who had never menstruated, had such induration and stiffness of the skin that it was like leather, or, rather, hard almost as wood. The neck was the part first attacked, then the face, and finally the whole body. Even the lips and tongue were stiffened. The skin had not, however, lost its sensibility; the edge of the nail or point of a needle caused great pain. A singular circumstance mentioned by the author, and by him attributed to the defect of transpiration, was, that the urine greatly exceeded the quantity of fluid drank; but one is at a loss to see how the suppression of customary secretions could actually increase the quantity of fluids in the system. The explanation of the fact must be found in the excess of pulmonary absorption, since it is difficult to suppose that there was even the customary activity of this function on the part of the skin. With the exception of this peculiarity the young woman made no complaint.

* *Journal des Savans.* December 1775.

The treatment was directed to softening the skin; and the first remedy employed with this view was a fresh water bath, of a temperature not mentioned; but we are led from the context to suppose that it was warm. The patient could not bear it more than half an hour at a time, and it seemed as if it caused greater contraction of the skin than before. After the seventh bath, finding the disease grow worse, the physician imagined that if he could prevent the pressure caused by the water, the moisture would still be serviceable. He accordingly had recourse to the vapour bath; after the sixth application of which there was a little perspiration under the arm-pits, on the chest, and hollow of the ham. This effect went on gradually increasing until the skin became less rough to the touch, though it was still very hard. After twenty baths, there was continual sweat, and at length the skin of the thighs regained its suppleness, then that of the legs; and after five months' treatment, which consisted internally of the use of mercury, the patient was entirely restored to health.

A case of tedious and troublesome induration and thickening of the cellular tissue of the mammæ and of the upper limbs, is related in M. Rapou's work. The cure was brought about by the use of the vapour bath, at first moist and afterwards sulphurous, aided by vapour douches to the affected part.

Assalini very properly insists on constant attention to the state of the sanguiferous system, in herpetic eruptions. Sometimes there is general plethora, at other times it is local or cutaneous. The abuse of warm and hot baths, undue quantity of clothing, and ardent spirits, increase in a more peculiar manner the cutaneous plethora, and give rise to extensive furunculi and numerous pustular herpes; chiefly on the forehead, arms, shoulders, and perineum. The varieties of the cutaneous tissue in different regions cause corresponding differences in the eruptions of the part. The odour of the secretion from the skin of the feet is different from that of the trunk, and both again vary from that of the arm-pits. The practical inference from this observation is, that as these eruptions are often merely local and are maintained by a supply of blood directed to the skin, equal in purity to that which is the pabulum of

Healthy secretions elsewhere, we are not to look always for internal disease, connected with general impurity of blood, as the cause, nor have recourse always to internal and general remedies, but we may at once remove the local irritation by the vapour bath or analogous applications.

Syphilitic eruptions and ulcers are greatly benefited by the moist vapour, alone, or in alternation with sulphurous and mercurial fumigations. Assalini furnishes instances of very obstinate affections of this nature cured by simple moist vapour, or medicated with emollient and sedative substances.

The good effect of the vapour bath in these as well as in numerous other morbid states of the animal economy has been attributed to the free perspiration, and, in this respect, the restored function of the skin, after it has been suppressed. This opinion has been supported by reference to the fact, of a stoppage of cutaneous transpiration, by exposure to cold and moisture, being followed by numerous maladies; catarrh, rheumatism, pleurisy, and inflammation of the lungs and other organs, fevers of various kinds, intermittent, puerperal, &c. Additional evidence is supposed to be furnished in the condition of the skin during many chronic maladies, in which it remains dry and rough.

The admission of these facts does not, however, by any means pledge us to a belief that they bear this connection with each other. Suppressed perspiration and otherwise disturbed function of the skin are often the effect of prior derangement of the internal organs; and the restoration of the former is, also, often subsequent to, rather than the cause of, the removal of the latter. Nor is a belief in the revulsive operation of the vapour bath, and its thus relieving the system from pain, inflammation, and fever, by derivation of blood from those organs, borne out by the phenomena which are evinced after its application. Countenance may seem to be given to the popular hypothesis by the manifest relief which follows restored eruptions of the skin, either of an acute character, as in measles, or chronic, as in herpes; also by the diminished discharges from internal surfaces, as in diarrhœa, after the skin has been excited and its capillaries filled by the action of warm

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clothing, frictions, and the warm and vapour bath. But this explanation cannot apply to cases of constipation relieved, torpid liver excited to secrete bile, and the uterus menses, after the skin has been rendered soft and made to pour out freely perspirable matter. Here the increased discharge from the organs and surfaces, internally, is consentaneous and almost synchronous with increased discharge from the skin and additional excitement of this organ.

In the preceding account of the use and success of the vapour bath, we have had reference, mainly, to that mode of its application by which its primary action is on the skin alone; the head of the invalid being out of the bath, so as to allow of his breathing the common atmospherical air. Immersion in the vapour is, however, sometimes complete, so that it is inhaled into the lungs, and thus applied to their mucous surfaces in a long list of diseases. This mode of administration would even have marked advantages when the pulmonary mucous lining is in a state of irritation, and the skin at the same time dry and the perspiration deficient, as we find in catarrh, bronchitis, croup, asthma, and a certain stage of measles and small-pox. When, likewise, the lungs are perfectly sound and clear of irritation, while there is febrile disturbance of the system, with thirst, and small or active and hard pulse, there would be great advantage in introducing moisture freely into the pulmonary cavities, as it would be rapidly and greedily absorbed and carried into the circulation, and act as an effectual diluent. The main point on all these occasions, from which our attention is never to be diverted, is, that the degree of heat of the vapour shall bear a due proportion to the heat and febrile excitement of the system, so that there shall be an inverse ratio between the two; the greater the excitement the lower the temperature of the vapour bath, and the reverse.

M. Rapou gives examples of the entire relief afforded in cases apparently of incipient phthisis, by the use of his Oriental bath (that of general immersion), the vapour of which was impregnated with demulcent vegetable substances.

Dr. D. T. Coxe published a short paper on the efficacy

of the vapour bath,* which he superintended at the time, in various diseases. In most of them the vapour was inhaled as well as applied to the surface of the body. The diseases enumerated, greatly relieved, or entirely cured, were chronic disease of the liver, rheumatism, ulceration of the fauces, pimples and other blemishes on the skin, enlarged spleen, with tendency to dropsy, dyspepsia, inflammation of the kidneys, hemicrania, influenza, and erysipelas. In reference to the dyspeptic patients who used the bath, he informs us that it removed their costiveness, and generally improved their complexion; perspiration was with difficulty brought on. We are told that "here the benefit terminated. Indeed, in one case the inhalation of so much warm vapour seemed to excite too much phlogosis in the stomach, as the patient was worse after taking several baths, and attributed to them this effect." Erysipelas, says Dr. C., was one of the diseases which yielded readily and kindly to the influence of the vapour bath.

It was remarked that the peculiar odour of some of the articles, through which the steam was made to pass before its being applied to the body of the patient, was perceived in the urine.

Mention was made in one of the chapters (XX.) on "The Watery Regimen," of the use of vapour, topically, for surgical purposes, by Dr. Macartney of Dublin. This gentleman invented an apparatus "for the administration of steam, either simple or medicated, and without interruption or variation;" the boiler being so constructed that he was enabled "to generate not only steam as hot as could be borne, but at all degrees downwards, to below the standard temperature of the human body."

When the remedy is used in the manner directed by Dr. Macartney,—“immediately after the receipt of any of the following accidents, viz., lacerated, gunshot, and punctured wounds, contusions of bones, fractures near joints, recent luxations, bruises and strains of joints, and in all wounds accompanied with a peculiar overcoming pain, and a shock to the nervous system, it removes all pain and consciousness of injury in a very short time.”

* North American Medical and Surgical Journal, vol. iv., pp. 20—27.

"Steam, at a low temperature, has an extraordinary power, in reducing the heat and vascular dilatation, while, at the same time, it soothes the sensations of inflamed parts."* It is, also, the best application for the relief of active inflammation. It removes, almost immediately, the painful sensations of ophthalmia, and the vascularity of the conjunctiva, and "is singularly beneficial in all cases of phlegmonous abscess."

CHAPTER XLIX.

VAPOUR BATHS (*continued*)—**DRY MEDICATED VAPOUR BATHS**—**SULPHUROUS VAPOUR**—**THE CHIEF MINERAL SUBSTANCES FOR FUMIGATIONS**—**TWO KINDS OF SULPHUR VAPOUR**—**TEMPERATURE OF THE BATH**—**PHYSIOLOGICAL EFFECTS OF THE SULPHUROUS VAPOUR BATH**—**THERAPEUTIC EFFECTS OF THE SULPHUROUS VAPOUR BATH**—**ITS GENERAL INTRODUCTION OWING TO GALES**—**HIS EXPERIMENTS**—**HIS SUCCESS IN THE TREATMENT OF ITCH**—**AND IN OTHER CUTANEOUS DISEASES**—**REPORTS OF COMMITTEES ON THE USE OF SULPHUROUS VAPOUR**—**DE CARRO'S TRIALS AND SUCCESS**—**M. RAPOU'S CASES**—**ASSALINI'S CONTRIBUTIONS**—**NATURAL SULPHUROUS VAPOUR BATHS**—**DISEASES TREATED BY ASSALINI**—**HIS CONCLUSIONS.**

DRY MEDICATED VAPOUR BATHS.—Blended as is the use of the different kinds of vapour bath in the treatment of disease, it is not easy, as the reader must already have perceived, to speak of the therapeutic value of each of them separately. Although, in what has been hitherto said on the subject, the common or moist vapour is the agent chiefly designated, yet the dry or hot air has also occupied a portion of our attention; and the medicated, both moist, as in the cases mentioned by Assalini, and dry, as in the sulphurous, described by Rapou, have been pointedly referred to, as being used in alternation with the simple or moist vapour.

* Treatise on Inflammation, p. 100-1. Am, Edit.

Sulphurous Vapour.—Just now, I propose making some remarks on dry medicated vapour, and particularly on the variety in which sulphur is sublimed and diffused in the heated air of the bath; and in this form applied to the skin of the patient, whose head is external to the bath.

The chief mineral substances employed in fumigation are, sulphur, cinnabar (deuto-sulphuret of mercury), calomel (proto-chloride of mercury), corrosive sublimate (deuto-chloride of mercury), the protoxide of zinc, deutoxide of arsenic, and sulphuretted hydrogen gas (hydro-sulphuric acid).

Sulphur projected upon a metallic plate of the temperature of 232° F. is converted into vapour without its being decomposed, provided the air be excluded: but, if the heat of the plate be raised to 300° F., and a current of atmospheric air be directed on it, the sulphur burns with a bluish flame, and by combining with oxygen forms sulphurous gas. It is necessary, therefore, to modify the apparatus, and regulate the heat of the metallic plate, according as we wish to procure one or the other of these results in the combustion of the sulphur.

The quantity of sulphur for each fumigation, or bath, is from two drachms to half an ounce, and even more if the vapour is to be united with that of water. The process of the combustion of the sulphur will have to be renewed several times during the bath.

The temperature of the sulphurous vapour bath will range from 100° to 120° F.

The *physiological effects* of this kind of vapour are not materially different from those caused by hot air, although the state of the skin is somewhat modified by the sulphur.

After the patient has been in the case or apparatus ten or fifteen minutes, he exhibits evidences of greatly increased excitement of the vessels of the head: the face is red, the eyes shining, and the conjunctiva injected. To this succeeds perspiration, first in minute drops and then in larger ones, and, finally, in a profuse flow. So great is the quantity of fluid thus discharged, that often it completely wets the seat and the bottom of the apparatus. If the hand be introduced through one of the openings of the bath, the skin of the person inclosed in it "communicates a peculiar sensation, not of an oily nature, but astringent,

almost as if we immersed our hands in a solution of sulphate of alumen. No doubt this is owing to the deposition of the sulphurous acid on the skin, and its combination with the secretion from the surface.”*

The pulse and respiration are accelerated, and the former is full and strong; although, in these respects, there are considerable differences, according to temperament and the constitutional disturbance at the time.

Most persons, after being half an hour in the bath, are wearied and wish to leave it. Some complain of a feeling of debility, vertigo, and sickness.

After coming out of the bath, the skin of the person immersed in it is seen to be extremely vascular; so that not only the cutaneous capillaries, but, also, the superficial veins, particularly those of the extremities, are distended with blood. On this point, also, there is lack of uniformity. In some instances the skin is as red as scarlet. In others, it exhibits only a general faint blush.

Among the effects experienced by some, at this time, are slight vertigo, watchfulness, and loss of appetite, with some derangement of the stomach and bowels. which will require a temporary suspension of the treatment, and the exhibition of some appropriate remedies, chiefly for the relief of the digestive organs.

Frequently, however, the very opposite effects result from the use of the sulphurous vapour bath. The appetite is improved, the sleep is more tranquil, and the alvine discharges more copious and regular.

A remarkable and not uncommon effect of sulphurous fumigation is an entire desquamation of the cuticle. In other cases, a papular eruption is met with. The different periods in which this removal of the cuticle takes place is worthy of notice. Sometimes it occurs after two or three fumigations. Sometimes not until after many weeks from the conclusion of the treatment. We see in this some explanation, at least an organic change calculated to diminish our surprise at the fact of, occasionally, the curative influence of the fumigations not being evinced until sometime after their administration.

*** Wallace—Observations on Sulphureous Fumigations as a Powerful Remedy in Rheumatism and Diseases of the Skin.**

The occurrence of the desquamation is not productive of inconvenience to the patient; nor does it interrupt the treatment.*

The eruption is chiefly confined to the upper part of the trunk and the arms. It is accompanied by some febrile excitement, and by smarting and itching. Mr. Wallace represents it to be analogous to the Bath eruption, already spoken of as an occasional effect of thermal, particularly hot bathing. This eruption sometimes requires us to suspend the treatment for awhile.

The *therapeutic effects* of sulphurous fumigations have been only ascertained, with any degree of accuracy, since the first part of the present century,—although, at an early date, these applications were recognized as a remedy in diseases of the skin. Passing over antecedent periods, we find Glauber (in 1659) making distinct reference to sulphur fumigations for the itch. J. P. Frank, nearer our own day, also suggested the use of sulphur, in the form of vapour, for this disease.

To Gales, who was for a number of years apothecary to the hospital of St. Louis, in Paris, are the profession and the world at large indebted for the introduction of sulphurous fumigations for the methodical and successful treatment of cutaneous diseases. In 1812, Gales began a series of inquiries respecting the cause and diagnosis of the itch (*scabies*), which he showed, as indeed others had done before, to depend on the presence of an insect, the *acarus scabiei*.† He next gave his attention to discover a remedy, safe, expeditious, and easy of application. The result was, not the discovery of a new remedy, but of a means of so applying it as to render its use general, and to remove the objections which had hitherto prevented its introduction into practice. His first trials (in the month of August 1812) were, it must be acknowledged, with a very simple, but, at the same time, crude contrivance. “It merely consisted of a heated pan, in which the flowers

* Wallace, *op. cit.*

† For a historical sketch of the observations and experiments on the *cirio* or *acarus* of scabies (*sarcoptes hominis* of Raspail), see Rayer (*op. cit.*), p. 135–7. “Hauptman was the first who published a figure of one of these acari, drawn from nature, as he says, and represented with six feet.”

of sulphur, mixed with the nitrate of potash, were thrown, and the whole introduced under the bed-clothes of the patient, tucked in as close as possible about his body.”*

The success attending these first trials, between August, 1812, and March, 1813, which resulted in the cure of 385 patients with itch, induced Gales to devise a regular apparatus for fumigations. His first model was that of Lalhoutte, employed by the latter for mercurial fumigations in the treatment of syphilitic diseases. This was afterwards improved and altered, partly by Gales himself, and partly by Darcet; and he was thenceforward enabled to prosecute his experiments in a satisfactory manner.

The complication of various obstinate diseases of the skin with scabies, and the radical cure of some of these, and the great amelioration of others, by the use of the fumigations instituted for the removal of the itch, gave a wider direction to the inquiries of Gales.

M. Morgue, superintendent of the hospital of St. Louis, proposed to his colleagues, the members of the administration of the Civil Hospitals of Paris, that a special jury or committee should be formed to examine into the merits of the new treatment, by a series of experiments directed to this end. Subjoined are the conclusions reached by this body :†

* Wallace, *op. cit.*

† “1. That sulphurous fumigations cure perfectly every kind of scabies, even the most inveterate.

“2. That the number of fumigations requisite to cure scabies varies from four to twenty; according to the age and sex of the patient, and to the intensity, the species, and the complication of the disease.

“3. That females and infants, *cæteris paribus*, require a smaller number of fumigations than adult males, and particularly than old men.

“4. That old inveterate cases of scabies are cured proportionably more quick than recent cases.

“5. That the length of time required for each fumigation is ordinarily about half an hour

“6. That patients may take even four fumigations daily; according to their temperament, their leisure or their anxiety to obtain a more or less rapid cure.

“7. That the treatment of scabies, by sulphurous fumigation, does not require any auxiliary treatment, either internal or external; nor any sort of particular regimen.

“8. That, compared with all other known modes of treat-

Among the "Facts" put on record by the above jury, are the following: On an average, thirteen fumigations were administered to each of the patients who were cured of this disease, in a period of seven days. The nine darts (herpetic) patients who were cured, were each, on an average, thirteen days while undergoing the treatment. Each patient labouring under prurigo, required twelve days for his treatment.

Two committees of the Faculty of Medicine of Paris, reported favourably on the subject of sulphurous fumigations. The second of these affirms the superiority of this remedy over every other, not even excepting natural and artificial sulphurous baths, for the cure of chronic diseases of the skin. We are assured, also, that hereditary cutaneous diseases, and diseases of the skin supervening on venereal affections, which last had proved intractable to sudorifics and mercury administered in many forms, were cured by sulphurous fumigations.

Great advantage, we learn from this report, was procured from the remedy in neuralgia, and particularly in gout

ment, even with those that are regarded the most rational and the most efficacious, such as sulphur ointments, mercurial ointments, mercurial lotions, arsenical frictions, lotions of tobacco, baths of sulphuret of potash, &c., &c., the treatment by sulphurous vapour appears to excel very much in simplicity, brevity, innocence, and efficacy.

"9. That it is also much less expensive than any of the others.

"10. That various other cutaneous diseases, such as pedicular affections, prurigo, tinea. dartres, even inveterate and regarded as incurable, are susceptible of yielding to sulphurous fumigations.

"11. That, in general, other chronic eruptive diseases require a greater number of fumigations than scabies; but that this means should always be regarded at least as an auxiliary, in the treatment of these diseases.

"12. That it is of the greatest importance to make known the advantage of these fumigations, to propagate them, to establish them in hospitals, on board vessels, in camps, in barracks, in prisons.

"(Signed) PINEL, A. DUBOIS, A. E. TARTRA,
ESPARON, and BOUILLON-LA-GRANGE.

"Seen and approved,

"(Signed) MORGUE."

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and rheumatism, and even in local palsies and hemiplegia itself. Finally, sulphurous fumigations seem to favour the resolution of indolent lymphatic tumours and scrofulous swellings.*

Many interesting details on the subject are contained in the Memoir† written by Gales, at the instance of the French government.

The perusal of this memoir by De Carro, of Vienna, who had busied himself with much success in extending the practice of vaccination, in the Austrian empire, induced him to take up the subject of sulphurous fumigations. The result was, the publication of a pamphlet in 1819,‡ by this gentleman, and the establishment of a fumigatory in his own dwelling-house, for the benefit of his patients.

De Carro afterwards published the results of his practice, which were confirmatory, in every respect, of the experience of Gales, and the medical bodies in Paris. He adds: "However efficacious these fumigations may be in the different diseases of the skin, they are still more so in *chronic rheumatism*, in a *variety of pains of the articulations*, in *lumbago*, and *sciatica*, and other diseases of this species, which are deeply seated."

The reader has become acquainted with M. Rapou's large experience of the use of vapour baths of all kinds in a great number of diseases. Sulphurous fumigations constitute a no small part of his treatment,—which consisted very often in the successive, or the alternate use of moist or watery vapour and sulphurous vapour, aided, at times, by vapour douches. I may instance, just now, *chronic laryngitis*, sometimes associated with aphonia, in which this practice was eminently successful. The treatment of chronic diseases of the skin by the means just indicated, without neglecting, however, other remedies, is the subject of a hundred and forty pages of the second volume of his treatise.

* Following this report came a requisition from the Minister of the Interior, that a pension of twelve hundred dollars (6,000 francs) a year should be given to Gales, and that he should be appointed one of the physicians to the hospital of St. Louis.

† Memoire et Rapports sur les Fumigations Sulfureuses, &c

‡ Observations Pratiques sur les Fumigations Sulfureuses.

The success which attended the practice of Assalini with the simple and medicated moist vapour bath, was not less signal with his dry vapour bath by sulphurous fumigations. By improving and simplifying the invention of Galés, Darcet, and De Carro, he succeeded in making an apparatus in which the vapour of sulphur could be conveniently applied either to the skin of the whole body, excepting the head, or to any part of it, without its escaping and offending the lungs.

Natural sulphurous vapours are largely given out at different places in the vicinity of Naples; principally at the grottoes of *San Germano* and at *Monte Secco* and *Solfaterra*. At San Germano there are several rooms excavated in the side of the hill, the air in which raises the thermometer to 122° F., or if applied to the fissures from which it escapes, the mercury mounts up to the degree of boiling water. The traveller, who has visited Naples and its environs, is aware that on the opposite side of the road to these *stufe* is the celebrated *Grotto del Cane*, resembling a small hut at the side of the hill. The hollow at the foot of the hill, formerly the crater of an extinct volcano, is now a lake, *D'Agnano*, from the stagnant waters of which, especially during the season of steeping hemp, exhalations of a deleterious kind are said to arise. This may be one reason why the *stufe* of San Germano are now so entirely neglected.

Sulphurous fumigations were administered by Assalini in nearly all the varieties of disease in which the moist vapour had been applied; but with somewhat more reserve, however, in sthenic habits, or where there was much general or cutaneous irritation. In the itch his success was as signal as that of Gales himself. He directed the treatment of six hundred and eighty-three soldiers for this disease in one year, on whom five thousand fumigations were practised: and they were all cured without their experiencing any subsequent uneasiness. Of these, twenty-three had other diseases, such as rheumatism, syphilis, partial paralysis, and chronic ulcers.

The Italian physician is in accordance with Sir A. Clarke, in asserting that the effects of mercury given for the cure of *syphilis* are more prompt, diffusive, and benign, and that salivation is less apt to occur, and less violent, if

sulphurous fumigations and the common vapour bathing are used conjointly with the preparations of this metal. Experience now satisfies us that, for the cure of syphilis in its various stages, we may often rely on these adjuvants, to the entire exclusion of mercury. In the secondary forms of the disease, when the throat is the seat of ulcerations, or the skin of blotches, or still farther, the fibrous system of nodes, syphilitic rheumatism, &c., the treatment by alternate sulphurous fumigations and moist vapour will often be attended with complete success.

Ulcers, whether scrofulous or mercurial, or associated with depraved digestion, will yield to the same course, provided a plain light diet, and dilution by simple drinks, be used at the same time.

Among the numerous cases detailed by Assalini, in which he used the vapour bath and fumigations with decided success, were those of *tumefaction of the inguinal glands*, with and without syphilitic taint, *inflammation of the parotid gland*, *acute rheumatic attacks in a joint or limb*, *chronic rheumatism*, *chlorosis*, *ulcers after congelation of a part*, *squamæ* in various forms—sometimes with *suppressed hemorrhoids*, or with *syphilis*, or *hepatic disorder*; *cough*, sometimes *convulsive*, at others with symptoms of *incipient consumption*; *hemiplegia*, and other forms of *palsy*, *gout*, *hepatic obstructions*, and *sciatica*; this last complicated with *anasarca* in one case, and in another with *hemoptysis*. In a case of *hypochondriasis* with neuralgia, Assalini obtained the happiest results by the use of sulphurous fumigations, and by substituting a light vegetable diet, with fruits and milk, in place of aromatic and tonic tinctures, and a stimulating regimen.

The temperature of the sulphur bath was generally about 100° F. In one instance in which it was gradually raised from 95° to 104°, the patient affected with pityriasis, sweated profusely. His pulse, after the fumigations, was soft, full and compressible, and less frequent than before. He was cured in three months, during which he took sixty-two fumigations with sulphur and some vapour baths, with mallows infused in the water. The period of duration of the vapour bath, as also for the fumigations, was usually half an hour. It is worthy of remark, as confirmatory of the views which I have advanced respecting the *modus operandi*

of vapour baths in general, that under the use of the sulphurous fumigations, in cases of hepatic obstructions, there often took place, says Assalini, copious bilious discharges.

This writer, towards the conclusion of his work, in giving the details of his success with the Neapolitan soldiers already noticed, assures us,

1. *That those persons who make use of artificial vapour baths may, very shortly after being well dried, and resuming their usual habiliments, expose themselves to the open air without any risk of getting cold.*

2. *That the vapours and gas, evolved from sulphur by means of caloric, are absolutely harmless, both to persons in the bath and to those who are in attendance as assistants.**

3. *That there is no exhalation of sulphur from the bodies of those who have made use of the sulphurous fumigations.*

CHAPTER L.

VAPOUR BATHS (*concluded*)—WALLACE'S OPINION OF SULPHUROUS FUMIGATIONS—BARDSLEY'S EXPERIENCE OF THEIR UTILITY IN CUTANEOUS DISEASES—RAYER'S AND BIETT'S ADVERSE TESTIMONY IN SCABIES—SULPHUROUS FUMIGATIONS IN DIABETES—IN CHRONIC RHEUMATISM—NECESSITY OF A GOOD FUMIGATORY APPARATUS, AND OF CAREFUL SUPERVISION OF THE BATH—THE REMEDY CHIEFLY ADAPTED TO CHRONIC CASES—SULPHURETTED HYDROGEN GAS—ITS APPLICATION AND EFFECTS—MERCURIAL FUMIGATIONS—CINNABAR AND CORROSIVE SUBLIMATE—QUANTITIES EMPLOYED—SUPERIORITY OF MERCURIAL FUMIGATIONS IN SYPHILIS—PRINCIPLES GUIDING THEIR USE—THEIR SUCCESS IN SECONDARY SYPHILIS—MM. RAYER'S AND BIETT'S EXPERIENCE—ARSENICAL FUMIGATIONS—VAPOUR DOUCHES—HOT AIR IN WOUNDS AND ULCERS.

MR. WALLACE, already quoted in connection with the

* This must mean that, with proper precautions and a good apparatus, there is no escape of vapour or gas.

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physiological effects of sulphurous fumigations, and from whom I have freely borrowed, in the notices of Gales and De Carro's success with this remedy, makes the following statement:

"I can say, that in innumerable cases of chronic diseases of the articulations, the consequence of gout and rheumatism; in such chronic diseases of the osseous, fibrous, and synovial systems as are the *sequelæ* of syphilis and the indiscreet use of mercury; in almost all chronic diseases of the joints, from whatever cause arising; in some cases of local palsy; and in some very chronic tumours and glandular diseases;—sulphureous fumigations, either partial or general, will be found a most valuable remedy. In a large majority of these cases, alone or uncombined with proper medical treatment, and with proper attention to circumstances on the part of the patient, they will accomplish a cure or afford much relief; and frequently in those very cases in which other means have been tried in vain."*

Dr. Bardsley, in a "Report on the Remedial Efficacy of Sulphureous Fumigations"† specifies the particular kinds of cutaneous disease in which he chiefly employed them, and with highly favourable results. These are, *scabies, impetigo, porrigo, prurigo, lepra, psoriasis, pityriasis, ichthyosis, and pompholyx.*

In *impetigo*, Dr. Bardsley begins the treatment by having the affected parts washed several times daily with a decoction of poppy heads and chamomile flowers; and when the inflammation is very severe he always resorts to the aid of leeches, the application of which is repeated according to the particular circumstances of the case in which they are used. After the skin has been well softened by these means, the sulphurous fumigations may be advantageously employed.

Dr. Bardsley considers "the sulphur bath more serviceable in *lepra, psoriasis, and ichthyosis*, than in other diseases of the skin." He is desirous, indeed, as he tells us, of exciting more attention to the use of this remedy in scaly diseases.

Prior immersion of the squamous patches (of *lepra*) in warm water for twenty minutes or half an hour, twice or

* *Op. cit.* p. 69.

† Hospital Facts and Observations.

thrice daily, is a good means of softening and cleansing the skin, and of rendering it more susceptible to the curative action of the sulphurous fumigation. Free purging contributes greatly to the cure of lepra, and there are not wanting instances of this means alone sufficing for the purpose.

In two cases of *pompholyx*, Dr. Bardsley found the sulphur bath to be a remedy of great value. One of these is detailed in his report, as having been removed by the remedy in question.

The success of sulphur fumigations in scabies being considered indisputable, dispensed Dr. Bardsley from a particular notice of this disease.

Notwithstanding the array of testimony, from that of Gales to Bardsley, and it might be still farther extended by reference to Clarke and others, favourable to the employment of the sulphur bath in cutaneous diseases, some experienced writers give a very different view of the subject. M. Rayer, for example, tells us: "Sulphureous fumigations are often serviceable in chronic eczema, but they are rarely available against pityriasis, lepra, and impetigo. They certainly weaken the patients more than sulphureous water baths; they also modify the constitution in a less durable manner, and more rarely accomplish perfect cures. These fumigations too, sometimes irritate the skin further; they have been known to occasion syncope, a sense of suffocation, &c. It would be imprudent to attempt their use, without great discretion, among children, pregnant women, asthmatic persons, or in cases where there was any suspicion of tubercles in the lungs."*

Subsequently, when describing the treatment of scabies, this author remarks: "*Sulphureous fumigations*, which are employed in some hospitals, are not attended with expense, leave no unpleasant smell, and do not soil the linen: but the long continuance of the treatment necessary to relieve the disease more than counterbalances these insignificant recommendations."

M.M. Schledel and Cazenave, in giving the practice of M. Biett at the hospital St. Louis, had, several years

* *Op. cit.*, p. 34.

ago, expressed similar sentiments—as when they say: “Sulphurous fumigations are far from producing the marvellous cures that have been attributed to them: they are often useful as auxiliaries, particularly in old persons, but when used alone, the average duration of the treatment is thirty-three days, one fumigation being used each day; but this method is fatiguing and will seldom be submitted to by patients. What are we to think of those who advise two fumigations per day, in order to hasten the cure?”*

A similar view of the subject is presented by M. Gibert.†

Among other diseases in the treatment of which the sulphur bath was employed with success, Dr. Bardsley specifies a case of *diabetes*. The remedy was administered every other day from the 1st of December, 1826, to the 16th of March, 1827. The patient took a mixed diet. The duration of each bath and its temperature is not mentioned. Its use was preceded by a mild but regular course of aperients.

A Table of forty cases of chronic rheumatism, as given by Dr. Bardsley, shows thirty-one cured, and seven relieved. In two others, the treatment was discontinued before the expiration of the period of fair trial.

During a period of three years and three months, 3,046 patients used the sulphur baths, which, in this time, numbered 7,732.

Great and merited stress is laid by De Carro, Rapou and Wallace, on the necessity of a good fumigating apparatus, and of a careful supervision of its use in the diseases to which, after due examination, the remedy is believed to be adapted.

As a general rule, chronic diseases alone are those in which benefit can be expected from sulphurous fumigations. In many of these it will be proper to precede the use of the remedy by other treatment adapted to remove remaining inflammation or irritating congestion in any organ. With this view, bloodletting on some occasions, purgatives in others, diet, and warm and moist vapour

* A Practical Synopsis of Cutaneous Diseases, &c.

† *Traité Pratique des Maladies Speciales de la Peau.*

baths should be prescribed, as circumstances may seem to warrant, before recourse is had to the sulphurous fumigations,—which are decidedly stimulating in their operation. Not unfrequently, their force is moderated and their therapeutical value increased by the mixture of common aqueous vapour with the fumes of sulphur.

Sulphur baths are contra-indicated in those persons whose conformation or acquired habits predispose them to apoplexy, pulmonary congestion and inflammation, and hemorrhages, organic affections of the heart and chronic visceral inflammation.

Sulphuretted hydrogen gas (hydro-sulphurous acid) has been used by Rapou in the form of bath and of douche. He protests against the common opinion of its being, like the vapour of sulphur and sulphurous acid, an excitant; but, on the contrary, it ought, he assures us, to be regarded as a cooling and sedative remedy of great value.

He has succeeded in allaying with it nervous and muscular pains which had resisted other means. Acute herpetic eruptions, syphilitic, and other cutaneous phlegmasiæ, have also yielded to this remedy. In the form of douche, when used at a low temperature, its effects in removing inflammation and pain, are very marked.

M. Rapou points out the singular property of sulphuretted hydrogen gas to moderate the exciting effects of the caloric of watery vapour,—the heat of the compound vapour, measured by the thermometer, being the same as that of simple moist vapour. Thus, for example, while the latter would give rise to redness, heat, and swelling of the parts to which it is applied, no such results ensue when it is mixed with the sulphuretted hydrogen gas. This compound is the best cosmetic that can be used: it leaves the skin in a soft, smooth, and shining state.

If we are to receive these statements of the therapeutic effects of this agent as well-founded, we must look on the action of the gas as purely local, since we know that is one of the most virulent poisons to which the living body can be subjected, and that it finds entrance into the blood by inhalation. Absorbed by the skin, its effects, without being quite so destructive, could hardly fail to be most deleterious.

Sulphuretted hydrogen gas is procured by pouring a few drops of sulphuric acid into a watery solution of the sulphuret of potash. This gas, when mixed with atmospheric air, is decomposed; water is formed, and sulphur is deposited. It will be necessary, therefore, to renew, from time to time, the disengagement by adding a few drops of the acid to the hydro-sulphurous solution.

Of the different mineral preparations which furnish materials for medicated vapour baths, the *mercurial* are the most employed.

The fumes of *cinnabar* produce effects on the skin analogous to those of sulphur. Two drachms constitute the quantity requisite for a fumigation.

Corrosive sublimate is, also, occasionally converted into vapour for medicinal purposes: the quantity being five or six grains for each bath. Great care is demanded in the administration as well as in watching the effects of so powerful an irritant as the deuto-chloride of mercury. It stimulates the skin in a very active manner, and seems to excite perspiration.

Some allowance must be made for his predilections for a favourite remedy, when M. Rapou assures us that the mode of administering mercury by fumigation is beyond all doubt the most certain and convenient, and that it affords advantages superior to all the other anti-syphilitic methods of cure.

Very early in the history of the mercurial treatment of syphilis, fumigations were employed; but, owing to the imperfections of the apparatus, or rather to the want of anything deserving this title, the practice got into disrepute and frictions took its place.

Towards the end of the last century, Lalouette, by his improved methods of applying mercurial fumigations, and the great pains which he took in superintending their use himself, gave deserved vogue to this remedy. In a volume* printed by the direction of the King of France, this writer relates a number of cases of venereal affections, intractable to other modes of treatment, which were entirely relieved by this one.

* Nouvelle Methode de Traiter les Maladies Veneriennes, &c

By means of fumigations we obtain the double end of introducing mercury into the system, and, at the same time, of producing free diaphoresis, itself a therapeutic operation of admitted power in the cure of syphilis. Even when mercury is administered in the common way, by the mouth and by friction, its operation is rendered much more efficacious and safe, if the moist vapour bath be used at the same time.

Some may deny the superior advantages of the fumigating treatment claimed for it by M. Rapou, as the only one that can be had recourse to without danger in the cases of pregnant women, nurses, and children. The simple vapour bath, and still more the sulphur one, are contraindicated in pregnancy; and we can scarcely give a license to the mercurial, on the score of safety, that is denied to them.

In direct contrast with the prepossessions of Rapou are the following statement and prohibition by M. Rayer: "Pregnant women bear the pills of mercurial ointment, and the use of the *tisane de Feltz* (sarsaparilla and sulphuret of antimony), prepared after the formula of the Hôpital de la Charité, without any apparent derangement of their health. Mercurial fumigations to the genital organs, vapour baths, and prolonged and repeated sublimate baths, ought not to be recommended to them."*

Much stress cannot be laid on the alleged prophylactic property of mercurial fumigation, as a preventive of syphilitic disease

The favourite preparations of M. Rapou are cinnabar and the argillaceous powder of Lalouette, or the oxide of mercury. The first, in a dose of one to two drachms; and the second, of two to three drachms, but in each case to be vapourized at two or three times. These are preferable to corrosive sublimate, both on the score of ready fumigation and of safety; and they are, at the same time, sufficiently active for all curative purposes.

The same general principles govern us, as regards temperature, duration, and constitutional conditions of the patient, which were laid down in reference to other modes of fumigation.

* *Op. cit.*, *Syphilida*, p. 313.

The use of mercurial fumigations does not preclude recourse, during the treatment, to other forms of bathing, watery and vapour, nor remedies, including even mercury itself, by the mouth, or by friction.

Among the reasons assigned by M. Rapou for a preference of this method of using mercury in syphilis over the other, commonly practised, is the impunity with which the patient may expose himself to the open air at all seasons, immediately after undergoing the process. The skin, moreover, is saved the irritation to which, especially in hospital subjects prone to erysipelatous inflammation, it is often subjected by frictions. Still greater inconvenience and positive injury are inflicted on the digestive passages by the internal use of, at times, even the mildest preparation of mercury, to say nothing of the deuto-chloride and of the oxides of this metal. Salivation is less liable to occur in the fumigating than in the other methods of introducing the medicine into the system.

In secondary syphilis, when there is ulceration of the mucous membranes of the mouth, throat, and nose, and various cutaneous eruptions, often running into the ulcerative stage, mercurial fumigations have displayed curative powers of great activity. In nodes and pains of the bones, this remedy often gives great relief. At times, leeches should precede the use of mercurials.

The following is a good method of applying cinnabar, by means of fumigation, to venereal ulcerations of the throat: After soaking sage-leaves in strong gum-water, the sulphuret of mercury is sprinkled over them, and they are dried in the sun. In this state they are introduced into a pipe and smoked as tobacco would be. By this method the vapour is directly and conveniently applied to the diseased surface.

M. Rayer tells us: "Vapour baths, aromatic baths, and fumigations of cinnabar, and flying blisters, employed either alone or in combination with the internal exhibition of opium, have appeared to me the most powerful of all the therapeutic agents we possess in allaying pains of the bones and articulations. The administration of opium and sublimate in combination, is one of the best means for effecting their permanent cure."*

* *Op. cit.*, p. 313.

"The *squamous* syphilitic affections are advantageously modified by fumigations of cinnabar, used alternately with vapour baths; but they almost always get well without any kind of specific local treatment, by merely cleansing the surface of the skin by the use of the tepid bath from time to time." This remedy, topically applied, has been found very serviceable in partial *prurigo*, such as *p. pudendi*, *p. podicis*, *p. scroti*.

M. Gibert, who may be supposed to give utterance to the experience of M. Biett, and of the physicians of the hospital of St. Louis in general, tells us that the most obstinate syphilitic affections of the skin have often yielded to fumigations of cinnabar.*

The *oxide of arsenic*, in the quantity of five grains, reduced to vapour, has been used by M. Rapou in certain rebellious cases of that large family of French dermatologists, *dartres*. If this active poison be employed at all in this way, the greatest circumspection is necessary, not only in preventing the escape of any of the fumes from the apparatus and the consequent danger from their being inhaled, but also in selecting the *squamous* affections, and carefully excluding the vesicular and pustular, which might offer any surface for absorption of the arsenic. The arsenical treatment ought only to be had recourse to after all other remedies have been tried in vain.

VAPOUR DOUCHES.—As in the case of water baths of various degrees of temperature, so in those of vapour baths, the application of douches constitutes an important auxiliary to their therapeutic employment.

Douches of vapour may be made by directing a column of vapour through a suitable pipe or tube, from which it is projected with considerable rapidity, and a kind of percussion upon any particular part of the body. This column is measured, as in the case of water douches, by the size of the spout, which is fixed upon the end of the tube, in place of which the head of a watering-pot may be substituted. The two varieties of vapour douche are the lateral and ascending. They are applicable, according to their temperature, to the treatment of the same class of affections with the warm and hot water douches.

* *Op. Cit.*, p. 439.

Assalini gives a representation of the contrivances,—tubes and spouts of various sizes,—by which vapour douching may be applied to the eyes, ears, and nostrils, and to the vagina and rectum.

The activity of the douche is increased by bringing the end of the tube closer to the part affected, or by covering this latter with a piece of flannel. In this case, the vapour is diffused through the tissue of the flannel, and remains longer in contact with the skin, from its not being affected by evaporation to anything like the same extent as the naked skin.

The affusion of vapour may be practised by its passing through the tube with its end arranged in rose fashion, so that the vapour falls like mist; and, by a quick motion of the tube or hose, it is applied to an extended surface with great ease.

Occasionally the vapour douche is directed at the same time as the bath by *encasement*, or in a box. It should, in such a case, be applied before the bath, so that the latter shall keep up, to a certain extent, the more energetic operation of the douche, and, by this means, there will, also, be less danger of the patient's catching cold. The partial application of heat or of cold by the douche places the body in a more susceptible state than when the whole system is exposed,—as by immersion or affusion,—a general bath, in fine.

The *physiological effects* of the vapour douche must vary according to its temperature, duration, force of projection, and the substances suspended in the vapour. The chief modification, however, depends on the temperature. According to the intention with which it is used will be either its local action as a sedative, or its more general effects as a derivative. In both cases there is increased expansion of the cutaneous tissue which implies that of the nervous papillæ and the capillaries of the skin. But in the one, when the vapour is at a low temperature, the operation is sedative, and as such allays heat, itching, and pain. In the other, in which the vapour is of an elevated temperature and projected with force, it causes a redness, and a sensation almost amounting to pain,—so that, for a time, the part becomes the seat of afflux and irritation, accompanied with some febrile movement.

This rubefaction may be increased so as to cause actual

inflammation, and one of its results, vesication of the skin. When we stop short with rubefaction, we design to use the vapour as a discutient, to resolve indolent or chronic tumours,—it may be to hasten resolution, by temporarily exciting local inflammation, also to fix erysipelas on a part, and prevent metastasis. More commonly, however, it is resorted to as a derivative, for the purpose of acting sympathetically upon one or more internal organs, to relieve deep-seated congestion, or intense phlegmasia.

Short of its directly rubefacient and even vesicating operation, we cannot, it seems to me, for the reasons already assigned, when speaking of the general or constitutional operation of the cold, warm, and hot baths, place much confidence in the revulsive effects of the vapour bath. It is much more likely to excite directly the internal organs than to diminish their excitement. Hence, it is a remedy, when of an elevated temperature, best adapted to torpid states of the general system, and congestion without inflammation of the internal organs.

Without any minuteness of specification, it is sufficient for us to know that the moist vapour douche of a low temperature, as from 90° to 95° F., is analogous in its operation to the tepid or barely warm water douche, and that when of a greater heat, as of 120° to 160° F., it is adapted to the same class of cases in which the upward limits of the warm and the hot water douches are directed. In the latter case we look for its good effects in indolent tumours, whether of the lymphatic glands or of the viscera, paralytic affections, chronic cutaneous diseases, rheumatism, gout, and various nervous disorders.

Hot Air in Wounds and Ulcers.—Some years ago, M. Guyot directed the attention of surgeons to a method of treating recent wounds of all descriptions, and ulcers, by keeping them exposed to a hot and dry air. His object was to force the formation of a scab, by drying the clot and serum of a wound, or the pus of an ulcer.

M. Guyot performed several experiments on rabbits, on which he had inflicted several wounds, and afterwards placed them in boxes having apertures through which their heads projected. The air contained in these chambers was heated by a spirit-lamp, generally to 95° F., and

sometimes higher. The results were quite satisfactory.

M. Guyot was not, however, so successful in getting ulcers in the human subject to heal in this way. After two or three weeks' trial he was obliged to relinquish it; the patients not being able to bear the fatigue of having the limb so long confined to a box without any change of position.

In some cases, he did, it is true, succeed in ulcers of long standing, after making them scab repeatedly; pus having formed again and again under the superficial dried film.

Dr. Macartney, from whose treatise (*on Inflammation*) I derive this notice of M. Guyot's practice,* thinks that it would abridge the period of the cure, if the secretions of pus were to be diminished or stopped by the use of steam or water dressing, previously to the application of the heated air.

CHAPTER LI.

PULMONARY ATMIATRY—INHALATION OF VAPOUR, AN ANCIENT PRACTICE—TWO KINDS—SUFFITUS—HALITUS—MODIFICATIONS OF EACH OF THESE—EXTRAVAGANT HOPES OF BED-DOES—BREATHING THE AIR OF COW-HOUSES—OBJECTIONS—DR. REID'S OBSERVATIONS ON ARTIFICIAL ATMOSPHERES—VENTILATION WITH INHALATION—TEMPORARY POPULARITY OF PULMONARY ATMIATRY—HOSPITALS TO FURNISH FACILITIES FOR ITS USE—VARIETIES OF ATMOSPHERE FOR INHALATION—IODINE INHALATIONS—SUGGESTIONS OF MURRAY.

PULMONARY ATMIATRY.—Growing out of the subject of vapour bathing, and, to a certain extent, a modification of it, is the application, by means of inhalation, of different kinds of vapour and gas to the pulmonary mucous surface.

* The author first presented his views in the *Archives Gen. de Med.*, and afterwards in a pamphlet form in 1835.

We have had occasion to learn, incidentally, when speaking of the bath of moist vapour, both the application to the lungs of this agent, and of aromatic and other substances which it may be made to hold in solution. Thus, in the Oriental vapour bath of M. Rapou, various kinds of vapour were inhaled as well as applied to the skin, while, at the same time, if necessary, vapour douches were directed to any part of the latter surface. Similar contrivances for the like purpose had been resorted to many years before by Dominiceti, at Chelsea near London.

That process to which, just now, I wish to direct the attention of the reader, consists in the introduction of either simple, moist, or of medicated vapour into the lungs, alone, or the introduction of which is the main design for the time being. It is called by some *pulmonary insufflation*; by others, with more philological precision, *atmiatrics* or *pulmonary atmiatry*.

From the earliest periods of medicine, pulmonary atmiatry has been practised; but, for the most part, in a clumsy fashion, and only in cases of great gravity; and, of course, with unsatisfactory results.

Authors admit two kinds of pulmonary insufflation,—the one of dry substances, *suffitus*, the other of moist ones, *halitus*. The first is made by diffusing the fumes of turpentine, frankincense, styrax, tar, &c., or the different gases, in the room in which the patient is,—or, but with more management, by his inhaling them from a vessel or apparatus for the purpose. The second consists in the evaporation of decoctions holding various vegetable principles in solution, and the application of the vapours thus generated in the same manner as that in which the dry kind is applied.

The reader at once perceives that whether recourse be had to *suffitus* or to *halitus*, there are two modifications of the process in each. The one consists in a prolonged, uniform, and gradual introduction of the vapour into the lungs, by common respiration, as when the patient is in a room, the air of which is impregnated with the medicinal vapour: and the other, by a more limited and hurried exercise of respiration, as when the vapour is inhaled from a Wolfe or analogous apparatus. The first may be called *atmiatry by inhalation*; the second *atmiatry by*

AAA*

insufflation. It must be admitted, however, that after a little practice, the process of inhalation in this last method is quite easy, and hardly demands more effort than is made in ordinary breathing.*

The extravagant hopes entertained by Beddoes and others, seemingly sustained by the experiments of Davy and Cavallo, of the wonderful effects which were to be produced by breathing factitious airs—gases in specified quantities mixed with atmospheric air—have been long since dissipated. The physician no longer hopes to find in the inhalation of pure oxygen gas or nitrous oxide a suitable stimulus to rouse the system from torpor, and to cure disease depending on obstructions, defective secretions, &c., nor in nitrogen or carbonic acid similarly used, a sedative to allay excessive arterial excitement and too abundant hematosis.

Belonging to pulmonary atmiatry is that other recommendation of Beddoes,—for patients threatened with, or even actually labouring under phthisis, to inhale the air of cow-houses; by a free communication being opened for the purpose between these latter and the apartment of the invalid. With Dr. Pereira we may attribute the benefit from this source, provided that good has really ensued from it, “to the warm air with which such places are filled, though something, perhaps, may be ascribed to the carbonic acid gas which is present.” Must we not admit, as an offset, the deleterious effects of the exhalations from the lungs and skins of the cows, and from their excretions,—although some of these exhalations were imagined, at the time, to be balsamic for ulcerated lungs.

Not only ought the invalid to be protected from the exhalations from animals and from their excretion, but also from his own; and hence, ventilation must never be forgotten in all our plans of either general vapour bathing or of pulmonary atmiatry. On this topic I find some very useful suggestions by Dr. David Boswell Reid.†

Artificial Atmospheres.—Under the head of “Artificial Atmospheres,” this writer points out the fact familiar to pathologists, of the very prominent part which the lungs bear

* Dictionn. de Med. and de Chir. Pratiques, Art. *Vapeur*, by Martin Solon.

† Illustrations of the Theory and Practice of Ventilation, &c.

in relieving the body from the various products that abound in it; and when the per centage of carbonic acid is considerably beyond the amount evolved in health. "Farther, the offensive odour discharged from the lungs and surface of the body in particular stages of disease, where they do not arise from an incipient putrefaction preceding dissolution, evidently indicate the great importance of allowing every facility to the lungs and skin to operate according to the laws that regulate the diffusion of gases, which have thrown a new light on some of the functions of the animal economy, more particularly those that regulate respiration and transpiration."

Dr. Reid, making the practical application of these facts, remarks: "How important would it be, in such cases, that air loaded with the products of respiration and transpiration, instead of lingering around the person, and following a devious and uncertain course, from an ill-defined and a dubious ventilation, should pass away continuously in an unceasing stream, and be replaced by a pure atmosphere at a regulated temperature, and in a precise state of dryness or humidity, so that, at one time, the full oxygenating influence of the air should be brought to play upon the body with the highest power of evaporation, or one of these forces be made to act in full while the other is subdued."

Premising his knowledge of the great absorbing power of the lungs, every reader must be struck with the forcible manner in which the practice of pulmonary atmiatry is presented in the following question by Dr. Reid:

"What frequent repetition of any ordinary prescription can ever approximate to,

	20 distinct and separate impulses, in	1 minute,
1,200	" " " " "	1 hour,
28,800	" " " " "	24 hours,

and all these acting, not upon a secondary organ—not subject to any intermixture with the food or products of digestion—but conveyed directly to the blood in the lungs, and presented to an area many times exceeding that of the surface of the body?"*

* The physiological reader need not be told that the "impulses" referred to by Dr. Reid, are the successive movements of healthy inspiration, performed in the times specified.

A few years ago pulmonary atmiatry had acquired some vogue; but we are constrained to admit that although it merits still farther cautious and systematic trials, the results so far have not by any means been of that conclusive character which entitle it to our confidence. In this remark I mean to refer more particularly to medicated vapours by the addition of active chemical agents, rather than to simple aqueous vapour. Of this last I have already spoken in terms of eulogy, nor can it be doubted but that it is an agent which might be and ought to be still more extensively used than hitherto, in some one stage of nearly all the diseases of the pulmonary apparatus.

The vapour of tar was at one time recommended as peculiarly adapted, by its alleged balsamic powers, to heal ulcers of the lungs. Dr. Mudge, on the subject of his inhaler, recommended the fumigations of balsams, and laid especial stress on the virtues of tar; so much as to assert, in a strain abundantly extravagant, that much of the benefit which consumptive patients experience from sea voyages is derived from the tar vapour constantly present on board a ship. Its place among the remedies for this disease has been mainly preserved for it by the essay of Sir Alexander Crichton.* Dr. Paris (*Pharmacologia*) is inclined to think well of it from the result of a trial of its effects. No details are given to strengthen the faith of the reader. He goes on to say, "The tar employed should be that used in the cordage of ships, to every pound of which half an ounce of sub-carbonate of potass must be added, in order to neutralize the pyroligneous acid generally found mixed with tar; the presence of which will necessarily excite coughing; the tar thus prepared is to be placed in a suitable vessel over a lamp, and to be kept *slowly* boiling in the chamber during the night as well as the day; the vessel, however, ought to be cleaned and replenished every twenty-four hours, otherwise the residuum may be burnt and decomposed, a circumstance which will occasion increased cough and oppression on the chest."

Dr. Reid's suggestion is worthy of the serious consideration of the several parties who have it in their power to carry it into practice. He says:

* An Account of some Experiments made with the Vapour of Boiling Tar, in the cure of Pulmonary Consumption.

"By constructing a chamber in every hospital, where the quality of the air that passes the zone of respiration might be entirely under control, and medicated, heated, dried, moistened, cooled, and applied in any quantity, as circumstances might dictate, a more specific power would be obtained, capable of being applied advantageously to numerous cases of disease."

He enumerates thirty-four varieties of atmosphere that might be applied in this manner, omitting, oddly enough, the iodinic.*

In the apartments and air baths constructed for the purpose by Dr. Reid, "the materials were introduced by being conveyed by a ventiduct, which was the sole supply for the atmospheric air used; the chemicals added being communicated by various arrangements, according to their peculiar properties, the quantities required, and the manner in which they were to be used."

He expresses some confidence in the means that may be adopted for producing a powerful warming, oxygenating, cooling, or evaporating effect, as may be required by the circumstances of the case. Chemicals, though they require to be tried with extreme care and much attention, appear, Dr. Reid believes, to be capable of being often added with advantage, from the numerous effects which he has seen in the laboratory and in manufactories.

The luxurious as well as invalids may derive pleasure from adopting the following hint with which Dr. Reid concludes his remarks on "Artificial Atmospheres."

"Besides those atmospheres that may be produced in the hospital or the chamber of the invalid, a very pleasing

* These are, 1. Dry air; 2. Dry and hot air; 3. Dry and cold air; 4. Rapid and hot air; 5. Rapid and cold air; 6. Moist air; 7. Moist and warm; 8. Moist and cold; 9. Rapid, moist, and warm; 10. Rapid, moist, and cold; 11. Steamed air or steam baths; 12. Highly oxygenating, by an infusion of oxygen; 13. Less oxygenating, by diluting air with nitrogen; 14. Deoxidating, by adding minute portions of deoxidating agents; 15. Nitrous oxide (Davy's intoxicating gas); 16. Nitrous acid; 17. Nitric acid; 18. Chlorinated; 19. Sulphureous; 20. Carbonic; 21. Ammoniacal; 22. Prussic; 23. Acetic; 24. Arsenical; 25. Mercurial; 26. Alcoholic; 27. Etherial; 28. Benzoic; 29. Camphoric; 30. Lavender; 31. Orange; 32. Cinnamon; 33. Creosotic; 34. Hydro-sulphate of ammonia.

and refreshing variety may be communicated to ordinary atmospheric air, by causing steam from a small retort to mix with it, after adding a few drops of oil of lavender, orange, cinnamon, *eau de cologne*, or of any other volatile material that may be preferred; the whole atmosphere of the apartment being soon impregnated with the volatile matters they communicate to the passing air."

Iodine, now so extensively employed in scrofulous and syphilitic diseases, and chronic rheumatism, and in affections accompanied with increased mucous discharges, has been recommended to be converted into vapour by a mild heat, and in this state inhaled for the cure of chronic bronchitis and pulmonary consumption. The chief writers in favour of this practice are Drs. Murray, Scudamore, Berton and Corrigan. The first of these seems entitled to the merit of priority of suggestion, as well as of having tested his idea by actual experiment.

"The valuable property," says Dr. Murray, "possessed by iodine, of subliming where *moisture is present*, below the temperature of boiling water, and of remaining diffused at low degrees of heat (even that of the atmosphere), when humid, entitles it to attentive consideration as a remedy by inhalation."*

When a cup, tube, or vial containing moistened iodine is placed in the stream of vapour, the iodine sublimes in beautiful violet exhalations, from which the substance itself derives its name. "I mention this," says Dr. Murray, "because I knew a young lady, a patient, very much alarmed when she saw the vapour approaching her breath, purpled almost like the ominous colour of blood."

This writer, after some strictures on the worse than useless method of breathing for a few minutes from a teapot or a tin inhaler, dwells on the advantage to be derived from a long-continued contact of the humid vapour, when it is supplied from a proper apparatus. Virtues are properly attributed to the moist vapour itself, independently of the substances which may be dissolved in it. We must receive with some allowance the assertion of Dr. M., to

* A Dissertation on the Influence of Heat and Humidity, with Practical Observations on the Inhalation of Iodine and various Vapours in Consumption, Catarrh, Croup, Asthma, and other Diseases. By John Murray, M.D. London, 1829.

show how much watery vapour can be taken into the lungs, that "a patient will inhale it during four hours, through a close bag, appearing to admit little atmospheric air." It can hardly be deemed proper to allow a patient to inhale any kind of vapour for so long a time without a due admixture of atmospheric air.

Plausible as are the views and suggestions of Dr Murray, the details of which I forbear from repeating, they are sustained by one case only of iodine inhalation, the result of which was encouraging, although not entirely successful.

CHAPTER LII.

PULMONARY ATMIATRY (*continued*).—SCUDAMORE'S PRACTICE—HIS UNITING IODINE WITH DIFFERENT NARCOTICS FOR INHALATION—HE USES OTHER REMEDIES CONJOINTLY WITH INHALATION—HIS SUCCESS—HIS VIEWS OF THE GENERAL TREATMENT OF PHTHISIS—BERTON'S METHOD—CORRIGAN'S TESTIMONY AND APPARATUS—CHLORINE—ITS ALLEGED PREVENTIVE POWERS—ANTICIPATIONS NOT REALIZED BY IT—RESULTS OF TRIALS IN PARIS—ALBERS'S CASES AND CONCLUSIONS—TOULMOUCHE'S IN BRONCHITIS—ITS USE SUGGESTED IN GANGRENE OF THE LUNGS—SCUDAMORE'S RECOMMENDATIONS—FUMES OF MURIATIC ACID GAS—SMOKING STRAMONIUM AND CAMPHOR—GENERAL VIEW OF THE EFFECTS OF IODINE AND CHLORINE INHALATIONS—USE OF CHLORINE AS AN ANTIDOTE.

ALTHOUGH so far the results of iodine inhalations have not corresponded with the sanguine anticipations of Dr. Murray and others, the importance of the subject will justify my giving some farther details from reliable sources.

Sir Charles Scudamore* uses the compound solution of iodine with alcohol for procuring the vapour to be inhaled.

* Cases Illustrative of the Efficacy of Various Medicines administered by Inhalation in Pulmonary Consumption; in certain Morbid States of the Trachea and Bronchial Tubes, attended with Distressing Cough, and in Asthma. London, 1830.

The proportions of the ingredients are to be varied according to the circumstances of the case. Sir Charles used the tinctures of conium, stramonium, and ipecacuanha, and also ether, separately or variously combined, and in union or alternation with the iodine. Tincture of opium may, he tells us, sometimes be used advantageously, either alone or as entering into the composition of the inhaling mixture. He has occasionally added it to the iodine solution, but, for the most part, he gives the preference to the conium.

"The tincture of digitalis produces sedative effects, and more especially when united with the hydrocyanic acid. In one case in which spasmodic irritation, united with slight symptoms of inflammatory action, prevailed to a great degree, I obtained the best effects from this mixture.

"The tincture of stramonium exerts an antispasmodic power in asthma.

"The tincture of ipecacuanha is expectorant."

"Æther is found to be very useful in a spasmodic condition of the air-passages, and contributes to facilitate expectoration. It may be joined with any of the other ingredients, or used separately. Such is its great volatility, that the water in the inhaling bottle should not be of a higher temperature than 100 degrees; and the quantity should be renewed every three or four minutes, ten minims being added each time; but the water need not be changed."

Of all these agents, to which we may add hydrocyanic acid and chlorine, Sir Charles Scudamore declares the iodine to be the most active, and the only one in which he places any confidence in bringing about the curative process in phthisis pulmonalis.

For those who may still feel disposed to try the practice, I subjoin the directions given by Sir Charles.* The ad-

* "The temperature of the water with which the preparation is to be mixed should be from 115° to 120° of Fahrenheit; and, when the proportion of iodine is increased to a full measure for each inhalation, I direct that the quantity be divided into two equal portions, the one to be used for the first ten minutes, and the other for the same space of time in continuation; and, at the average frequency, three times a-day: but sometimes it may be expedient to use it for ten or fifteen minutes only at a time, and three or four times a-day. The inspiration should be as strong as can be conveniently made, in order that the vapour may freely enter into the lungs: but the

ministration of the iodine is contra-indicated when any inflammatory action is present.

In my former work, when treating of pulmonary inhalation, I indulged in some strictures on the concealment, by Sir C. Scudamore, of the proportions of the ingredients, in fact of the precise composition of the mixtures, from which the vapour that he directed to be used by his patients was formed. Similar strictures were made nearer home, with the effect, though after a sufficiently long interval, of inducing him to make public his favourite formula. This, as amended, together with some additional observations on the general subject, are found in the Medical Gazette, for February 17th, 1838; and, subsequently, February 7th, 1840. It is: R. Iod.; Potassæ Iod., aa gr. vi.; Aquæ dist., ℥v. ℥vi; Alcohol, ℥ii. M. Fiat solutio, in inhalationem adhibenda. Of this solution, from one drachm to six, and from twenty to thirty-five minims of a saturated tincture of conium are used in each inhalation, which is continued from half an hour to forty minutes. It is better always to add the conium at the time of mixing the iodine solution with the water, just before inhaling. "At the temperature of 90°, the volatile properties of iodine are given off very sensibly; but the conium requires more heat, and that of 120° is not too much for the iodine. This degree, therefore, I most recom-

patient should inhale in a manner not to fatigue the chest; and this evil will be avoided if he allow himself sufficient interval between the period of inhaling to recover power.

"I lay it down as a principle, that inhalation should always be so conducted as not to produce distress to the patient in any way, either as regards the composition of the mixture, its strength, or the period of carrying on the process.

"In first entering on the treatment of inhaling, the irritation of coughing is usually produced; and in some cases this happens on every subsequent occasion; but, unless this prove excessive or permanent, it does not form an objection to the treatment, for the power of expectorating is remarkably facilitated, and, the bronchial tubes being cleared, a material subsequent relief to the cough is afforded. But a curative and not merely a palliative effect is the object to be held in view.

"The proportion of alcohol contained in the different materials is too small to produce any inconvenient stimulation; it is necessary as the menstruum, and it is useful also as causing the volatile parts of the medicine to rise more freely with the watery vapour."

BBB

mend ; or, if the patient have not a thermometer, let the instruction be to put the water into the inhaler (first warming it a little to prepare it), quite as hot as the finger can bear without pain. The inhaler should be kept immersed in rather hotter water during the process. A good glass inhaler also is a material consideration. If it be small, and the tubes too contracted in the bore, the difficulty of inhaling would be great to the invalid, whose respiration is easily embarrassed ; whereas, with a fit apparatus, the process is perfectly easy, and not fatiguing."

Sir Charles remarks, respecting the proportions and dose of the inhaling mixture : "In the commencement of the treatment I advise very small proportions of the iodine mixture ; for example, only from half a drachm to a drachm for an inhaling of eight or ten minutes, to be repeated two or three times a-day. Of the soothing tincture, I direct half a drachm—which I usually find sufficient ; but it may be increased if the cough be very troublesome. I soon augment the quantity of the iodine, and progressively from $\mathfrak{z}\text{j}$. to $\mathfrak{z}\text{iv}$. ; but also, then prolonging the time of inhaling, I divide the iodine dose, putting two-thirds at first, and the rest after the expiration of seven or eight minutes."

"It is of the utmost importance that the strength of the inhaling mixture should be considered in relation to the particular case ;* the feelings of the patient will be a great guidance. He should have the sense of relief, and not of inconvenient irritation, produced. The cough arising occasionally during the process is not an objection ; but if it be more irritable afterwards, it shows that it has been used too strong. There is a certain stage of the tubercular disease, when over-excitement, from employing the iodine in too great quantity, might hurry on the softening process too quickly. It is here that the treatment demands the greatest judgment."

. . . "In the employment of inhalation, perseverance is necessary, and in some instances for many months. The object sought to be obtained is not merely

* "In acute phthisis, the inhaling doses should be very weak. No remedy with which I am acquainted exerts so much influence over the hectic fever, used in the intervals, as the inhalation in question."

palliative benefit,—not merely a temporary impression on the morbid function,—but the superseding of the diseased action by a healthy one, and the effecting some organic change.”

In his communications Sir C. S. professes to give a concise summary of his further experience in phthisis and bronchitis. He refers to cases formerly published by him, and states the favourable result of several of these. The new cases, up to 1838, are six, related by Dr. Davidson, including his own case; several of which are much in favour of the practice. Sir C. S. contents himself with stating that he could “relate the cases of a gentleman, aged fifty-four; of a young lady, aged twenty; and of a medical practitioner, aged thirty; in which the most unequivocal symptoms of tubercular disease were strongly developed, in which there was every threatening of danger: and in all of them I was happily quite successful.”

In 1840, Sir Charles adds to his former clinical results notices of several cases, in which apparent cure or great alleviation was obtained.

“The patients, whose symptoms of tubercular phthisis, with the treatment, were fully described in this Gazette, beginning at page 720, vol. xv., have not had any relapse, and are now enjoying excellent health; a period of rather more than five years having elapsed.”

In other cases, equal benefit was obtained by the inhalation. The requisite details, including the auscultatory phenomena, are given by the author, which showed the existence of a tuberculous state of the lungs—sometimes in the first stage, sometimes after softening had set in and cavities were formed.

“In every case one of the following events may be expected to happen: either that the tubercular irritation will be arrested and gradually removed, be arrested and suspended, but not cured; or pass on to the softening process, which terminates in the production of an excavation. In all these different states of disease I advise the inhaling treatment to be employed.”

Sir Charles has not pretended to restrict himself to the use of iodine and other inhalations. He enlists the usually recognized means of cure, both therapeutic and hygienic, in bronchitis, and of relief in phthisis.

Whatever we may think of the following recommendation, we heartily concur in the protest which precedes it:

"I have, on different occasions, entered my protest against sending the unfortunate patient, as is so commonly done, in a confirmed state of the disease to a warm climate; trusting for benefit almost, perhaps wholly, to its influence. This usually proves a journey to a foreign grave. Rather let us, however late the attempt, and with however poor a prospect of success, enter upon the attentive [tentative?] treatment of the case; and of which, according to my views and experience, inhalation will prove a most valuable part."

The following remarks respecting the general treatment of phthisis, although they can lay no claim to novelty, are worthy of being repeated on the present occasion,—the more so as they serve to distinguish the enlightened physician from the mere empiric, whose mental vision cannot extend beyond the particular remedy which he professes to regard as a panacea.

"But great as is the importance which I attach to this one remedial method, I should be sorry to have it supposed for one moment that I would depend on it alone. On the contrary, I am fully aware how essential a matter it is to treat the whole constitution; such treatment being modified according to the circumstances of the individual case. As a general principle, I am an advocate for a very supporting plan of diet, and the use of corrective tonic medicine, combining with it the occasional careful administration of *alteratives*. Good air, the avoidance of vicissitudes of temperature, while, at the same time, a due ventilation is well maintained in all the apartments which the patient occupies, are points of great importance. It is not sufficient that we attempt to relieve the lungs from the irritation of tubercles at present existing; but we must endeavour to remove the tubercular *diathesis*, and counteract the tendency to fresh formation of tubercles. Hence it follows also, that when a consumptive patient may have had the good fortune to be benefited by treatment to the extent of a tolerable recovery, it is incumbent upon him to lead a life of exceeding care afterwards, in regard to diet and regimen, clothing, place of residence, and in every mate-

terial particular relating to health ; in order that a relapse may be prevented."

Apparatus for Inhalation.—Proper stress is laid by Sir C. Scudamore on a suitably constructed glass inhaler being used. For this purpose, we should procure a double-necked glass bottle, into which we introduce about an inch of water, to which the inhaling mixture is to be added. Through one of the necks a straight glass tube passes, and dips under the surface of the water. The other neck has a short curved glass tube passing through it, by which the patient inhales.

In the absence of a double-mouthed bottle, a common wide-mouthed bottle may be used, the cork of which has two perforations, through which pass the glass tubes.*

Sir Charles gives the following directions : " The bottle should be large, and the tubes capacious. The one issuing from the bottle should be upright, passing off in a gradual slight curve, so that the vapour shall not be much cooled in the course of its progress ; the ingress tube should dip very near to the bottom of the bottle, that all the air so introduced may receive impregnation. The patient must be desired to inhale by using, at the same time, suction and a pretty full inspiration, then to drop the under lip from the mouth-piece and make a free expiration ; so conducting the process by pausing, and, if he like, little suspensions, in order that he may not experience any of the fatigue, which would certainly happen if breathing quickly, or using an inhaler with small tubes, or with too much water in the bottle."

Dr. Berton places more confidence in the efficacy of iodine inhalation for chronic bronchitis than for pulmonary consumption, and in this belief he is doubtless borne out by the facts of the case. His mode of administering the remedy is thus described : " In a flask with two tubular openings, he puts diluted sulphuric acid, and on this projects a quarter or half a grain per diem, of the hydriodate of potassa ; the iodine is promptly disengaged in the form of vapour, and this is inhaled by the patient through one of the tubes of the flask. The process is repeated from

* Figures of these bottles are given in Pereira's Elements of Materia Medica and Therapeutics.

four to ten times a-day ; the duration of each being from four to five minutes."

Dr. Corrigan advocates inhalation of iodine in phthisis, and refers to the good effects of the medicine, introduced into the system in this way, on the digestive organs.

That inhalation, as a remedial process, may obtain a fair trial, it is requisite, Dr. C. thinks, " 1st. That the apparatus should be simple in its construction, and easily kept in order ; 2d. That it should be capable of keeping up a supply of vapour for any length of time, and that the evolution of the vapour should be steady, and should be easily regulated ; 3d. That it should also furnish a sufficient supply of aqueous vapour, to prevent any irritation of the larynx or lining membrane of the air-tubes ; 4th. And most important of all, that its employment should entail neither trouble nor fatigue on the invalid."

The author then gives a diagram and description of an apparatus which he calls a "Diffusion for the Administration of Iodine, Chlorine, &c., in the form of Vapour."

If, adds Dr. Corrigan, " we suppose the patient to inhale only one-twentieth of the iodine evaporated, he will inhale in each hour, and apply to the diseased surfaces, one grain and a half of iodine in a state of the most minute division or solution. This quantity we know is quite sufficient to exert a decided action upon scrofulous ulceration ; for we find, on reference to Lugol's valuable work on the employment of iodine in scrofula, that in external scrofulous ulceration, the preparation of iodine which is found beneficial, is a solution which contains only about three grains of iodine in each pint of fluid. The duration of the inhalation can of course be extended at pleasure."*

Chlorine has had its season of fame for the cure of phthisis ; but undeservedly. If Dr. Murray had been rightly informed, we should think something of it as a preventive, but on this point we want much more decisive testimony than he adduces, when he says :

" If the statement of our respected friend, Mr. Greenfield, be proved correct, that an atmosphere of chlorine gas and vapour of water prevents consumption, among his

* Dublin Journ. Med. Science, March, 1839. Also, London Med. Gazette, April 6, 1839.

paper makers, a class of persons most of all obnoxious to that complaint, from their confinement, part of the day, in thick clouds of dust in a rag-loft of the paper-mills,—if chlorine and steam, dissipated through the works, can prevent phthisis, is it not reasonable to suppose, similar means might contribute towards the cure of persons who might have contracted the complaint? Would not, therefore, the junction of chlorine gas, and that of iodine, be a rational proposal, regulated, of course, according to the different degrees of the disease?"

By similar arguments we might be persuaded that the vapour from oak-bark decoction is useful in phthisis, since it is stated in some quarters that tanners were not observed to be liable to the disease.

That great caution is required in administering so powerful an agent as chlorine, especially where, as in phthisis, partial bronchitis and pneumonia are often associated with tuberculous formations, must be evident, from a knowledge of its *physiological effects*. These are, when it is not largely diluted, irritation of the bronchiæ propagated to the lungs, copious expectoration, dry and fatiguing cough, flushed cheeks, hot skin, and frequent pulse. Dr. Pereira* tells us that twice he suffered most severely from the accidental inhalation of chlorine; and each time it gave him the sensation of constriction of the air tubes, such as might be produced by a spasmodic condition of the muscular fibres of the bronchial tubes. "The attack usually goes off in increased secretion from the mucous membrane. When diluted with a large quantity of air, chlorine may be inhaled without exciting cough: it occasions a sensation of warmth in the respiratory passages, and promotes expectoration."

Habit, as may be readily supposed, makes a great difference on the impressibility by this gas. Thus, for instance, we learn from Dr. Christison,† that a chemical manufacturer could not remain above a few minutes in an atmosphere of chlorine, in which his workmen could work with impunity.

Dr. Albers, whom I shall quote presently on the thera-

* The Elements of Materia Medica and Therapeutics.

† Treatise on Poisons.

peutic value of this agent, believes that, although the topical and primary action of chlorine is stimulating, the remote operation is antiphlogistic ; as it diminished the frequency of the pulse, and calmed excitement. When applied to the skin or bronchial membrane, this gas, owing, we must believe, to its being absorbed, produces such a change in the urine as to impart to it bleaching properties.

The most frequent disorders caused by inhaling chlorine, among the manufacturers in Great Britain and Ireland, are acidity and other gastric complaints, and the absorption of fat.

The *therapeutical effects* of chlorine inhalations are far from being of that satisfactory nature which M. Gannal, a chemist of Paris, and M. Cottureau of the Faculty of Medicine, of the same city, would persuade us.

M. Gannal has tried the chlorine inhalation in many cases of pulmonary consumption, prompted thereto, in part, by the apparent immunity from this disease enjoyed by those engaged in bleaching establishments. But, so far as I am able to judge from the published accounts of his practice, and even from his own statements, biassed as they are by excessive partiality for the remedy, and, I may add, from some trials made by myself, I am not disposed to regard it with any favour in this formidable disease.

M. Cottureau's case of phthisis, alleged to be cured by chlorine inhalations, was reported on favourably by a committee of the Royal Academy of Medicine, the reporter of which, M. Desportes, says that he has derived similar effects from the use of this agent. The experience of many of the members present was of an adverse kind. M. Cottureau did prosecute his trials with alleged favourable results. His cases of cure of phthisis, under the use of chlorine inhalation, are subjected to a rigid analysis by M. Louis ;* and the results are anything but flattering to the new treatment.

M. Louis informs us that he has himself "studied the action of chlorine in upwards of fifty phthisical patients, at the Hospital of La Pitié, the Hôtel Dieu, and the Hospital

* *Researches on Phthisis, &c* London, 1845. Published by the Sydenham Society.

Beaujon. The chlorine (prepared at the Central Laboratory of the Paris hospitals) was inhaled from a vessel provided with two tubes. In no instance did I obtain any successful result from its employment."

Trials of the chlorine by other practitioners in Paris, did not bear out the confident anticipations of M. Cottereau. M. Joly remarks, in reference to these trials, that all that can be expected from chlorine can be procured with much less trouble and irritation to the patient from the chlorides, particularly, it may be added, of lime and of soda.

Dr. Albers, in the years 1829, 1830, and 1833, instituted a series of experiments in the Medical Hospital at Bonn, on the effects of chlorine vapours in phthisis, chronic bronchitis, and chronic pneumonia. These experiments were repeated in private practice. They possess a value over most of the trials made elsewhere, in the care that was taken to establish an accurate diagnosis in every case.---

"The chlorine vapour was applied in the manner recommended by Murray ; or, instead of exposing the patient to vapour strongly impregnated with chlorine, for the space of a few minutes at different times in the day, he was kept the whole day in a chamber filled with very weak chlorine vapour. The vapour was produced by boiling chloride of lime, and then heating it in a large dish, or by sprinkling it with muriatic acid ; sometimes it was generated by pouring sulphuric acid on culinary salt."

I omit the details and give the therapeutical conclusions of Dr. Albers, viz. : "In tubercles of the lungs, in chronic catarrh, in chronic inflammation and ulceration of the bronchial mucous membrane, and in dilatation of the bronchi, chlorine vapour is of no service, and in most cases will not be borne, in consequence of the irritation it produces. On the other hand, it has a very salutary operation in pure ulceration of the lungs, or vomica. This state, however, is not to be confounded with suppurating pneumonia, to which the use of chlorine vapour is not so applicable. How far patients labouring under disease of the lungs may be adapted for using this remedy cannot be determined ; much will depend on general irritability and individual disposition, and the chlorine vapour should be always tried experimentally at first.

“From the foregoing observations it appears, that chlorine vapour produces salutary effects in chronic ulcers of the lungs; this agrees with the results obtained in surgical practice from treating old ulcers with the solutions of chloride of soda and chloride of lime.”*

A more favourable opinion of the practice of chlorine inhalations in bronchitis will be formed, after perusing the results of trials made by M. Toulmouche, of Rennes (*Bull. de l'Acad. Roy. de Med.*).

“The greater number of the experiments, the inferences from which are here related, were made during a period of four years and a half in a ‘Maison de Detention,’ where pulmonary catarrhs are very common. The majority of the patients have borne very well the first impression of the chlorine; and all have become capable of employing it, by gradually accustoming themselves to it. With the fewest exceptions,—such as where great irritability and oppression existed,—the chlorine was employed in every case which bore the name of pulmonary catarrh, acute or chronic, inflammatory or pituitous. Its sensible effect is to change the quality of the bronchial secretion, to diminish its quantity, and finally to put a stop to it.

“The result of the use of chlorine in 228 females is recorded in this paper.

“Of these 228, 141 were affected with acute, and 65 with chronic bronchitis; 17 of which latter were double, 4 complicated with pulmonary emphysema, and 22 with phthisis. Of the 141 acute cases, 51 were cured in from five to six days; 33 in from seven to ten; 29 in two or three days, and 21 in from eleven to fifteen. The greater number were thus cured in from five to eight days; the smaller in from eleven to fifteen; a result much superior to that which is obtained by the ordinary means. Of the 65 cases of chronic bronchitis, 16 were cured in from twenty-one to ten days; 15 in from eleven to ten; 13 in from two to ten; and one only in eighty-eight days. The average of cures requires, therefore, from sixteen to thirty days: and two-thirds of the patients recovered in from five to twenty or twenty-five days. This is regarded as a

* British and Foreign Medical Review, vol iv.

period of treatment two or three times shorter than that which is commonly employed.”*

Dr. Stokes† found the chlorides of lime and soda, combined with opium, of great service in gangrene of the lung, by removing the offensive odour, and improving the strength of the patient. Might not the inhalation of diluted chlorine gas be serviceable in such cases?

Sir Charles Scudamore observes, in relation to chlorine inhalation, that it has not afforded him results approaching in value to those obtained from iodine. He recommends that, as chlorine, from its great volatility, comes over so quickly with the aqueous vapour, the total quantity used at each inhalation should be partitioned into doses, if the process be continued beyond four or five minutes, otherwise its action will at first be too strong, and at last too weak.

For the temperature of the water he prefers 110° F., and for each of the subdivided doses from two to twenty minims.‡

* British and Foreign Medical Review, vol. iv., p. 224.

† On Diseases of the Chest.

‡ The apparatus recommended by Gannal, consists of a flask with three circular openings. The middle one is closed with a cork, which is open in its centre, so as to allow of the introduction and adjustment of a tube which extends to the bottom of the vessel. One of the lateral tubes serves for the introduction of the desired fluid: after which it is hermetically sealed. The other tube is short, extending only a few lines into the vessel. It has a curve, and its external extremity is enlarged so as to be adapted to the mouth: it is pierced with several orifices.

The vessel, holding half a pint of fluid, is half filled with water of the temperature of 90° F., into which is poured liquid chlorine, or chlorinated water (hydrochlorine), which holds two volumes of the gas. Of this, from five to ten drops are introduced into the water. The patient now applies his mouth to the perforated tube, and inhales the chlorine mixed with atmospheric air in the upper part of the flask. The dose may be gradually increased if necessary.

The object of the middle tube is to allow of the continual introduction of atmospheric air, which being carried down to the bottom of the vessel, is necessarily, in its rise through the fluid, mixed with chlorine, and becomes fit for inhalation.

M. Bourgeois, in common with M. Joly and others, prefers the gradual evolution of the gas from a chloride, that of lime

The fumes of muriatic acid gas have been used occasionally by inhalation, with the same intention, and with as equivocal success as chlorine.

More satisfactory evidences of pulmonary atmiatry are said to be furnished in the practice of smoking stramonium leaves and camphor cigarettes, &c., in cases of asthma and chronic bronchitis. It is very doubtful, in these cases, whether the smoke reaches the air-passages at all, since in the act of smoking the glottis is closed.

In summing up the results of the various trials of pulmonary inhalation, including those of iodine and chlorine, made by the author of the present work, we do not find ourselves much advanced towards a more successful therapeia by its instrumentality. As yet, indeed, notwithstanding the experiments made at different times, the whole thing is in its infancy. The subject promises much, but these promises are not yet realized. So far as we may draw inferences from what has been done, it appears, 1. That phlogosis and irritation of the air-passages, and even of the fauces and pharynx, will be soothed by the inhalation of warm moist vapour, the good effects of which may sometimes be increased by its being made the vehicle of certain anodyne and narcotic principles. 2. That a relaxed state of the mucous membrane of these passages and cavities, with excess of secretion, will be benefited by the inhalation of dry vapours, or of those holding in suspension the volatile principles of different resins and aromatics, which act as expectorants, by clearing the passages of accumulated mucus, and diminishing its secretion, as in chronic bronchitis, humoral asthma, &c. 3. That alterations of tissue, amounting to ulceration of portions of the respiratory tube, as in chronic laryngitis, and tuberculous cavities, have been, in some instances, relieved, and even a curable process set up, by the inhalations of iodine; and, still better, when it is united with narcotics. 4. That chlorine, under similar conditions, has palliated bad symptoms, by enabling the patient to throw off adherent and accumulated mucus and purulent matter: and in some cases of membranous croup, and, still more, in diphtheritis, and in certain cases preferably, so as to fill the air of the room with it. The extrication may be made more rapid by the addition of a little sulphuric acid to the chloride.

of chronic bronchitis and asthma, the lively stimulus which it imparts may aid in the separation and rejection of the morbid secretion and formation.

In the scrofulous diathesis, and in incipient or threatened tuberculosis, the moderate and prolonged inhalation of iodine, by its being diffused in the air of the apartment, or even suite of rooms of the invalid, may prevent the development of the disease, and prove a useful auxiliary to other means of prophylaxis, medicinal and dietetic.

Chlorine, owing to its known property of decomposing sulphuretted hydrogen gas, has been used in cases of poisoning by the accidental inhalation of this latter, as in privies, common sewers, &c. Great caution, however, is demanded in the administration of so powerful an irritant as chlorine, which ought to be diluted to a considerable extent. The safer plan will be to hold the chloride of lime or soda to the mouth and nostrils of the asphyxiated persons.

Various substances, reduced to an impalpable powder, have been recommended to be introduced into the lungs by inhalation, with a view of their acting on the diseased surface in phthisis and some other pulmonary diseases. Dr. Mydleton has advocated the use of cinchona, sulphate of iron, myrrh, &c., in this way.*

As applied by inhalation, although really not reaching farther than the larynx, certain powders may be mentioned in this place, which have been used in the treatment of chronic laryngitis. These are usually mixed with sugar before being introduced. The patient is recommended to make, after a complete expiration, a sudden inspiration, through an open glass tube, or reed, one end of which is over the powder, and the other introduced into the mouth. A portion of the powder is retained by the pharynx; another is conveyed into the larynx. For this kind of medication, M. Valleix (*Guide de Médecin Praticien*, &c.), recommends the following articles, viz.: subnitrate of bismuth, which may be either pure or mixed with an equal quantity of sugar; sulphate of zinc, one

* A Preliminary Dissertation, Illustrative of a New System of Pulmonary Pathology, 1825. I refer to this work, second hand, from Dr. Pereira's *Elements of Materia Medica*, &c.

grain mixed with thirty grains of sugar; sulphate of copper, similarly mixed; alum, five grains mixed with ten of sugar; acetate of lead, two grains with fourteen of sugar; nitrate of silver, one grain with seventy-two of sugar.

CHAPTER LIII.

PULMONARY ATMIATRY (*concluded*)—INHALATION OF ETHER AND CHLOROFORM FOR THEIR ANÆSTHETIC EFFECTS—ETHERIZATION FIRST USED IN BOSTON—DIFFERENCE OF OPINION ON THE SUBJECT—PHYSIOLOGICAL EFFECTS OF ETHER AND CHLOROFORM INHALATION—PATHOLOGICAL EFFECTS—ETHERIZATION IN SURGERY—DR. JOHN C. WARREN'S CONCLUSIONS—ADMINISTRATION OF ETHER INHALATION—ETHERIZATION IN MIDWIFERY—CHLOROFORM—ITS LARGE USE IN LABOUR—MODE OF ITS EXHIBITION—DR. CHANNING'S FAVOURABLE TESTIMONY TO ETHERIZATION—HIS PROPOSITIONS—DISEASES IN WHICH ETHER AND CHLOROFORM HAVE BEEN USED—CAUTIONS—DEATHS FROM INHALATION OF CHLOROFORM.

Inhalation of Ether and Chloroform.—Pulmonary atmiatry has acquired renewed importance, within a few years past, by the use of *ether* and *chloroform* for inhalation. At first resorted to as anæsthetic agents, for the suspension or removal of pain in surgical operations, and in child-birth, these substances have been also freely employed in a great number of diseases, but chiefly in those marked by exaltation of sensibility or acute pain, with often accompanying disorder of the muscular system. Our periodical literature is filled with accounts of anæsthetic surgery and midwifery, and of cures, or at least great mitigation of various painful diseases; nor are regular treatises wanting in which the merits of these recent accessions to therapeutics are set forth with, for the most part, a partiality amounting to enthusiasm. Unfortunately for those who hate to pause before they reach conclusions, but fortunately for the cause of truth, the whole subject has given rise to some controversy, not only in respect to the person to whom is to be

awarded the merit of the first discovery of ether as an anæsthetic agent, but also to the real therapeutic value, on the score of efficacy and of safety, of both ether and chloroform.

Whatever doubts may still exist respecting the rival claims of Dr. Charles T. Jackson, chemist and geologist, and of Dr. G. W. Morton, dentist, there can be none that Boston is the place where the discovery of ether as an anæsthetic agent in surgery was made, and that in that city, up to the present time, the great majority of its medical members are ardent in their recommendation, and free in their use of the new agent.* In this respect there is a manifest contrast between what some would call the *entetement* of our friends in the city just mentioned, and what others would designate to be the apathy of the physicians of Philadelphia towards the new practice.

Similar differences of opinion prevail between Dr. Simpson and many of his professional brethren in Edinburgh, on the one hand, and professors and practitioners south of the Tweed and in Dublin, on the other.

Dr. Simpson sees in chloroform, which he was the first to introduce into obstetrical practice, an agent for relieving the pains of parturition, which it is the bounden duty

* A very little retrospective lore shows that different gases, and ether itself, have been inhaled for medicinal purposes, in times gone by. In 1779, Fontana experimented on man and animals, to determine the effects of the inspiration of various kinds of air. He, himself, repeatedly inhaled hydrogen gas. Davy, at the beginning of the present century, it is familiarly known, made a large number of experiments on himself, by the inhalation of different gases, especially the nitrous oxide.

Dr. Pearson, of Birmingham, was the first to employ the inhalation of ether medicinally (1796),—either alone or combined with hemlock, in phthisis, and other pulmonary diseases. Cases of this practice are detailed by Dr. Thornton, in Beddoes' work on *Factitious Airs*. In one of these the patient fell asleep. A case is related in which it was given at the beginning of the present century, by Dr. Woolcombe of Plymouth. Nysten (*Diction. des Sci. Med.*) speaks of the inhalation of ether for pulmonary diseases, and to relieve the pains of colic.

Dr. Wells, of Providence, Rhode Island, had been engaged in experiments on the inhalation of nitrous oxide as an anæsthetic agent,—before the use of ether for this purpose by Drs. Jackson and Morton.

of every accoucheur to employ in every case of labour, for the purpose of alleviating or removing the pains incident to this state ; whether it goes on naturally or physiologically, or is retarded and becomes pathological.

Other teachers and experienced accoucheurs, who are not less ardent in their desire to save their patients all needless pain, and in their search after improvements in practice, think that an entire suspension or removal of the pains of labour is not desirable, either for the benefit of the patient or for the study of diagnosis by the accoucheur in attendance. Nor can they overlook the startling fact that, both in surgery and midwifery, deaths sudden, and, as sudden, of course frightful, have occurred.

The problem of the real value of the use of the anæsthetic agents, ether and chloroform, is not yet solved, although the more sanguine may already assert that the use of these agents is the greatest boon which has been conferred in modern times on suffering humanity. I feel the less regret at my inability to exhibit the subject under its various aspects in my present restricted limits, from the fact, that the arguments on both sides, and a vast number of cures of the new treatment are on record, in reports, in essays, and in journals, accessible to nearly every reader who has a professional interest in acquiring a knowledge of them.

The *physiological effects* of both ether and chloroform, as far as regards their operation on the nervous system, are nearly identical. They correspond with those produced by experiments on animals in which portions of the brain were successively removed.

The parts first affected are, according to MM. Flourens and Longet, the cerebral lobes, the seat of intelligence proper ; next the cerebellum, which maintains an equilibrium of locomotive movements, then the medulla spinalis, which may be regarded as the principal seat of sensation and motion. M. Longet places etherization of the *Pons Varolii* at this period. M. Flourens believes that when the medulla oblongata becomes subdued life is extinguished.

The stupor developed by ether may be continued for many hours by means of repeated inhalation ; but it cannot with safety be carried beyond a certain stage. Both Flourens and Longet ascribe death to a loss of vitality of the medulla oblongata, producing, as the latter thinks, asphyxia.

The arterial blood loses its red colour by the inhalation of ether: but this redness is retained, if not actually increased, by the use of chloroform. The venous blood acquires a distinct red colour by this latter agent.

Both ether and chloroform lower the animal temperature; the former the most so.

Chloroform is more prompt and powerful in its effects than ether, and is given in smaller doses. One drachm of the former may be considered to be equivalent to an ounce of the latter. The use of chloroform has already, in a great measure, superseded that of ether.

The pulse is at first sometimes quickened, sometimes nearly natural. After a while it becomes slower, and, finally, ceases to beat, if the insensibility be prolonged. Dr. Henry J. Bigelow* directs attention to the pulse as an indication of the stage of narcotism. Etherization, to the extent of complete insensibility, may be prolonged, provided the pulse continue full and strong. "If it be retarded, it is curious to observe with what certainty it recovers force and frequency after a few inspirations of pure air. It will be inferred from these remarks that the pulse is to be carefully examined during the whole anæsthetic process, and that inhalation is to be temporarily discontinued at its indication."

The muscular system, at first thrown into a state of contraction, is subsequently, in the period of insensibility, completely relaxed.

Certain *pathological* effects short of death have been noticed to proceed from etherization. These are, prolonged insensibility after partial recovery from the first narcotism, nausea, and vomiting, stertorous respiration, corresponding with muscular rigidity, and snoring inspiration coinciding with muscular relaxation, headache, hysteric or tetanic convulsion, and alarming diminution of the action of the heart.

Coughing not unfrequently ensues on the first inhalation of the anæsthetic agent.

Etherization in Surgery.—Dr. John C. Warren, the first, as we believe, who performed a surgical operation†

* Transactions of the American Medical Association, vol. i., p. 204-5.

† About the middle of October, 1846.

on a patient under the anæsthetic influence of ether, has written a good account of the beginning and subsequent progress of the practice, so far as regards the inhalation of this agent.*

The age, experience, and conscientiousness of Dr. Warren, impart deserved respect, and, for the most part, credence to the inferences, which he may draw respecting surgical therapeia. On the present question, we attach no small value to his conclusions, presented in the work just referred to. They are as follows :—

“ 1st. Inhalation of ether produces insensibility to pain.

“ 2d. Ethereal insensibility, judiciously effected, is not followed by any dangerous consequences

“ 3d. Its administration is easy, and usually requires but a few minutes.

“ 4th. Individuals of all ages may be safely etherized.

“ 5th. Individuals of the same age are susceptible of the influence of ether in variable degrees.

“ 6th. Surgical operations may be done under the effect of ether, which could not be done without.

“ 7th. Operations very short, and not very painful, especially those about the head and neck, are best done without ether.

“ 8th. The shock of the nervous system is greatly diminished by etherization.

“ 9th. The use of ether has increased the number of successful operations, by encouraging a resort to them at an earlier period of disease.

“ 10th. The use of the sponge is more safe and easy than that of any special apparatus.

“ 11th. A special apparatus is convenient for some peculiar cases.

“ 12th. The existence of chronic pulmonary disease rarely forms an objection to etherization.

“ 13th. Etherization may often be employed advantageously as a substitute for narcotics.

“ 14th. The employment of ether does not retard the healing of wounds, nor give them an unfavourable character.

“ 15th. The pains of death may often be relieved by etherization.”

* Etherization : With Surgical Remarks. Boston, 1848.

Administration of Ether by Inhalation.—The sponge is directed by Dr. Warren “to be of an excavated form, in order to accommodate the projection of the nose.”*

The quantity which he generally found necessary has been about two ounces; but on this point “we are not to be guided by the quantity of the ether consumed, but by the effects on the patient.”

“The time required is ordinarily from two to five minutes; but this may be prolonged in accordance with the length of the operation, and the difficulty of accomplishing etherization. When this exceeds ten minutes it is well to raise the sponge frequently, in order to admit a supply of pure atmospheric air.”

Precautions.—The following precautions must not be lost sight of in anæsthetic therapeutics. I repeat them in the order in which they are given by Dr. Ranking :†—

“1st. Never to exhibit the ether vapour without having previously auscultated the heart and lungs.

“2d. Never to employ it in persons who have signs of obstructive diseases of the heart to any amount, or of dilatation of its cavities, or whose heart is feeble even though not disproportioned.

“3d. Never to employ it in persons who have any considerable portion of a lung unfitted for respiration, as from hepatization, tubercular deposit, pleural effusion, &c.

* “The winding indirect channel of the nostrils,” continues Dr. Warren, “the more natural passage for the ærial fluid, diminishes the impulse on the lungs, and the consequent propensity to a troublesome cough. The sponge previously moist, saturated with ether of the purest quality [vide Appendix A], should be closely applied to the nasal apertures with due caution to prevent the introduction of the fluid into the mouth and eyes; and its position should be occasionally changed, on account of the gravitation of the ether to its inferior part. Some patients prefer employing the sponge themselves, and this is true particularly in regard to parturient females. And so far as our experience has extended, it has given us reason to believe, that the practice of committing the sponge to the patient may be advantageously adopted in a greater number of instances. When the lungs are irritated, and cough produced, the sponge may be momentarily removed.”

† Half-Yearly Abstract of the Medical Sciences, vol. v., January to June, 1847.

"4th. In persons with short necks, with tendency to cerebral congestion, its employment is not without risk; also (perhaps), in those with disposition to insanity or other recurrent disease of cerebral origin.

"5th. No operation of consequence should be performed under the influence of ether without a preliminary 'trial' exhibition."

In *Midwifery*, etherization has been most extensively employed by a large number of practitioners, at the head of whom is Dr. Simpson. This gentleman at first employed ether, and subsequently chloroform, which, as already mentioned, he was the first to use as an anæsthetic agent—especially in labour.* He uses the latter now, as he had used the former before, in, with few exceptions, every case of labour that has come under his care, and with results the most gratifying.

Dr. Murphy,† after a calm investigation of the subject, draws the following conclusions:—

"1st. Chloroform does not interfere with the action of the uterus, unless given in large doses, which is unnecessary.

"2d. It causes a greater relaxation in the passages and perineum. The mucous secretion from the vagina is also increased.

"3d. It subdues the nervous irritation caused by severe pain, and restores nervous energy.

"4th. It secures the patient perfect repose for some hours after delivery.

"5th. Its injurious effects, when an ordinary dose is given, seem to depend upon constitutional peculiarities, or improper management."

Dr. Prothero Smith, after giving an account of three forceps cases in which ether was inhaled, agrees with M. Dubois in the following deductions:—

"1st. That ether prevents pains during obstetrical operations; 2d. That it does [not?] suspend uterine or abdominal contractions; 3d. That it appears to lessen the natural

* Dr. Simpson enumerates other fluids which he has ascertained to possess anæsthetic properties. These are, *Chloride of Hydrocarbon*, *Nitrate of Ethyle*, *Benzoin*, *Aldehyde*, and *Bisulphuret of Carbon*.

† Chloroform in the Practice of Midwifery.

resistance of the perineal muscles ; 4th. That it does not appear to exert any bad influence on the life or health of the mother or child ; 5th. That it does not retard the subsequent contractions of the uterus.”*

Dr. Simpson, in his “Report on the Progress of Anæsthetic Midwifery,”† states, that, in his own practice, up to the time of his writing, he had delivered 150 patients in a state of anæsthesia. All the children were born alive except one, which was expelled dead and decomposed prematurely. Subsequently, one died with the symptoms of cyanosis. As relates to the mothers, his firm conviction is, that, since he has employed chloroform, he has seen more rapid recoveries and fewer puerperal complications. Two patients died of puerperal fever, but this happened during an epidemic which also destroyed numbers who had not been under anæsthetic influence.

Mode of Exhibition of Chloroform, and Dose.—Occasionally, in the early stage of labour, Dr. Simpson has given it in small doses, so as to obtund sensibility without destroying consciousness ; but this plan, as a general rule, appears to be injudicious, and, upon the whole, he prefers to induce a deeper anæsthesia. In this case, the uterine contractions are occasionally suspended ; but they are resumed on withdrawing the chloroform. When this is the case, a few inhalations repeated with each uterine contraction will keep the patient sufficiently unconscious ; and this may be maintained for hours. The amount of unconsciousness which may be exactly necessary, and not too great, is, observes Dr. Simpson, only to be known by experience.

At the latter stage of labour, when the head is passing, the anæsthesia requires to be deeper ; and the relaxation of the soft parts induced by this is observed to accelerate the extrusion of the child. In obstetric operations, the unconsciousness must be as complete as in surgical operations.

Dr. Simpson further remarks, that the degree and depth of anæsthesia which different patients are capable of enduring without interfering with the parturient act, varies with the individual. In administering chloroform

* Lancet, May 1, 1847.

† Monthly Journal, Oct., 1848.

he always prefers the handkerchief. The quantity he pours on, at first, is usually three or four drachms. He takes care that plenty of air is admitted. The time at which he generally commences its use is towards the commencement of the second stage of labour; but if the pains are severe, he begins with it earlier.”*

Dr. Channing, in his treatise,† lays down the following propositions, based on etherization in 500 cases of labour:

“1st. I generally take the ether or chloroform with me, and if the pains are severe, I offer inhalation as a sure and safe means of abolishing pain, and this in a perfectly natural labour.

“2d. In protracted labours, in which dilatation goes on slowly, notwithstanding severe contractions and great suffering, I recommend and employ inhalation.

“3d. In any labour, if there be imperfect dilatation, or the secretions are deficient, I use inhalation.

“4th. In instrumental labour, I use inhalation, *always applying the instruments before inhalation is commenced.*

“5th. In turning, I employ inhalation.”

“In 516 cases of cephalic presentations, in which anæsthesia was induced, the mother did well in all.”

In 51 cases of instrumental, preternatural, and complex labours, the maternal deaths were four—a mortality, as Dr. Channing remarks, so small as was never before presented. These cases included forceps and craniotomy cases, arm and breech-presentations, cases of unavoidable hemorrhage, and of convulsions, among which were the four fatal cases.

As a therapeutic agent, in a large number of diseases of almost every class, the inhalation of ether and chloroform has been tried with varied success. As yet its use in these cases has been for the most part empirical; at any rate we cannot say that it is based on any defined principles. Etherization has been practised in typhous fever, insanity, delirium tremens, neuralgia, tetanus, chorea, asthma, hysteria, hydrophobia, laryngismus stridulus, renal calculus, cholera, &c.

For salutary admonitions on the danger from the general and almost indiscriminate use of ether and chloroform,

* Ranking's Abstract, No. vii.

† Etherization in Childbirth.

reference may be instructively made to communications on the subject by Dr. C. D. Meigs, in the Philadelphia Medical Examiner (March, 1848), and Dr. Montgomery, in the Dublin Journal of Medical Sciences (May, 1849).

Although the use of chloroform has, in a great measure, superseded that of ether, we ought to bear in mind the important fact, that the deaths directly attributable to the former have been more numerous, under similar circumstances, than those due to the latter.

CHAPTER LIV.

**MEDICATED BATHS—SEA BATHING A VARIETY OF THIS KIND—
MEDICATED VAPOUR BATHS—THE CHIEF MEDICATED BATHS
ARE AT MINERAL SPRINGS—NATURAL AND ARTIFICIAL MEDI-
CATED BATHS—GAS BATHS—CHLORINE GAS—ITS PHYSIO-
LOGICAL AND THERAPEUTICAL EFFECTS—MODE OF ADMIN-
ISTRATION—BATHS OF CARBONIC ACID GAS—THE CHIEF ONES
ARE IN GERMANY—THEIR LOCATION—THEIR PHYSIOLOGICAL
AND REMEDIAL EFFECTS.**

SOME observations on medicated baths will conclude the present work. To a certain extent the subject has been noticed in former chapters. Sea bathing, for example, consists in the use of water strongly impregnated with saline matters: and among the varieties of vapour bathing are those in which various medicinal substances have been either vaporized or suspended in simple aqueous vapour. Under the first head of vapour baths come sulphurous and mercurial fumigations: under the latter the balsams and different aromatic principles.

There still remain, however, for consideration, that large class of medicated baths which consist of the water of different springs, and of nearly all temperatures, from cold to hot, holding in solution various saline and other substances. In addition to these, the most frequently met with of medicated baths, there are those, fewer in number, of a gaseous, and others, equally limited, of a solid or semi-fluid medium, in which the body is placed.

fore I cleared my face from the tenacious cataplasm. I had now been nearly half an hour in the Schlammbad, and prepared to quit, as the mixture was fast cooling down, and the heat could not be kept up, as in the water bath. On raising myself slowly and perpendicularly, with at least twenty pounds of mud on my surface, I caught a full length portrait of myself in the glass, and I think the view would have sickened Narcissus of self-contemplation for ever!! I was really shocked at my sudden metamorphosis into the Æthiopian, and began to doubt whether I should ever 'change my hue' again. The warm water bath was close at hand, but I had the presence of mind not to jump into it at once, as I should, in that case, render it a black wash-tub; but by clearing away with both hands, some sixteen or eighteen pounds of peat varnish from my body, I rolled into the clear fluid, where it required half an hour's rubbing and scrubbing to purify myself from the 'Bain de Boue.' Both on this, and on subsequent occasions, at Marienbad, Carlsbad, and Teplitz, I experienced a degree of exhilaration, strength, and elasticity from the mud bath, which I had never done from any other. The iron in these baths, instead of corrugating the skin, as I expected, imparts to it a glossy or satiny feel and softness quite peculiar—and much more in degree than the waters of Schlangenbad.

"The bog-earth is well picked, and in some places sifted, so as to remove all the fibrous and woody parts, leaving the fat unctuous substance to be mixed with the mineral water of the place. In general, these baths produce a pricking sensation, and sometimes an eruption on the skin, an effect which I did not experience.* They are therefore much used in old and obstinate cutaneous complaints, as well as in glandular swellings, sequences of gout, rheumatism, &c. They are very exciting to the nervous system, and should not be used where there are any local inflammations, or much general excitability of the constitution. They do not lose their heat so rapidly as the

* "Dr. Clarus, Dr. Granville, and others, state that the skin exhales an acid odour, and even feels salt to the tongue for several hours after leaving the bath. This I did not perceive in my own case at all."

water baths, and consequently they maintain the volatile and penetrating principles longer than the latter. They are much employed in paralysis, chronic ulcers, and cutaneous affections.

“Here and at other spas where mud baths are employed, I met with several veteran warriors, whose aching wounds reminded them too often of battle-fields and bloody campaigns. They almost all agreed in attributing more efficacy to these than to the common baths—and I think, from what I have seen, heard, and felt, that there is much truth in these statements. The Schlamm-bads have one advantage over the others, which is more prized on the Continent than in England—the facilities which they afford the bathers, both male and female, of receiving morning visits from their friends while in the mud, and that without any violation of delicacy, propriety, or decorum; for there, persons are more completely veiled than in any dress, even of the most dense and sable furs of Russia. An English lady of rank, at Teplitz, was visited by her physician and friends while immersed to the chin in peat-bog. They read to her, and conversed with her till the signal was given for exchanging the black varnish for the limpid and purifying wave, when they retired.”*

Saline mineralized mud is used on a large scale in the Crimea. The following description of it is derived from Dr. Gairdner's volume:—

“*Sacker*, a salt lake in the Crimea, the evaporation of which in July and August, yields a deposit very much used as a medicinal agent. According to Serre, 1000 parts consist of

Lime, Magnesia, and Alumina, mixed with				
Silica and Iron	.	.	.	687·0
Muriate of Soda	.	.	.	225·0
—— of Lime	.	.	.	17·0
—— of Magnesia	.	.	.	45·0
Sulphate of Lime	.	.	.	6·0

Patients flock thither from all parts of the Crimea, and the cure lasts from eight to thirty days, and is conducted by the Tartar priests. The following is the method of using it detailed by Lang: * Early in the morning a pit is dug,

* “*Scherer's Russischen Heilq.*, p. 184.”

where the mud is freest from hard bodies and saline crystals. In this the patient is laid about noon, and covered up to the neck with the mineral mud. He is protected from the sun's rays by a parasol or cloth. He remains from two to three hours in this position, during which time the mud is renewed twice or thrice. His thirst is quenched by wine and water or quass. After the bath, the patient is laid upon a straw-mat, and his whole body washed with the salt water of the adjoining lake. This process is considered by the natives a sovereign remedy for chronic gout and rheumatism, abdominal obstructions, glandular swellings, chronic cutaneous eruptions, and even intermittent fevers."

For topical applications, use is sometimes made of *glairine*, called also *baregine*, a vegeto-animal matter, deposited in large quantity at sulphurous springs; and also of the sediment of waters mixed with the slime formed by the *coffervæ*, and a thermal plant, the *anabaina monticulosa*. This slimy compound is, I believe, the *muffe* of Italian writers.

Baregine is an unctuous substance, of a greyish-white colour. It is little soluble in cold water, more so in warm; and the solution, in the latter case, has very much the smell and appearance of thin beef-tea. It resembles mucus more than any other known organic matter. It is deposited from the water of certain springs, in which it is partly dissolved and partly suspended, in a glutinous form. This matter, which exhibits of itself no traces of organization, is converted, so soon as it is exposed to the air, into vegetable growth, resembling *algæ* of the simplest kind. It constitutes the *sulfuraria*, in the waters of the Pyrenees; the *anabaina*, in those of Neris, &c. Perhaps the microscopical animals noticed by Cotta in the Carlsbad waters, and by Dumas and Bertrand in those of Mont d'Or, have a similar origin.*

To the impregnation with matter of this kind must we attribute the flavour of chicken water which the Arkansas thermal springs are said to impart.

Baregine is used in the same manner as the mud baths; but more commonly as a local application for the relief of

* Soubeiran, *op. cit.*

pained parts. It should be used so soon as it is collected, and not be much squeezed.

Animal matter (*matiere grasse*) is sometimes found in thermal waters. "Fabrini supposes that it may be derived from the percolation and lixiviation, as it were, of fossil bones, by the mineral water in its route through the earth's interior."*

At Wisbaden and some other German baths, a scum or cream is found on the surface; which is sometimes collected in considerable quantities, with a view to its use as a cosmetic, especially when added to the water of the bath.

CHAPTER LVI.

MEDICATED BATHS (*concluded*)—IODINE BATHS—MINERAL WATERS CONTAINING IODINE AND BROMINE—THE IODIDE OF POTASSIUM PREFERRED FOR ITS SOLUBILITY—DISEASES IN WHICH IODINE BATHS ARE USED—BATHS OF CORROSIVE SUBLIMATE—THEIR MODE OF PREPARATION AND THERAPEUTICAL USE—BATHS OF LIQUID CHLORINE—OF MURIATIC ACID—OF NITRIC ACID—OF NITRO-MURIATIC ACID—BATHS OF COMPRESSED AIR—A COMMON AIR BATH.

In addition to the classes of mineral waters specified in the last chapter, which furnish a fluid for medicated baths, new ones have been recently added, under the title of *ioduretted* or *iodated*, and *bromuretted* or *bromated*.† The presence of either bromine or of iodine in a mineral water imparts quite special and decidedly medicinal properties, which, to a certain extent, must be felt by those who employ it as a bath, either alone or in addition to its use as a drink. It is not my purpose to give details on this point in the present volume. They will come up more appropriately in the work already promised.

The waters just mentioned have been subdivided into the saline, the acidulous saline, and the sulphurous; in each of which we find iodine or bromine, and sometimes both. In the first or saline subdivision comes sea water.

* Gairdner, *op. cit.*

† Soubeiran, *op. cit.*

When, however, we wish to obtain, with certainty, the full therapeutical operation of iodine,—for as yet our knowledge of bromine is limited,—we combine it with water in proportions and in states in which mineral springs do not furnish it; and hence water, thus prepared, constitutes an artificial medicated bath.

Iodine and iodated baths have been most employed in scrofulous affections. The best preparation is the iodide of potassium, owing to its ready solubility in water. When still greater activity of operation is required, the iodine itself may be added,—as it is soluble in water with the aid of the iodide.

M. Lugol, who has made the largest use of ioduretted baths, especially in scrofula, gives the following directions:—

They are to be made in wooden vessels, of varying strength, according to the age of the patients, and exigency of the case. Thus, for a child from four to seven years old, he prescribes 30 to 36 grains (troy) of iodine and 60 to 72 of iodide of potassium, to be mixed and dissolved in 36 quarts of water; and, for one of 11 to 14 years, the iodine is 72 to 96 grains; the iodide 144 to 192 grains, in 32 gallons of water. For an adult the proportions are, 2 to 2½ drachms of iodine, and 4 to 5 drs. of iodide to 50 gallons of water; and another formula gives 3 to 3½ drs. of the former article, and 6 to 7 drs. of the latter in 75 gallons of water.

In order to prevent the vapour of iodine, which rises from the bath, from irritating the respiratory passages, a covering or lid should be added to prevent this effect. There are cases, on the other hand, such as of chronic bronchitis, and even of phthisis, in which it will be desirable to combine both methods of introducing the iodine into the system, viz., by cutaneous and pulmonary absorption. This is more especially true when the patient suffers from gastric irritation, or chronic gastritis itself,—a no uncommon accompaniment of the diseases just mentioned. In scrofulosis, also, the extreme irritability of the digestive passages is not unfrequently such as to make it desirable to procure the anticipated effects from the iodine, by introducing it in other channels than through the stomach.

In syphilitic eruptions, and in the squamæ, iodine baths are of service.

Baths of *corrosive sublimate*, in the proportion of two drachms to an ounce of the mercurial salt, and thirty gallons of water, have been used in the tertiary forms of syphilis;—but the uncertainty of its effects, and the risk of salivation, or even more violent operation, such as the occurrence of gastritis, should make us prefer other means of relief. In giving this caution, it must, however, be admitted, that no sinister effects have resulted from baths of corrosive sublimate, in the hands of different practitioners. M. Rayer is of this number; but he adds: “their good effects have also appeared to me to be very questionable. I have never ventured to prescribe them in a case of serpiginous ulcerated syphilis, fearing that the sublimate might be absorbed in too large a quantity.”*

Caffé and Wedekind have proposed a particular formula for a bath of corrosive sublimate,—viz., half an ounce of this salt, and the same quantity of muriate of ammonia, dissolved in ten ounces of distilled water, and then poured into the requisite quantity of water for a bath.

As a proof of conflicting opinions on the constitutional operation of corrosive sublimate, applied in the form of a bath, we find that Baumé directs a pediluvium made in the proportions of half a grain of this salt to a pint of distilled water,—with a view of producing salivation.

In the form of a lotion, corrosive sublimate has been employed in scabies, and at the hospital of St. Louis in cutaneous affections, suspected to be connected with a venereal taint. M. Rayer says that serious consequences are said to have followed the application of compresses imbibed with an empirical wash analogous to the wash just spoken of. This latter is made of a drachm of corrosive sublimate in a pint of water the solution being coloured with alkanet root.

Chlorine, combined with water (*aqua chlorini*), has been employed, after suitable dilution, as a bath, in some diseases, especially hepatic and syphilitic eruptions. What was said of the therapeutical use of gaseous chlorine (Chapter LIV.) will apply to that of the liquid. Even in

Op. Cit. Preliminary Considerations.

this state some precautionary measures are necessary in cases in which the patients have irritable or inflamed pulmonary mucous membrane, and hence this kind of bath had better be used in a covered tub, or at least in a slipper bath—with the addition of a sheet brought round the neck. A more convenient preparation, especially in cutaneous diseases, would be a bath prepared by the addition of two ounces of the chloride of lime or of soda to an ordinary bath.

We cannot lay much stress on the reputed preventive properties of a chlorine bath against the plague. In low states of the system, as in the advanced stage of fevers, either immersion in or ablution with the chlorine water would probably be of service. I have used the muriatic (hydrochloric) acid under these circumstances with benefit.

Muriatic (hydrochloric) acid, suitably diluted, as when two to four ounces are added to thirty gallons of water, is occasionally directed in cutaneous diseases, and in some other chronic affections, in which a moderate excitement of the skin is thought desirable.

Rowley, in his *Treatise on Gout*, in 1792, had boasted of his having cured the erratic form of this disease by prescribing for his patients thus afflicted a pediluvium, to which some muriatic acid was added. More recently, this remedy has been applied to cases of rheumatic and neuralgic headache. I have found it very serviceable in this way. The proportions are half a pint of the acid to eight quarts of water.

Nitric acid, the internal administration of which was at one time believed to be an efficient substitute for mercury in syphilis and hepatic affections, has, also, been employed externally, in the form of a bath, in these diseases.

More confidence, however, has been professed in the *nitro-muriatic acid* bath under the circumstances just mentioned. Its effects are very identical with, if not analogous to a chlorine bath.

In using all the medicated baths mentioned heretofore in this chapter, the vessels ought to be of wood.

A few words are due to the *gelatinous and emollient* baths, used in cases of great cutaneous irritation.

The first of these is made by boiling one pound of purified gelatin or isinglass in ten pints of water, and then adding the compound to an ordinary bath.

An emollient bath is made by first taking althea, marsh-mallow, and elder flowers, or the pith of sassafras, and the bark of the slippery elm, four pounds, and of flaxseed, half a pound; then tying them loosely in a cloth, and boiling them in two gallons of water, and finally, after squeezing the bag, add the decoction to the water of the bath.*

BATHS OF COMPRESSED AIR.—I omitted to speak of this modification of bathing in what might be supposed to be its most appropriate connection—viz., gas baths.

There are two modes of using compressed air,—the first externally, by applying it to the entire cutaneous surface, or to any portion of it; the second by inhaling it from an appropriate machine. Dr. Junod has devised an apparatus by which, as he assures us, the atmospheric pressure on the body may be increased from twenty-six thousand pounds, its ordinary amount, to a hundred thousand pounds. The part immersed in the compressed air, which Dr. J. calls a *pneumatic bath*, is powerfully affected. The process is employed by him in diseases of the chest and larynx, in anorexia, scrofula, marasmus, certain cases of deafness, and diseases of the skin arising from debility of this organ, &c.

M. Pravaz has written two essays (in 1840 and 1841),† on this remedy. In the first he describes the good effects from its use, associated with gymnastics, in the treatment of rickets, strumous and spasmodic affections, and catarrhal deafness. He speaks, also, of its salutary operation in weakness of the lungs, by its rousing their vitality, increasing the richness of the blood, &c.

The second mode of applying compressed air, or that by inhalation, has been used advantageously in diseases of the larynx, and especially in the loss of voice depending on relaxation of tissue and mucous accumulation in the air passages. M. Merat‡ tells of his having witnessed its success in two cases; the one of Mademoiselle F——, a

* Rayer, *op. cit.* Formulary.

† *Memoire sur l'emploi du bain d'air comprimé, &c.*

‡ Dictionn. Univ. de Mat. Med. et de Therap. Gen. Supplement.

celebrated singer at the Opera, and the other of M. F., a member of the French Academy of Sciences.

The machine used for the purpose of inhalation was invented by M. Tabarré, a mathematical instrument maker. The period of inspiration is from one to even three hours daily.

Cutaneous Aëration.—When describing the effects of compressed air, let us not forget those of air at the common atmospheric pressure,—as a bath. More extensive use of common aëration, by exposure of the naked body to fresh air, would be attended with many advantages, both in health and disease. Franklin's suggestion and practice are worthy of imitation. The temporary exposure of the naked body to air, immediately on rising in the morning, would not only prove refreshing at the time, but diminish the liability to colds, rheumatism, &c. To be most beneficial, it ought to be in an apartment adjoining the bed-room, in which the air is comparatively fresh and cool. The restlessness and nervousness, which often prevent sleep, are not unfrequently removed, and this greatest of boons obtained by partial exposure of the skin to the air.

In many diseases, as well febrile as nervous, stripping the patient, and exposing him to a fresh, and if possible cool air, would often be attended with the best effects—analogue, in fact, to those procured by the cold or cool bath. Not only in the delirium of fever, but also in the paroxysms of mania, much relief might be anticipated from a measure of this nature. The good effects in these cases are not, however, attributable entirely to the access of air to the skin. Something is owing, also, to the removal of clothing, the contact of which, in highly sensitive conditions of the organism, proves a cause of considerable, though, perhaps, not acknowledged, or even directly appreciable irritation, to the cutaneous surface.

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