

# INDUCTION AND DEDUCTION

A HISTORICAL & CRITICAL SKETCH OF SUCCESSIVE  
PHILOSOPHICAL CONCEPTIONS

RESPECTING THE RELATIONS BETWEEN

INDUCTIVE AND DEDUCTIVE THOUGHT

AND OTHER ESSAYS

BY

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EDITED BY

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LONDON

BICKERS & SON 1 LEICESTER SQUARE W.C.

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1890



Ever yours sincerely,  
Constance C. W. Nadey



Es glühte *ihre* Wange roth und röther  
Von jener Jugend die uns nie verfliegt,  
Von jenem Muth, der früher oder später  
Den Widerstand der stumpfen Welt besiegt;  
Von jenem Glauben, der sich stets erhöh'ter,  
Bald kühn hervor drängt, bald geduldig schmiegt,  
*Damit das Gute wirke, wachse, fromme!*  
*Damit der Tag des Edlen endlich komme.*—GOETHE.

Pres. Dept '89

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## MEMOIR.

IT is a painful and pathetic task for an intimate friend of Constance Naden to be called upon to write a memoir, however brief, of her short life, instead of looking forward to years of happy and elevating intercourse, sharing in works of benevolent usefulness, and gladly watching her rise to the distinction which her intellectual gifts entitled her circle of friends to anticipate. The sorrow for her loss must be lifelong. As Mrs. Browning says, "the inevitable strikes us dead," but the expression of it is unavailing. All that remains for the most devoted of her friends is to keep her memory green, by striving to let the world know what it has lost, both in promise and in fulfilment. Miss Naden's earlier life was uneventful, and almost all the details for this portion of it have been drawn from accounts published in the Birmingham papers, at the time of her death, by those associated with her school and college career.

Constance Caroline Woodhill Naden was born on the 24th January, 1858, at her father's house in Edgbaston, where he still resides, and is the President of the Birmingham Architectural Association. Her mother died on the 5th February, a few days after the birth of her child. Shortly afterwards the motherless infant was domesticated with her mother's parents, Mr. and Mrs. Woodhill, of Pakenham House, Edgbaston, and here Constance lived a retired, peaceful life, adored by her grandparents, till they died, Mr. Woodhill in 1881, and his widow in 1887. It was probably partly in consequence of living this retired life with elderly people that she grew up, in the words of her cousin, Miss Woodhill, "a quaint, retiring, meditative and

silent child." Her memory showed itself as remarkably retentive, but her great intellectuality was not perceived till later on. From the age of nine to about sixteen she went to a private school kept by the Misses Martin, Edgbaston, and after that age her extraordinary powers of mind began to appear. In the year 1876 she met at Southport, Dr. Lewins, the friend who was to have so great an influence on her mental development, and in many ways on her subsequent life. Dr. Lewins, himself a man of great culture, of wide travel and worldly experience, became Miss Naden's trusted mentor and friend, and by his influence she was stimulated to travel extensively in Italy, France, Germany, England and Scotland, vacation tours she greatly enjoyed, and which contributed not a little to widen her views and sympathies. How much he influenced her philosophical thoughts the following essays bear witness. To do the utmost honor to his friend and pupil, Dr. Lewins has founded an annual gold medal in the Mason Science College, Birmingham, to be called the Constance Naden Medal. The subjects of the Competitive Essay to vary from year to year, but when possible the preference to be given to philosophical rather than special subjects. Dr. Lewins is also having a marble bust of Miss Naden executed by Mr. William Tyler, of 26, Hereford Square, London, for the library of Mason College, which is already pronounced to be a most striking likeness and an exquisite work of art. Hers was a face which would lend itself well to reproduction in marble; it was so calm and still, and the elevation of expression natural to her is best portrayed and preserved in the unchanging stone. In the summer of 1881 she visited Switzerland for the first time, with what delight it may be imagined to a girl who had led an intensely tranquil life in the tame Midlands of England, and who yet was full of artistic feeling and great far-reaching thoughts and aspirations. Before the Mason Science College was opened in 1881, Miss Naden attended classes at the Midland Institute for Botany and German, in which she was a thorough scholar. Latin she also read with the Rev. Mr. Bates. For music she had neither taste nor talent,

but till her nineteenth year showed great aptitude and predilection for water-colour painting, chiefly flower pieces, several of her works in that department of Art, after appearing in the Birmingham Annual exhibitions, adorned the walls of the drawing room both at Pakenham House and in Park Street. For information regarding this part of her intellectual career I am indebted to Mr. W. R. Hughes, F.L.S., Treasurer to the Corporation of Birmingham, and President of the Sociological Section of the Birmingham Natural History and Microscopical Society, which was established in the year 1883, for the study of the Synthetic Philosophy of Mr. Herbert Spencer. He says, "Of the many diligent and enthusiastic students of the doctrine of evolution who have assisted at our meetings in discussions and by readings, criticisms and expositions from learned professors, and local scientists, down to tyros who were just beginning to understand Herbert Spencer—not one was so highly valued as Miss Naden. Her connection with the Section commenced in 1884, and during the time she resided in Birmingham, she attended the meetings at the Mason College regularly, and from the wide range of her knowledge—extending from Mathematics to Sociology—the lucidity of her intellect and the richness of her illustrations, she never failed when speaking to impress her audience and carry conviction to their minds. But although a scientist and philosopher as well, her woman's grace and her woman's sympathy were always dominant. The Section considered two of her papers, 'On Special Creation and Evolution,' delivered in 1885, and the 'Data of Ethics,' 1887, so valuable, that they resolved to publish them as separate pamphlets. Mr. Herbert Spencer himself thought very highly of these contributions, spite of certain reservations from his own synthesis, as detailed in her essay on Evolutionary Ethics. They are admirable expositions of the subjects dealt with, were greatly appreciated by Spencerians at the time, and have since acquired a reputation in America. The third paper considered worthy of preservation, and for which the Section is ever grateful, was the address which the gifted and lamented authoress specially

went down to Birmingham from London to deliver so recently as the 22nd October last, on the occasion of the opening session of the Section for the current year. It was on the *Principles of Sociology*, and was delivered in the spacious Examination Hall of the Mason College, before a large and sympathetic audience of nearly a hundred members and friends, many of whom were ladies. At its termination a cordial vote of thanks to Miss Naden was moved by Mr. W. B. Grove, M.A., President of the Society, and seconded by Prof. Tilden, D.Sc. F.R.S., who paid her the high compliment of saying that she had done well to undertake original research in preference to obtaining a degree. Prof. Lapworth, LL.D., F.R.S., Dr. J. A. Langford, LL.D., and Mr. F. J. Cullis, F.G.S., were also among the speakers, who warmly thanked and congratulated the reader of the address, and the motion was carried with acclamation. Many friends present remarked how well Miss Naden was looking, and seemed to have entirely recovered from the illness which, unfortunately, had developed in her Indian tour. She was a favorite pupil of Dr. Lapworth's, and there was a strong friendship between them." A note to Dr. Lapworth, hoping that he would make a point of coming to see her on his next visit to London, was the last that my dear friend dictated.

But we are anticipating, and must return to Miss Naden's early compositions in poetry. Her first published poem, "The Lady Doctor," appeared in 1877 in "*London Society*," when the editor, in accepting, asked for as many more of the same kind as the writer cared to supply; but a few *jeux d'esprit*, printed in each of her two volumes of poetry, are all she ever wrote in that style. They are very remarkable productions, especially from a young girl, being full of a lively grace, and, at the same time, the science at which they playfully scoffed was strictly accurate. The first volume of poetry, "Songs and Sonnets of Springtime," appeared in 1881, and received a certain amount of attention, and many favorable reviews, as also a niche in Eric Robertson's "English Poetesses" and Mrs. William Sharp's "Women's Voices." They are far above the average in thought and

feeling, and delicacy of expression; but it is very rarely, if ever, that a writer makes his or her mark with a first volume of poems. The next volume, "A Modern Apostle," and other poems, did not appear till 1887, when both that principal poem and the others: "The Elixir of Life," "Clarice," and the shorter pieces and translations, gave evidence that all the deepest and most complex problems of civilization had been profoundly meditated by the young authoress. "A Modern Apostle" touches with great power and pathos on the evolutionary, scientific and neological changes now unsettling the religious belief of thoughtful minds; but, as in "Robert Elsmere," love overcomes all differences of faith. Since leaving College she seems to have altogether abjured poetry for philosophy, having since then never written a verse even as pastime. It was not till after her lamented death that Mr. Gladstone's article appeared in the second number of "The Speaker," in which he ranked her, with a few others of her sex, among great poets, as distinguished from *poetesses* of this, or any previous century. He distinguished "The Pantheist's Song of Immortality" as the finest; but, for fulness of thought and grasp of the difficulties and confusions in modern society, I am inclined to prefer "A Modern Apostle." This volume was favorably noticed in many metropolitan and provincial papers, and appreciated by many good judges. But the world, unpoetic though it be, is flooded with poetry just now, and moreover has no time to read for thoughtful pleasure or profit. It flies through a railway novel, a volume an hour, or plunges into a new scientific or religious theory, if sensationally set forth; but, until a poet has made his name familiar by repeated appearances, the indiscriminating public ranks all new aspirants as minor versifiers. Tennyson and Browning would have been no exception if cut off at the age of 31. The suggestive poem: "The Roman Philosopher to Christian Priests" is not a common girlish song—the passionate anger of the Roman father against the priests, whose teaching had robbed him of his child's love, and the strong spirit of the old Roman breaking out in the last verse, expresses vividly the spirit of declining Paganism:—



“Go eat and drink, and call your feast divine;  
But, if my daughter dies, ye shall not live:  
The ancient Roman spirit still is mine,  
And I forget not, neither can forgive.”

“The Lady Doctor,” another poem so full of brightness, and bearing its own good lesson, is one to be classed with Evolutionary Erotics—those astonishing mixtures of exact science and gay sprightliness.

When Miss Naden was 23 years of age she began the study of advanced organic chemistry, and in the next three years obtained first class certificates in that subject as well as in systematic physiology, geology, and physics. In 1887 she was the first recipient of the highest prize which has been offered to the past and present students of Mason College—namely, the Heslop Gold Medal, founded and endowed by the late Dr. Heslop. The medal is awarded annually by the Council, on the recommendation of the Academic Board, for the best dissertation or essay upon a subject to be selected by the candidate. Before the 25th December in each year, the Academic Board issues a list of subjects arranged in the following divisions:—

- (a) Language, Literature and Philosophy.
- (b) Mathematical and Physical Sciences, including Metallurgy and Engineering.
- (c) Biological and Geological Science, including Mining.

One division is taken each year, and in 1887 the Philosophical Section being selected, Miss Naden wrote the essay which forms the principal part of this book, *i. e.* the one on Induction and Deduction. She also received the honor of being made an Associate of the College, as yet the sole female one. For some time Miss Naden edited the *Mason College Magazine* with great success, and was chosen President of the Ladies' Debating Society, in succession to Mrs. Dale and Mrs. Crosskeys—two well-known and highly honored Birmingham ladies. It is indeed seldom so young a girl obtains such a position. With all this active student life Miss Naden still found time, for several years, to attend every Thursday evening at the Home for Friendless Girls

in Bristol Street, to teach them reading, writing and arithmetic; and she was always deeply interested, and rejoiced in the success of this work. On her migration to London she became an active Associate of the Working Ladies' Guild, and shortly before her death was in correspondence with Lady Mary Fielding, the founder of the Guild, with regard to her taking the charge and financial responsibility of the Camden Houses for ladies of small means. Her private charities were numerous and liberal, poor ladies being a special subject of interest to her. She became a member of the Denison Club, the members of which are chiefly workers with the Charity Organisation Society, and others engaged in philanthropic work. Critical papers are read every month but of the most discouraging nature. Miss Naden used to say, laughingly, that it was a "Society for proving the uselessness of all charitable effort." She was elected a member of the Royal Institution, and last season attended most of its Friday evening lectures; her scientific training enabling her to appreciate and understand some of the most difficult. She was a member of the Aristotelian Society and active in its debates. Her name was down to take part in a symposium, and also to read a separate paper, but death prevented the paper being finished, and it was left in a partially fragmentary state. It is hoped, however, that it can be arranged so as to be printed next July in the *Transactions* of the Society, which the Secretary and other members are most anxious should be done.

Another distinction, gratifying to Miss Naden, was a request by Mr. Herbert Spencer, that she would answer one of his opponents, Mr. Lilly, in the *Fortnightly Review*. She wrote an admirable and lively paper, but, although the refusal was couched in most courteous and respectful terms, the editor declined to admit it. This critique will probably be eventually published with some of her numerous papers still in manuscript.

I made Miss Naden's acquaintance in June 1887, and was much attracted by her sweet seriousness, and felt, as every one must have done who was even a short time in her society,

that she was no ordinary personality. This attraction very soon deepened into a very strong personal attachment, and my residence of two years with her was a time of great happiness. I subsequently found that she had in Birmingham a circle of girl friends, all gifted in some way, as students, writers in the *College Magazine*, workers among the poor, or lecturers to them on sanitary and other practically useful subjects. Among these Miss Naden was the centre of affectionate admiration and example. They are among the deepest mourners for her loss. With a manner which, at first sight, might be considered reticent, she still had the power of attracting very strong affections, and her extreme truthfulness inspired perfect confidence. She had nothing to conceal, all her thoughts being noble and generous, but it was, perhaps, the clear directness and bird's-eye rectitude of mental perspective which made this truthfulness so conspicuous. The smallest evasion was a difficulty, and any approach to untruth in any shape an utter impossibility. In 1887 she sold Pakenham House with other property in Birmingham, and on the 29th September of that year we started for our enchanting tour to the East. Crossing Germany to Ratisbon and Vienna, we embarked on the Danube, stopping for a few days at Buda Pesth, and wherever else in the Danubian provinces the fancy seized us, till one evening we reached Varna, and went on board the steamer for Stamboul. At 6 o'clock the next morning she awoke me, saying we were entering the Bosphorus. That was one of the sensations which are not often repeated in this life, though too often described to be dwelt on here. The Orient sun, the castles on each shore, and the "Lost Souls," as the small white birds are called, which seem to pass their lives in whirling up and down the Bosphorus, skimming the surface of the waters, but never sinking below or rising into the air. A thoroughly delightful ten days were spent in Constantinople, and then we went on to Broussa, and the Bithynian Olympus, Smyrna, Cyprus, Beyrout, Damascus, and the solitary, most impressive and monumental ruins of Baalbec. From Constantinople we made up a party with an American



lady and gentleman, Mr. and Mrs. Patten, of Maine, U.S., and Dr. Alfred Stieglitz, of Leipsic. With these we travelled to Jerusalem, the Jordan, Dead Sea, and other parts of the Holy Land, and became such friends that it was a great pleasure to meet them again in Cairo, and the two former at Calcutta. Three weeks were spent at Shepherd's Hotel in Cairo, and many other acquaintances made, Sir Colin Moncrieff being one of our introductions. We spent much time in the Bulak Museum preparing ourselves to profit by, as well as enjoy, the voyage up the Nile. Miss Naden thoroughly enjoyed and appreciated that never-to-be-forgotten three weeks' voyage to Assouan and back, commencing with the Pyramids of Gheezeh, ascending that of Cheops and penetrating into its central sepulchral chamber. Of all the marvels on the Nile, including Thebes, Luxor, Phylae, &c., the great Temple and Avenues of the Sphinxes at Karnak, as seen by moonlight, seemed to impress her most. Their grandeur, solemnity and associations actually made her kneel, from an overmastering impulse of reverential awe! On the 3rd of January, 1888, we left Suez for Bombay in good health and spirits. Both having introductions to Lord and Lady Reay, and other friends, invitations came at once, and on one occasion we had the honor of meeting H.R.H. the Duchess of Connaught at dinner, when she was staying at Government House, who was curious about details of Miss Naden's college life. We visited the Caves of Ellora on our way to Calcutta, where we remained a fortnight. Lunching one day at Government House, Lord Dufferin, himself a literary man and of a literary family—his mother being a distinguished poetess, expressed himself in the warmest terms of admiration for Miss Naden's poetry, saying, as many others have done, that having once taken up the volume they could not lay it down. Our next stage was Darjeeling, close to the highest Himalaya range, where we were hospitably entertained by Mr. J. Claude White, now resident at Sikkim. We next made the tour of the principal towns of the North-West Provinces, including Agra, Delhi, Benares, Lucknow, Cawnpore, Jeypur, &c., the interest and value of which was

much enhanced by some introductions Miss Naden obtained from Prof. Max Müller to Mr. Malabari (the well-known reformer), and other native gentlemen. After making their acquaintance these gentlemen gave us introductions to the best educated of their native friends in each station on our route. Without claiming too much for the knowledge to be gained in such converse, Miss Naden learned a good deal of the feeling among educated natives with regard to the British Raj. They neither entirely praised, nor absolutely blamed the Government. Some were for the National Congress, and others thought that a great development in local native government was better suited to bring out and elevate the native character, but all appeared to express their opinions honestly; and, however much they might distrust the Government in their hearts, they *all* know that it is saving them from anarchy till they become trained to a higher civilisation. Doubtless, some are like Sir Alfred Lyall's "Old Pindaree," and regret the old days of forays and bloodshed and plunder, and one dear old gentleman openly expressed his preference for the old style. "For," said he, "in old days when I visited my rajah, he would give me a bag with a thousand rupees in it. Now the Government merely gives us a Star of India, or some such trifle, that costs nothing." Miss Naden brightly endeavoured to show him that the money of the Government mostly came out of the pockets of the poor, and we will hope he took the lesson to heart. Miss Naden was so interested in Indian subjects—the Jain community and architecture especially attracting her—that on her return home she became a member of the National Indian Association and attended several of its meetings and conversaziones.

At Mount Aboo, in Rajpootana, she was laid up by severe fever from the 27th March till the 19th May, when we left Bombay for England. She did not rally as rapidly on the voyage as was expected, but by slow degrees regained strength, and after reaching London, by short stages from Brindisi, and spending some time at Scarborough and Harrogate, she returned to town in very fair health. In November she bought a newly-built house, 114, Park Street, Grosvenor

Square, but it was not till the 4th of February that it was ready for occupation. She furnished it beautifully and began a life which she thoroughly enjoyed, and which it is a grief to remember was so soon ended. Shortly after entering she held a large and most successful drawing-room meeting for the benefit of the new Hospital for Women. Mrs. Garrett Anderson spoke with her usual power, and several hundred pounds were collected on the occasion. Miss Naden was also a member of the Norwood Ladies' Debating Society, and at one meeting argued against Miss Grover, who took the Socialist side. Miss Naden was full of sympathy with the sufferings of the people, and though she would never have called herself a Socialist, was strongly socialistic in many of her views, while holding to the necessity for individual development. Her political opinions were distinctly Liberal. She was a Home Ruler, recognizing the Irish question as a phase of the movement for racial solidarity so universal in our age. She canvassed for Mr. G. Leveson-Gower, the present member for Stoke-upon-Trent, when he unsuccessfully contested Marylebone. Her experience of the electorate, on that occasion, was a novel and to her an amusing one. She was strongly in favor of extending the suffrage to women, and her name was down, at the instigation of Miss Balgarnie, its secretary, on the Society's list of lecturers. She, however, only gave one address to the Women's Liberal Association at Deptford, when her health gave way. This lecture met with a very warm reception. The Committee of the Central National Society for Women's Suffrage, Lady Sandhurst in the chair, have since passed a resolution expressing "their profound regret at the death of one who had evinced her warm interest in Women's Suffrage, and deploring the loss of one who, by her ability and zeal, would have done so much to advance the cause of women." She was gradually attracting round her a circle of intellectual friends; her Saturday afternoon, and other parties, were very attractive. Many bright people were to be met there, some of them well known in the literary world. A visit to Paris, during the exhibition in autumn last, was a source of much interest to

us both. In person, Miss Naden was tall, slender, pale, with dark hair; a delicate yet powerful face, with singularly clear "blue-grey" eyes. It has been made familiar to a part of the public by the portraits which have appeared in *The Queen*, *The Lady*, and other London and Birmingham papers. She had specially small white hands, but was not at all fond of needlework. She used to write for some hours almost every morning, but was very fond of walking, and never failed to take outdoor exercise once or twice every day, till told by her medical attendant, Dr. Grigg, of Curzon Street, Mayfair, first, that she must remain in the house, and then, on the 25th of November, rest in the bed from which she never rose! On the 6th December, Mr. Lawson Tait came from Birmingham and performed an operation. She seemed to recover fairly well, and both Mr. Lawson Tait and Mr. Erichsen predicted her recovery. But she sank at a quarter to two o'clock on the 23rd December last.

The anguish caused by her death is not yet healed, and words do not come easily, but a friend would fain do justice to her lofty character, and marvellous endowments. Those who knew her best are those who valued and appreciated her most. Hers was an "*ideal*" character, one of a type common neither among men nor women, but which we must hope that the rational scientific training, now possible to both, will help to develop in greater numbers. Her own poem "*Das Ideal*," at page 76 of *Songs and Sonnets of Springtime*, dedicated to Dr. Lewins, perhaps expresses her aspirations better than anything else; and for this reason I end by venturing to recommend its perusal to those German students among my readers who are sympathetic with the object of this memorial sketch.

MADELINE M. DANIELL.

London, March 30th, 1890.

## NOTE BY THE EDITOR.

MISS NADEN, in quite early youth, became a convert, on the principles of exact contemporary physical and biological science and of the relativity of human knowledge, to that autopsic mental synthesis embodied in the formula of Protagoras, the saner Berkeley of antiquity, *viz.* that each sentient Self or Ego is the measure, standard and virtual creator of all percepts and concepts realizable by itself—a formula implicit in Kant's negation of *Das Ding an sich*. "Thing" thus becomes to each sentient unit, merely its own thought or "think" of what is otherwise, on the relative or phenomenal plane of existence, non-existent. "*De non apparentibus et non existentibus eadem est ratio*," is an axiom clearly as valid in Ideation, as in Jurisprudence. The universe is thus not merely an *Anthropomorphosis*, but an *Automorphosis*—object and subject being unified by immersion of the former in the subject Self or Ego, Dualistic Animism and Realism in solipsismal Egoism. This Protagorean Monism has been quite misunderstood and misrepresented by Plato in ancient times, and by the late Mr. Lewes and dualist scientism generally, in modern times; by no one more than by Francis Bacon, when he blames men "for spinning webs, like spiders, out of their own entrails;" the human mind, as organic function or cerebration, having no alternative. And yet the Abderite sophist, in his own day, though eventually persecuted and rendered odious like Phidias, Aspasia and even, in some measure, Pericles himself, for atheism, was so venerated as to have been canonized by the titles of *Logos* and *Sophia*. In two essays of this volume, "On the Brain Theory of Mind and Matter," and "On Hylo-Idealism, the Creed of the



Coming Day," as in others of Miss Naden's papers, several of which are still unpublished, this hylo-ideal *rationale* of Existence is well enucleated. It forms also the theme of a poem at page 76 of her "Songs and Sonnets of Spring Time," referred to above by Mrs. Daniell, entitled "Das Ideal," with the legend from St. Luke's Gospel, Chap. xvii, 21st verse: "Denn sehet das Reich Gottes ist inwendig in euch." Three stanzas of this characteristic effusion and confession of Faith or Unfaith are here quoted:—

"Der Wind verstärkt sich nur durch *eigenes* Wehen,  
 Die That gebiert die Kraft:  
 Ich *bin* noch nicht. Erst kann der Mensch entstehen,  
 Wenn er als Gott erschafft.

\* \* \* \* \*

Verzeih' mir o Natur, das kindische Lallen,  
 Den rasenden Gesang:  
 Doch was bist *Du*, als nur das Wiederhallen  
 Vom alten Seelenklang.

Der schöne Dichtertraum ist nicht verloren,  
 Er war zu eng, zu bleich:  
 Nur in des Menschen Seele wird geboren  
 Das Erd und Himmelreich."

## PREFATORY NOTE.

THE two first Essays which compose this little volume are united by a common purpose not immediately obvious. The first, on "Induction and Deduction," obtained, in 1887, the "Heslop Memorial Medal," provided out of the proceeds of a bequest to the Mason Science College of Birmingham by the late Dr. Heslop, and awarded annually by the Council of the College. It was, perhaps, fitting that on the first occasion of the award, the medal should have been gained by a treatise of this nature, as Dr. Heslop himself was deeply impressed with the importance of philosophical study, and desired that the College, to which he was an untiring benefactor, should possess a Chair of Philosophy, and should become in every respect a centre of intellectual light. A short paper on Mr. Spencer's "Data of Ethics," read before the Sociological Section of the Birmingham Natural History and Microscopical Society, supplied the nucleus from which the second essay has been developed.

The inner bond of union between these two essays consists in the principle, implied where not explicit, that man evolves from his inner nature the world of experience as well as the world of thought; that,

in fact, these seemingly rival spheres constitute but one Cosmos. Whether I insist upon the truth that "Induction and Deduction" are involved in the simplest percept, or on the kindred truth that the germ of morality lies in the power which every man possesses to image and asself the feelings of his neighbours, I am equally enforcing this primary idea.

When citing the opinions of any writer, I have always referred the reader to the passages quoted. For my first apprehension of the principle which underlies these logical and ethical theories, I am indebted to my friend Dr. Robert Lewins, who makes it the central point of his system of Hylo-Idealism, developing and elucidating the Protagorean formula, so distasteful to scientific Realism, that "man is to himself, on the relative theory of knowledge, the measure of all things," in the light of modern physic, physics, and physiology.\*

CONSTANCE C. W. NADEN.

\* See *Life and Mind on the Basis of Materialism, and Humanism versus Theism*, by Robert Lewins, M.D.

## INTRODUCTION.

**R**OUND all great intellectual movements which have helped to mould the world's history, popular legends tend to grow up; legends not usually written in any book, or definitely taught in any school, but loosely afloat in the general fancy. The legend of the inductive method would read somewhat as follows. In the beginning was a set of philosophers, who instead of looking about them simply investigated their own thoughts, and tumbled into many ditches, not so much through star-gazing, as through mind-gazing. Out of their inner consciousness they extracted a great many principles which were inapplicable to Nature, and were therefore of none effect; and on account of this wilful perversion they failed to invent the steam-engine or to discover the circulation of the blood. Their method is called deductive, and is a false method. This state of things went on for a long time; and in the Middle Ages matters grew worse rather than better; for now appeared a set of men called schoolmen, who submitted everything to the authority of the Church and of Aristotle, and wasted their time in frivolous debates about phantoms named quiddities and hocceities and haeceities. Their method also was deductive, and was false.

But in the glorious sixteenth century, and in our own glorious island, there arose a Lord Chancellor who wrote a book which changed the face of the intellectual world.

This great man found out that the proper office of the mind is to make useful discoveries, and that the proper way to make discoveries is to interrogate Nature. He laid down rules for the correct framing of our interrogations. He is the father of all such as make far places near by steam-engines and electric telegraphs, or numb our pain by anaesthetics, or light the world by gas or electricity. His method is called Inductive, and is true.

This legend, which let us hope is growing a little less popular as it grows older, is even farther removed from truth than most of its kind. In the following sketch, I hope not merely to show its falsity, which would be an easy task, but to trace the outlines of the true history which must take its place.

It is no part of my plan to describe or to criticise the different philosophic systems upon which I shall touch, except in so far as they bear upon the theory and practice of Induction and Deduction. For instance, in attempting to show how the Platonic doctrine of Ideas, or the Aristotelian doctrine of Forms stands in relation to my subject, I shall assume the contents of each as already known. Since this is a sketch, not of Philosophy as a whole, but of an essential part of philosophic method, I shall not mention the names of many, great in the history of thought, but as regards method unoriginal. Thus I say nothing of Zeno or of Epicurus, or of the Neo-Platonists of Alexandria. My aim being not to write a history of individual thinkers, but to summarize the results of their thought, I have selected those names which may serve as types of the different stages which it is necessary to describe. Little or nothing will be said of many who have really contributed to the theory of Inductive and Deductive Logic, but whose names do not symbolise any special advance. Among these may be specified Archbishop Whateley and Mr. Herbert Spencer. Thinkers such as Descartes and

Locke, who have strongly influenced the theory of Induction and Deduction, but have written little on its details, I have dealt with briefly.

With these few explanatory words, I proceed to my task ; that of trying, by a historical survey, to elucidate the commonly received definition of Induction and Deduction. Induction is defined as the passage upward from less general to more general truths ; Deduction as the passage downward from truths more general to truths less general. This definition represents the facts sufficiently well for present purposes ; at the end of our search we may perhaps discover a more precise formula.



# INDUCTION AND DEDUCTION.

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## I.

### THE GREEK COSMOLOGISTS.

THE first Greek Philosophy, with its crude, vague and unverifiable guesses as to the origin and nature of the Cosmos, is apt to seem to the trained intellect of the present day a mere childish mental game ; a "What is my thought like?" played seriously by grown men. The "thought" is the Cosmic principle, the original source or element whence the world of mind and matter has proceeded ; and although Thales can find ingenious reasons for assimilating it to water, Anaximenes may find reasons just as ingenious for calling it air, and Heraclitus for considering it to be fire. Thales noticed "that the nutriment of all things is moist," and "that the seed of all things is naturally moist,"\* and that living things dry up when they die. These observations, literally true so far as they went, became merely metaphoric when applied to the inorganic world, and made into the basis of a great cosmological generalisation. Water, or rather moisture, plays an essential part in organic life, and it is perfectly correct to state that all living tissues are moist ; although, since moisture alone can neither maintain nor generate life, the statement that it is the "vital principle" would to us

\* *Metaph.* I, 3 (Ueberweg's *History of Philosophy*, vol. I, § 12.)



be meaningless. But, passing this, the assumption, that moisture is to the Cosmos what it is to animals and vegetables, implies the prior assumption that the Cosmos is a living organism, subject to generation, growth, maturity and decay, like other organisms.

Heraclitus observed that the transformation of matter by combustion, and the subsequent dying out of the flame, aptly typified the constant flux of all things. He also remarked that "the dry soul is the best, the moistened soul of the drunkard is unwise."\* This fire theory is even more openly metaphoric than the water theory; for the constant flux finds only one of its types in the action of fire; and the evil effects of "moistening" the soul evidently depend on the liquor used. Raging thirst is not preferable to water-drinking.

Anaximenes, again, when he described air as the first principle, representing "fire, winds, clouds, water, and earth, as produced from it by condensation and rarefaction," and when he asserted that "as our soul, which is air, holds us together, so breath and air encompass the universe,"† had facts to go upon, but facts which he misinterpreted, and therefore misclassified. Condensation and rarefaction of air or vapour are physical facts; it is true that we breathe and that the earth (not the "universe") is surrounded by an atmosphere, but it is not true that the breath is the "soul" or mind, or that the atmosphere in any sense holds the world together.

I have dwelt upon these examples because they show very clearly the nature, and help to explain the unfruitfulness, of the inductions and deductions of early Greek philosophy. We find first, imperfect observation; second, erroneous interpretation, and third, mistaken generalisation. The two latter defects are traceable to their root in the first. Where there is faulty cognition there must be faulty recognition.

Men lived in a world as yet unexamined and undescribed. The relations and functions of its different parts were little known. Even the processes which were most familiar had

\* Ueberweg, vol. I, § 15.

† *Ibid.*, § 14.

never been investigated, and the apparent and superficial sequence was necessarily assumed, in the absence of deeper knowledge, to be the radical causal sequence. As the true relations of phenomena were unknown, there was no principle of selective observation; there was no clue by which the mind could guide itself to the really significant sequences. Every man founded his theory on those facts which he had the best opportunity of examining, or which happened to appeal most strongly to his mind. There were no well-established antecedent generalisations to which his own could be affiliated, or which could be applied to the interpretation of his experience. No body of knowledge was in existence by which his theorisings could be tested. It was out of his power even to draw sound comparisons between any two sets of phenomena; since he had of both sets an incomplete and often a misleading conception. In short, there were as yet no landmarks to show the traveller his way. He entered a broad, unmapped, unpartitioned world, where no highways had as yet been constructed, while the faintly-trodden tracks, crossing each other without plan, could but confuse and bewilder.

It may seem paradoxical to say that the serious game of "What is my thought like?" played by the Ionic philosophers, proves not childishness, but a near approach to intellectual maturity. For the generalising power was, if not full-grown, at least highly developed, and imperatively demanded to be set to work on the scanty materials supplied. Each of these philosophers did grasp certain important facts, and did perform a certain process of induction, issuing in a generalisation which was futile from the incompleteness of its basis.

But why did they not set to work to investigate the ways of Nature; why did not each confine his attention to a little corner of the Earth, instead of vaguely spreading his mind over the universe? Why did they not try to discover the true order of natural sequence, by observation and experiment, thus bequeathing to their successors some fixed point of departure? Why did they ask riddles about the

origin and principle of the Cosmos, involving the very hazardous assumptions that the Cosmos did at some time originate, and that its materials are but, as a modern physicist might express it, "varied states of aggregation of one primitive element?"

Man, when he begins to think, is interested primarily in himself, and in nature only as it concerns his own material interests. It is a great step in advance when he becomes interested in the history of his race; a greater still when he enquires about the origin and fate of the world in which he lives. But the mere stocks and stones of the world—nay, its plants and animals—do not at this third stage interest him for their own sakes. He wants to learn the fundamental truth about his dwelling-place; he wants to penetrate to the heart of things; and it naturally does not occur to him that the way to this truth is by a laborious and minute examination of objects which seem so very far from the heart of anything whatever—objects fluctuating, transitory, mean. There was no *a priori* reason for supposing that such a system of observation would lead to any very important results. The mind of the philosopher was a nobler and therefore a more trustworthy thing than the matter which grossly shut it in. Matter might help him with suggestions, hints, adumbrations; but that he should merely interrogate it, and then docilely acquiesce in its teaching—this was a path which no one would think of trying, till all others had failed. For it must not be forgotten that the psychical was no further explored than the physical. The relation of sense to thought lay in the deepest obscurity, whence it is but just beginning to emerge. The concept seemed more valid than the precept, as containing an immutable abstraction.

But the guesses of these searchers for truth were not invariably wide of the mark. The Heraclitean doctrine of continual flux, for instance, is true in its essence, though false in its details; it is, indeed, an abstract expression of the course of daily experience, verifiable without any special research, because lying as it were at the very threshold of

apprehension. The Eleatic doctrine of Unity shadows forth the sameness and permanence which underlies all phenomenal change. The Atomic theory of Democritus, on the other hand, was less an abstraction from experience than a happy though unverifiable guess.

Granting the merit of such speculations, it may be asked why they were not more fruitful, and why they completely failed to turn the philosophic current science-ward. The doctrines of flux and of unity were founded on broad if not systematic induction; the doctrine of Atoms was a hypothesis, and it is by hypotheses that present-day science grows and develops.

The answer is not far to seek. Where induction is vague, deduction must be abortive. None of these three theories admitted of precise and quantitative statement; so that it was impossible to deduce from any one of them a definite series of consequences which could be compared with facts. In other words, verification was unattainable; and this for two reasons. First, as I have tried to show, the bare idea of verification could not yet be formed. It involved a submission of the intellect to the senses, to which the whole spirit of the age was adverse. But even could the thought of the day have "stooped" to sensible truth, it could not have proceeded far in the sciences usually called "physical" as distinguished from those described as "natural." The latter may make considerable progress without the aid of measuring instruments and of mathematical knowledge. But it was in the physical sciences, if anywhere, that the verification of cosmological speculations must have been sought; and here only the rudest approximation could have been made.

When we contemplate the position, the puzzle seems to be, not "Why was the birth of science so long delayed?" but—"How came science ever to be born at all?" Men knew not what to look for, and if they had known there were but scanty means of looking. They needed principles to guide them to particulars, and particulars to supply them with principles. It would appear that the process of induction

and deduction forms a "vicious circle," which can have no beginning. Unless you possess general truths from which to draw rules of search, you can but grope blindly among facts; while only from facts can you draw your general truths.

There were, however, three ways in which progress was possible:—

- (1) By a development of mathematics, the first principles of which involve only the simplest and most obvious inductions.
- (2) By an investigation of mental processes, leading first to a formal logic, and later to a scientific psychology.
- (3) By the gradual accumulation of facts and the study of their mutual relations, at first for practically useful purposes, especially in connection with the medical art.

Pythagoras is said to have brought much mathematical knowledge from Egypt to Hellas, and, with his disciples, doubtless did something towards the development of the science, although their speculations enshrouded it with a mystical veil. The traditional story that the Egyptians, whose landmarks were every year destroyed by the rising of the Nile, invented an art of land-surveying to preserve the memory of the bounds of property, may be a myth; but it is an instructive myth, being typical of the birth of science from physical necessities rather than from intellectual cravings. It would be outside the scope of this sketch to give any details of the growth of mathematical science, and its application to physics and astronomy; but it must be remembered that Euclid, Archimedes, and their successors, wove one thread of the three-fold clue which guided mankind through the maze of the visible and tangible world. They gave data for the conception of quantitatively rigorous law. The simple observation of the stars might, indeed, give rise to the germ of such a conception; but the application of geometry and trigonometry to astronomical calculations gave it definiteness and intelligibility, and enabled the mind to anticipate nature not empirically but rationally. Mathematics, as a deductive science, was, indeed, not merely the fittest to prescribe lines

for thought and search, but, as not necessitating any elaborate inductions, it had the best chance of growth and cultivation in a non-experimental age. Its practical uses were great and easily recognized; its worth as a training for the mind was soon appreciated; and it was held in honour as a species of knowledge developed within the mind itself, and therefore, in Plato's phrase, not mere opinion, but a kind of cognition. Plato, indeed, gives it only a secondary place, as dealing with principles not directly, but through images. Little did he imagine how small a part his dialectic would play in the advancement of thought in comparison with the "intermediate" study of mathematics!

The second method of progress—that investigation of mental processes which branches into logic and psychology, began to be consciously pursued when cosmological enquiries ceased to attract the profounder minds. The famous Protagorean formula, that "Man is the measure of all things, of things that are that they are, of things that are not that they are not," might have been proved from every one's individual consciousness, since it merely comes to the assertion that every one thinks his own thoughts about his own perceptions. Yet, so long as thoughts and perceptions were supposed to be real only by participation in ideal realities existing outside the mind, and constituting an absolute standard of truth, this seemingly self-evident statement could not be accepted. It was necessary that the processes of reasoning should be more or less clearly brought into consciousness, and that thinkers should recognize at least the proximate source of their concepts.

## II.

## PLATO.

THE name of *Plato* is the greatest in Greek philosophy. Yet, if he be finally pronounced deserving of the honour in which he is held, the verdict may be given on grounds diametrically opposite to those hitherto assigned.

Plato is the father of two irreconcilable schools of thought. Like the Demiurge in the "*Timaeus*," he constructed a fair world, into which he consciously introduced disturbing elements, certain in the end to ruin the scheme. For as the non-sexual type of humanity first constructed could not maintain itself, but was compelled to give place to the bi-sexual type, for which thought had already been taken by the gods; so the immutable, eternal Platonic ideas have been forced to yield to mental concepts, generated in the commerce between sense and intellect, and known and described by Plato himself.

The so-called "induction" of the Platonic Socrates is by no means a step onward to his deduction. The two are wholly unrelated. The induction is a process not of verification, but, so to speak, of deverification. He takes a general term, as the holy, the beautiful, the just, puts forth a tentative definition of its meaning, tests this definition by various arbitrarily selected cases, and finally rejects it, because in some of these cases it is inappropriate. He never seriously attempts, by comparison of his instances, to ascertain what quality they have in common, and thus to found upon them a scientific generalisation. Thus he simply succeeds in proving that a general term very frequently does not stand for any clearly defined general idea; or at least, that the general idea is not readily discoverable. In the more didactic dialogues he seeks to bring a number

of individuals which have a common name under one form or idea ; the inductive or rather illustrative process being the same as that in the other dialogues, but the obvious criticisms not being urged. The idea sought or assumed is generally regarded by the Platonic Socrates not as a mere concept, but as an essence, by participation in which the particulars are what they are. Beautiful things, for instance, owe their quality to the presence of the self-beautiful—the absolutely beautiful. Love is due to some “*primum amabile*,” which is the primitive, essential and constant object of our affection, particular things being loved only as its shadows or associates.

The disjunction of induction from deduction in the Platonic dialogues is no mere accident ; it is a necessary consequence of his inductive method, which is essentially unfruitful. He constantly seeks to fit ideas to words, instead of words to ideas. A word in common and vague usage, such as good, or beautiful, will only roughly coincide with any natural class or group of classes. It can be made precise only by an *arbitrary* definition, excluding many of its loose popular applications ; trimming, as it were, its ragged edges. If we would use it scientifically, its meaning must be restricted ; in vain do we try to comprehend in one concept all its connotations. For instance, it would be an impossible task to define the word “element,” if we insisted on taking into account its use in such expressions as “the elements of knowledge,” “the strife of the elements,” “an element of discord,” “he was quite in his element.” Our plan is to narrow the signification of the word, and to employ it throughout the argument or treatise, in rigorous accordance with our convention. Then, if we define a chemical element as a substance, which cannot be split up into different kinds of matter, we exclude from consideration fire, air, earth and water, as well as reading, writing and arithmetic.

This hopeless search for the essence of words, rather than for the nature of things, necessarily prevented Plato from striking upon the only fruitful mode of generalisation ; the



identification of previously ill-understood with well-understood phenomena. This can be accomplished only by the patient study of natural processes at first hand, and not through a verbal veil. His attempts at classification are barren of results, and have no permanent value, because they are not based on really vital characteristics.

Turning to Plato's positive teachings, we can see that they shared the radical defect of all early theories: they did not admit of any precise and verifiable deductions. A variety of consequences may of course be drawn from the doctrine of ideas; but these, as shown in the *Parmenides*, are often self-contradictory, resting on verbal quibbles, and in no case can they be verified by an appeal to facts. Thus his philosophy could never come into vitalising contact with mother earth. In his own words "by successive steps she descends again without the aid of any sensible object, beginning and ending in ideas."\*

Yet Plato did render a definite service to the progress of thought. He called attention to the workings of the mind, and to the formation and validity of general concepts, insisting on the supreme importance of abstraction and generalisation. This constitutes his real importance in the evolution of philosophy, and countermines his own imposing system of real-idealism. In the *Theætetus*, where we find the first foreshadowings of a true psychology, he insists on the absurdity of merely enumerating particulars, instead of seeking a formula which includes the whole. "Suppose that a person were to ask about some very common and obvious thing—for example, 'What is clay?' and we were to reply that there is a clay of pottery, there is a clay of oven-makers, there is a clay of brick-makers; would not the answer be absurd?" We "might have said simply that 'clay is moistened earth.'"† Objects of sense are perceived by the organs of sense, but "neither through hearing nor yet through seeing" can we apprehend likeness or difference between sensations. Universals, as being, like and unlike, good and evil, are "notions which are essentially relative, and which the soul

\* *Republic*, Book VI (Jowett.)

† *Theætetus* (Jowett.)

also perceives by comparing in herself things past and present with the future \* \* \* \* their essence, and what they are, and their opposition to one another, and the essential nature of their opposition, the soul herself endeavours to decide forces by the review and comparison of them.”\* Throughout the argument, as Mr. Grote remarks, Socrates is made to imply that universals are “relative, though relative to the cogitant and not to the percipient.” This antithesis of thought and perception was inevitable in the time of Plato, and is only ceasing to be inevitable in our own day. It represents the analysis which must necessarily precede the final psychological synthesis.

In the *Statesman*, Plato regards the form or universal “as implicated in and with the particulars; as a result reached by the mind through the attentive observation and comparison of particulars; as corresponding to what is termed in modern language abstraction and generalisation.”† “The right way is, when a man once sees the unity of things, to go on with the enquiry and not desist until he has found out all the differences which exist in distinct classes, nor should he be able to rest satisfied in the contemplation of the innumerable diversities of minds until he has comprehended all that have any affinity to each other within the sphere of a single class, notion or essence.”‡ Later in the dialogue he says that his enquiry into particulars is for the purpose of acquiring knowledge of general truths which “have no outward image of themselves visible to man,” thus implying that the true path to the abstract is through the concrete.

Elsewhere, Plato seems theoretically to unite induction and deduction, although the specimens given of the completed process show that his method was purely dialectical, never scientific, and therefore barren. In the *Phaedrus*, for instance, drawing the picture of the true dialectician, Socrates is made to declare that “the speaker ought to embrace in his view many particular cases, to gather together what is common to all, and to combine them into one generic concept,

\* *Theætetus* (Jowett).

† Grote's *Plato*, ch. xxix.

‡ *Statesman* (Jowett).

which is to be embodied in words as the definition. He ought also to perform the counter-process; to divide the genus not into parts arbitrary and incoherent (like a bad cook cutting up an animal without regard to the joints) but into legitimate species, each founded on some positive and assignable character.”\* This looks like a process of induction and deduction, but it is really a method of *classification*, which, as I shall try to show in the sequel, is not necessarily an inductive process. Its whole value turns upon what is understood by “legitimate species,” and, from the specimens of classification given in the *Sophistes*, we may conclude that Plato did not understand the phrase in any very rigorous sense.

Carelessness of facts, and supreme care ostensibly for ideas, but really for words, vitiate the whole of Plato's reasoning. Of *verification*, he had, properly speaking, no idea. His verification was an orderly ascent to higher and higher principles, not a descent from abstractions to concrete facts. In the description which the Platonic Socrates gives of his mental development, he says: “I first assumed some principle which I judged to be the strongest, and then I affirmed as true whatever seemed to agree with this, whether relating to the cause or to anything else; and that which disagreed I regarded as untrue.” The kind of principle to which he refers may be seen by the example given. “Nothing makes a thing beautiful but the presence and participation of beauty, in whatever way or manner obtained. \* \* \* \* By greatness only great things become great and greater, and by smallness the less become less.” He proceeds to indicate the mode of verifying such principles: “You would say, I cannot afford to give up the sure ground of a principle. And if anyone assails you there, you would not mind him, or answer him, until you had seen whether the consequences which follow agree with one another or not, and, when you are further required to give an explanation of this principle, you would go on to assume a higher principle, and a higher, until you found a resting-place in the

\* Grote's *Plato*, ch. xxvi.

best of the higher."\* Himself a geometrician, Plato regards as a defect in mathematical science its need of those "intuitions" which Kant considers the very source of its certitude. "In enquiries of this sort, the soul is compelled to use hypotheses (images), not proceeding to first principles, because unable to ascend above hypotheses."†

This disdain for particulars is of course a natural consequence of the doctrines of reminiscences, and of immutable eternal ideas. In themselves, baseless and delusive, these doctrines yet spring from a keen sense of the value of general concepts, and contain a certain distorted truth. It is true that we know particulars only by knowing them, under universal relations; and in this sense it may be said that they have reality for us only by participation in an idea. It is true that every cognition of the adult contains an element of recognition. It is true that all reasoning must accord with the laws of thought, which may thus be said to contain the ultimate truth. This is the kernel of validity which lies within the fair fruit of Platonic idealism. His reverence for universals led to the hypostatisation—not of true universals even—but of words. His passion for general concepts led to the birth of those "barren virgins," the eternal ideas, which, as argued by his own Parmenides, can have no communion with the world of sense.

\* *Phædon* (Jowett).

† *Republic*, Book VI (Jowett).

## III.

## ARISTOTLE.

**A**RISTOTLE is the true father of modern scientific thought. In him, as in no previous thinker, the three modes of possible progress were united, and their co-relations foreshadowed. He regarded Geometry as the typical science; he was by instinct a psychologist, and by inheritance a physician. His father, Nikomachus, was "distinguished as a physician, author of some medical works, and boasting of being descended from the heroic germ of the Asclepiads. . . . We are told that among the Asclepiads the habit of physical observation, and even manual training in dissection, were imparted, traditionally, from father to son, from the earliest years, thus serving as preparation for medical practice, when there were no written treatises to study."\* Thus the path of physiological research was already laid open for Aristotle.

That he never attempted to elaborate any theory of induction is not wonderful. I have already tried to show that the "deductive sciences" must inevitably have been the first to attract the awakening intellect of mankind; being sciences which lay, so to speak, within the intellect itself, and did not apparently concern themselves with base earthly details. The so-called "inductive sciences" were too much clouded with doubt and error to furnish any satisfactory model of method; but Mathematics, though still in its infancy, was clear and certain so far as developed. Most of Aristotle's illustrations of the reasoning process are drawn from geometrical abstraction. Thus he shows the superiority of cognition of the Universal over cognition of the Particular, by remarking that he, who "knows that every triangle has its three angles equal to two right angles," also "knows potentially that the

\* Grote's *Aristotle*, vol. I, ch. i.

isosceles has its three angles equal to the same,"\* though he may as yet be unacquainted with the species Isosceles.

Aristotle's theory of the formation of ideas is not his least service to the development of philosophy and science. Indeed, the point of view which this theory implies is so completely opposed to the earlier mystical notions, that we at once feel ourselves in a new and clearer atmosphere. After trying to catch glimpses of the Platonic Ideas through cloud and mist, it is a relief to be shown, around and within ourselves, the genesis and evolution of the generalising faculty. We begin to feel on firm and familiar ground when illustrations are drawn not only from infant but even from animal psychology. The recognition of the Nutritive soul (or, as we should say, function) as the basis of life, and of the sentient soul as supplying materials for Phantasy and Memory, without which the cogitant soul would have nothing to work upon; the clear statement of the principle of Association of Ideas—these make us conscious of the breaking of a new day, still shadowed and clouded, but no delusive semblance of dawn.

Such is the position of Aristotle with regard to prior and subsequent thinkers. He stands at a turning-point of thought; and, though his errors were for ages at least as influential as his truths, every modern philosopher and man of science must acknowledge a deep debt of gratitude to the Stagyrte.

I shall now try to point out more definitely his place in the history of Induction and Deduction; and, as regards the latter, I cannot do better than quote a sentence from Mr. Grote's critical analysis: "It cannot be too often impressed that he was the first either to formulate the precepts, or to ascend to the theory, of deductive reasoning; that he was the first to mark by appropriate terms the most important logical distinctions and characteristic attributes of prepositions; that, before his time, there was abundance of acute dialectic, but no attempt to set forth any critical scheme whereby the conclusions of such dialectic might be tested."†

Aristotle was indeed absolutely original in his theory of the

\* Grote's *Aristotle*, vol. I, ch. vii (*Analyt. Post.*, I, xxiv.)

† *Ibid.*, vol. II, ch. xi.

syllogism. No one as yet had reflected *with* any purpose, or *to* any purpose, on the mode by which the mind performs its operations; no one had systematically pointed out the different sources of fallacy; no one had shown the essential unity of all processes of deductive reasoning. The syllogism was not merely a test of ratiocination; it was a contribution to psychology. We misconceive its significance if we object that every syllogism must contain a *petitio principii*—the very point to be proved being assumed in the major premiss. This is true enough, but it is beside the mark. The syllogistic formula does not represent the discovery of truth; it represents the *recognition* of truth already latent in the mind. Aristotle describes it as “a speech in which, some positions having been laid down, something different from these positions follows as a necessary consequence from this being laid down.”\* This definition is true if we take the word “different” as applying to *formal* difference merely. The conclusion is latent in the two “positions,” and its expression adds no fresh *matter* to our knowledge; but it puts our knowledge in a fresh *form*. This, indeed, seems to be Aristotle’s view. His distinction between implied and recognized knowledge is very instructive. “And in this sense the doctrine of Plato in the Menon is partially true—that learning is reminiscence. We can never know beforehand particular cases *per se*; but in proportion as we extend our induction to each case successively, we, as it were, recognize that, which we knew beforehand as a general truth, to be realised in each. Thus, when we ascertain the given figure before us to be a triangle, we know immediately that its three angles are equal to two right angles.”† This example would be treated by most modern logicians as a case not of true induction and deduction, but of “parity of reasoning.” Our conclusion does not really relate to the *particular* triangle inspected. We have already proved of every triangle what we assert of this one, which only serves as a convenient symbol of our concept; for the relations with

\* Grote’s *Aristotle*, vol. I (Anal. Prior. I, i).

† *Ibid.* (Anal. Prior. II, xxi).

which we are dealing, are such as constitute the concept of a triangle in general, and have nothing to do with the peculiarities of this special triangle. This is unquestionable; but later we shall see that all legitimate induction is really of the nature of "parity of reasoning."

Aristotle's doctrine of premises has next to be considered. In dialectic, the premises may be drawn from popular opinion, and need not be incontrovertibly true; in scientific demonstration, they must be "true, immediate, prior to, and more knowable than the conclusion." They must be "necessary premises, such as cannot possibly be other than they are." The predicate must belong to the whole of the subject, and must belong to it not occasionally, but at all times. It must inhere as an essence, not as an accident. A perfect predicate is true of the subject, as distinguished from any class which it comprehends, or in which it is comprehended. It will indeed be true of the sub-class, but not *distinctively* true; the sub-class having a minor distinction of its own; while of the higher class, as a whole, it is untrue. The sense in which Aristotle applies the term "necessary," must be carefully remarked. With him, it does not relate to what Kant calls "apodictic" verity; to mathematical or categoric certitude. By a "necessary" premiss, he means a premiss which expresses the essence of the subject—that which makes the subject what it is. Thus in the syllogism: "Man is a reasoning being, Socrates is a man, therefore Socrates is a reasoning being," the predicate "reasoning being" expresses the essence of man, while the predicate man expresses the essence of Socrates (not, it is true, his essence as distinguished from other individuals). The conclusion "Socrates is a reasoning being" will be necessarily or essentially true.

This becomes clearer when we examine the nature of the indemonstrable *principia* which form the basis of demonstration. These may be axioms, definitions, or hypotheses. The two axioms upon which all reasoning, dialectic or demonstrative, depends, and which are indeed involved in the very conception of reasoning, are the maxim of contradiction



—that a thing cannot both be and not be—and the maxim of the excluded middle—that a thing must either be or not be. A regress without end is obviously impossible, because, in the very attempt at regression, we must assume those principles as ultimate which we are denying to be ultimate. “The maxim [of contradiction] is assumed in all demonstrations; unless you grant it, no demonstration is valid; but [or therefore] it cannot be itself demonstrated.”\* Of course, as Aristotle points out, all the world must, consciously or unconsciously, apply these axioms in daily life; but, before him, no one had formulated them, and by some they had even been impugned. Other *principia* are of a lower degree of generality, and each science has some which are peculiar to itself. These may either be immediately true, or demonstrable by means of the common axioms. The definition expresses the essential meaning of the attributes to be demonstrated; the hypothesis is a statement not demonstrated, but taken on trust by the pupil or respondent.

But how, it must now be asked, do we acquire these *principia*? Are they innate in the mind, existing there as inheritances, or as relics of a former state of being, needing only to be brought into fuller and clearer light? Or, are they products of experience, gradually gathered by unconscious daily induction? Aristotle replies that they evidently do not exist full-formed in the infant mind, since we cannot have such valuable and accurate cognitions from the first moments of childhood, and yet not be at all aware of them.” Still, “we have, from the first, an inborn capacity or potentiality of arriving at them.”† So, indeed, have all animals; for all possess at birth an apprehending and discriminating power, called sensible perception. With many animals the act of perception leaves no mental traces, but others are able to retain perceptions in their minds. Thus “out of perception arises memory; next, out of memory of the same often repeated, arises experience, since many remembrances, numerically distinct, are summed-up into one experience; lastly,

\* Grote's *Aristotle*, vol. II, ch. xi (*Metaph.* I, iii).

† *Ibid.*, vol. I, ch. viii (*Anal. Post.*, II, xix).

out of experience, or out of the universal notion, the *meum et idem* which pervades and characterizes a multitude of particulars, when it has taken rest and root in the mind, then arises the principium of art and science."\* The *principia* are thus known by induction, resting on sensible perception; they are, however, apprehended by the infallible *noûs* or reason, and apprehended therefore with the greatest possible accuracy.

This account of the source of our most general ideas seems, at first sight, to trace them to a purely empirical origin; but it should be read in connexion with the definition of the Psyche in the "De Animâ." Especially should the significance of the term "potentiality" be studied, since, in Aristotle's thought, that which is a potentiality in one aspect may in another aspect be an actuality. The soul is the first entelechy or *actuality* of the body, making it potentially active, even before it begins to act. This state is therefore a *potentiality* as regards the second or higher entelechy, which consists in actual exercise of the faculties. The potentiality is not a mere blankness; it is the readiness to react in a special manner in response to impressions. Without the impressions there can be neither perception nor knowledge; but without an innate apprehending and discriminating power impressions cannot be received. Aristotle does indeed compare the *noûs* to "a tablet on which no letters have as yet been written, but upon which all or any letters *may be* written."† But this, when taken in connection with the succeeding paragraphs, seems to denote the receptivity of the *noûs* for the *matter* of knowledge, rather than an indifference to the *form* of knowledge. For the *noûs* is expressly said to handle the materials of sense "in a way of its own, and from its own point of view, comparing and analysing; recognizing the abstract in the concrete, and the universal in the particular; discriminating, mentally and logically, the one from the other, and noting the distraction by appropriate terms."‡ It is evident that a process of this kind, which *constitutes* induction, cannot rest

\* Grote's *Aristotle*, vol. I, ch. viii (*Anal. Post.*, II, xix).

† Grote, vol. II, ch. xii (*De Animâ*, III, 4).      ‡ *Ibid.*

on induction; it is further evident the process implies conformity to the axiom of contradiction, which therefore must govern even the earliest operations of nous. We are, then, not to regard the conviction that a proposition cannot be both true and false, or that there is no medium between being and non-being, as generated by experience; although experience is needed to bring even such primary truths into full consciousness.

As regards the secondary *principia*, that is, those belonging to special sciences, we may regard them as products of an induction carried on according to the laws of reason. "And thus reason is not to be regarded as belonging to and governed by the things of sense (reason being a faculty independent of the matter of such objects), but the world of thought and sense must be regarded as belonging to and regulated by reason."\*

This consideration of the mode in which universals are generated forms a natural transition from Aristotle's elaborated theory of deduction to his inchoate theory of induction. It is not indeed wonderful that he should never have expounded the Logic of Induction; his great merit lies in his conception of the immanence of universals in particulars. We have seen that Plato's doctrines never rest on an empirical basis, but are always excogitated independently of particulars, which are used merely for purposes of illustration; and that his empirical investigations never end in the solution of any doubt, or the discovery of any general truth. But Aristotle's method is very different. He cleaves to the concrete; to him the perfect reality, the "first substance," is neither the genus nor the species, but that union of form and matter which constitutes the individual. In the words of Mr. Wallace: "Every real thing is at once individual and universal: it is either an individual universalised by the relation in which it exists, or an universal individualised through the particular conditions which determinate existence impose on it. The truth of things thus lies in the fully determined concrete, rather than in the vague and

\* Aristotle's *Psychology* (Wallace), III, 4.

empty abstract: or, in Aristotelian phraseology, it is a combination in which matter merges in form, and form gains reality through an as yet unformed matter."\* The individual then is the real starting-point of Science.

The recognition of this simple truth was to philosophy an event not less momentous than to Astronomy the substitution of heliocentrism for geocentrism. The point of view was changed; the direction of investigation was reversed. Not that Aristotle himself, or his contemporaries or successors, appreciated the importance or carried out the consequences of this revolution. That was to be the work of future ages. Yet nothing can be clearer or more modern than sentences such as the following: "For without sensation there can be no induction, and it is from induction only that the premises for demonstration by syllogism are obtained. [This, as we have seen, is to be understood with some qualification.] We cannot arrive at universal propositions, even in what are called abstract sciences, except through induction of particulars; nor can we demonstrate except from universals. Induction and Demonstration are the only two ways of learning; and the particulars composing our inductions can only be known through sense."† The *Psychology* (*De Anima*) is conceived throughout in the inductive spirit. The higher mental functions, it teaches, are built up from materials furnished by the lower. "While imagination does not come into existence independently of sense-perception, conception is not found without the aid of imagination."‡ Aristotle's inductive theory, indeed, resulted inevitably from his doctrine of the trustworthiness of the senses, so different from the sense-scorning philosophy of Plato and the Eleatics. "The perception of the qualities peculiar to each sense is always true, and is an attribute of every animal; thought, on the contrary, may be false as well as true."§ The soul cannot reason without phantasms, which are the relics or reverberations of sense-impressions. It comes into correla-

\* Aristotle's *Psychology* (Wallace), Introduction.

† Grote, vol. I, ch. vii (*Anal. Post.* I, xviii).

‡ Wallace (III, 3).

§ *Ibid.*

tion with those cogitable or intellectual forms which are involved in the sensible forms," so that nous "stands towards its objects in the same relation as that in which the faculty of sense stands towards the objects of perception."\*

It cannot, however, be said that Aristotle was successful in his sole attempt to formulate a theory of induction. After expressly asserting that we know all things either by induction or by syllogism, he yet tries to represent induction in syllogistic form. His so-called inductive syllogism is in reality no more inductive than any other syllogism. It is "a process in which we invert the order of the terms, and reinforce them by introducing an extraneous assumption."† Thus, "let A (the major term) mean the class-term long-lived, and B (the middle term) the class-term bileless, or the having no bile; let C (the minor term) mean the individual animals—man, horse, mule, &c., coming under the class-term B, bileless."‡ Then, instead of predicating A of B, B of C, and therefore A of C, we predicate A of C, then B of C, and, assuming that C is co-extensive with B, we affirm A of B. That is, instead of saying: "All bileless animals are long-lived—such and such animals are bileless—therefore such and such animals are long-lived," we say: such and such animals are long-lived; such and such animals, *and no others*, are bileless, therefore all bileless animals are long-lived. Obviously the inference has no special claim to be termed "inductive." The premises represent the inductions which are still unaccounted for.

This brief account of Aristotle's theories of Induction and Deduction, will help us to understand his estimate of the relative cogitability of universals and particulars. His doctrine of forms, immersed in and inseparable from matter, yet not mere abstractions, but immanent causes, actualising what was potential, perfecting what was inchoate, led naturally to a point of view at once empirical and ideal. The individual, or the unity of matter and form, is the true reality; that is, the concrete is the real. And yet it is the

\* Grote, vol. II, ch. xii (*De Anima*, III, 8).

† Grote, vol. I, ch. vi (*Anal. Prior.*, II, xxiv).

‡ *Ibid.*

form in the matter which gives the individual its reality ; that is, the abstract in the concrete, the universal in the particular, is the actualising essence. Therefore, although science must start from particulars, it cannot rest in them, but finds its true home in universals. Thus, there is a distinction between things which are prior and more knowable to us, and things which are prior and more knowable by nature. "Now I call things prior and more known to us, those which are nearer to sense ; and things prior and more known absolutely, those which are more remote from sense ; and those things are most remote which are especially universal, and those nearest which are singular, and these are mutually opposed."\* We have to begin with particulars, because these lie before our eyes, and so are immediately more knowable ; we must progress to universals, for these hold the key of particulars, and so are ultimately more knowable. Not till we elicit a general conception from which we can reason deductively, have we true scientific knowledge, enabling us to recognise the relationships of individuals, and the unity which underlies their diversity, and even to predict their actions or attributes. Particulars perish, but the class is imperishable ; particulars are unknowable from their multiplicity, the class knowable from its unity. "He who knows the universal, does in a certain sense, know also the particulars ; but he that knows the particular cannot be said in any sense to know the universal,"† except so far as he finds the universal element in the particular.

This is not the antithesis usually drawn by modern logicians between universals and particulars ; consequently between induction and deduction. It is considered that induction is essentially a process of passing from the known to the unknown, and that, in the universals thus obtained, there is always an element of uncertainty. From the observed particulars to the universal, we have to take a "leap," if not in the dark, at least in imperfect light. Afterwards, our path is smooth enough ; but this leap in the middle

\* *The Organon of Aristotle* (P. F. Owen, vol. I, *Anal. Post.*, I, ii).

† Grote, vol. I (*Anal. Post.*, I, xxvi).

makes the whole proceeding somewhat hazardous. Zeller expresses very clearly the difference between the Aristotelian and the usual point of view. "According to Aristotle, induction consists in obtaining, from the *totality* of particulars in any given class, a rule which expresses, as a universal law, what has been observed in all the instances. But induction really consists in obtaining a rule from all the particulars *known to us*. In considering the principle of inductive reasoning, the main question is this—what justifies us in concluding from the particular instances known to us to all similar instances?" This is indeed the question upon which the whole theory of induction turns; and which never, in this form, suggested itself to Aristotle. Yet in the course of our subsequent enquiries, we may possibly find that the true answer lay implicitly in his philosophy; that he at least was not further astray than most of his modern critics.

There is, however, a distinct gap in Aristotle's theory, due to his non-recognition of any laws or generalisations, intermediate between the "necessary" *principia* of scientific demonstration and the *principia* of dialectic, which may be mere vague summaries of popular opinion. Generalisations approximately true, or possessing a certain degree of probability; hypotheses held loosely until verification is possible; empirical laws, which cannot be actually verified, either by experiment or by reasoning in all the cases which they profess to cover; of these Aristotle does not treat. This point of view was inevitable, since, as appears from most of his illustrations and from his mode of reasoning, he took Geometry as the typical science, and the mathematical concept as his type of the universal.

From Aristotle's theory it is natural to turn for a moment to his practice; and, if the latter falls even lamentably behind the former, there is no occasion for surprise or reproach. He was the founder of Logic and Psychology; he was a more or less careful zoological observer, and to some extent an anatomist; but for the most part his theories are merely of historical interest, and he does not scruple to eke out

his deficiency in experimental knowledge by the airiest hypotheses. He knew theoretically that "we must not accept a general principle from logic only, but must prove its application to each fact, for it is in facts that we must seek general principles, and these must always accord with the facts."\* Yet he could not free himself from the old verbal traps, or from the habit of confusing ideal perfection or logical consistency with objective necessity. The explanation of such inconsistencies is easy. Aristotle first brought the process of deduction into full and clear consciousness—a gigantic, but a possible task, as logical forms of thought had been made familiar by the progress of mathematics and by the current modes of philosophising. But the method of induction could not at that period have been brought into consciousness so fully or so clearly. To have appreciated its necessity and value was a triumph of intellect; but to foresee and provide against errors of observation and interpretation; to comprehend the importance of testing laboriously the most seemingly certain generalisations; to devise modes of experimentation for the discovery of truth—all this could not be accomplished till after long centuries of re-search. Much less was it possible to this patriarch of science—this father of inductive philosophy.

\* Lewes' *Aristotle (De An. Motione, I, 698)*.



## IV.

## FROM ARISTOTLE TO BACON.

THE history of philosophic method from the death of Aristotle, in 322 B.C., to the 16th Century A.D. may be very briefly told. Neither in the remaining forms of Greek thought, nor in the patristic and scholastic philosophies, shall we find much to detain us.

The earlier sceptics or pyrrhonists attacked the very bases of logic by denying the axiom of contradiction; and this exaggerated scepticism prevented their doctrine of the relativity of knowledge from bearing any fruit. Among the later sceptics, Sextus Empiricus pointed out "that every syllogism moves in a circle, since the major premiss, on which the proof of the conclusion depends, depends for its own certainty on a complete induction, in which the conclusion must have been already contained."\* The question which obviously follows: "If the induction is *not* complete, how can we pass from the known to the unknown?" Sextus Empiricus did not ask; his dogmatic scepticism leading him to assume that such a transition was impossible.

The Museum of Alexandria was founded on Aristotelian principles, and contributed greatly to the advancement of science, not by theoretical improvement in method, but by practical research. I need but recall the names of Euclid, Archimedes, Eratosthenes, Hipparchus, and Ptolemy, to indicate the progress made in mathematics and in astronomy. The biological sciences were also pursued, with results less striking, yet in the long run equally penetrative. For the succession of great Jewish physicians (whose influence upon Arabian intellectual life was so vital, and who kept up the light of knowledge through the long mediæval dark-

\* Ueberweg, vol. I, §60.

ness) found, if not a starting point, yet a decisive turning point from superstition to science in the Medical School of Alexandria.

But with the growing supremacy of Rome, the active militant spirit became predominant, and the spirit of investigation languished. Alexandria sunk to the level of a provincial town; her philosophy declined, and at last merged in Christian theology and Neo-Platonic mysticism. Mysticism, or faith in the "inner light" is less fatal to thought than authority in matters of belief, which quells investigation and imagination alike with a strong hand. It was the principle of authority which finally triumphed, and at last sat supreme in the Imperial City itself.

To trace the history of patristic thought would be a weary task, and fortunately it is not mine. St. Augustine, however, was a true and noble thinker. He laid down the fundamental truth that the most certain of all facts to every man, is the fact that he thinks; and that even the doubter, who knows his own doubts, is cognisant of himself as a thinking being. This ultimate axiom—the reality of thought—is logically prior to all reasoning. It is true that Saint Augustine went on to argue from the reality of thought to the reality of its objects, thus laying the foundation of Anselm's ontological fallacy; still, he had anticipated Descartes, and at a greater distance, Kant.

The scholastic philosophy was, broadly speaking, a combination of Aristotelianism with the doctrines of the Church, although the earliest scholastics, of whom Johannes Scotus, or Erigena, is the type, were more largely influenced by Platonism and Neo-platonism. Till nearly the middle of the twelfth century, indeed, none of the works of Aristotle, excepting the *Categories* and the *De Interpretatione*, were accessible to western scholars; but after 1128 the *Analytica* and *Topica* became known, and about 1200 the metaphysical and physical writings. It is interesting to turn for a moment from the fettered thought of Christendom to the temporarily freer speculation of Islam, and to see how the former received from the latter a fresh impetus. The Arabs, from

about the year 750 A.D., came much under the influence of Jewish and Syrian physicians, and by them were made acquainted with the writings and the spirit of Aristotle. Philosophers arose, such as Avicenna, Alhazen, Averroes, who combined the study of medicine, mathematics and astronomy, and explained away theology as showing forth in types and fables those truths which the philosopher sees in their naked purity. And from this source it was that the schoolmen became acquainted with all the works of Aristotle, excepting the previously known logical treatises. Through the agency of the Jews, Arabic translations were made into Latin, though later the original Greek text was brought to the West and translated.

The great question, which agitated the minds of thinkers from the end of the eleventh to the end of the fourteenth century, was the problem of Nominalism *versus* Realism, which resolved itself into several sub-problems. Have universals a real existence? If so, do they exist independently of and prior to individuals—are they “*universalia ante rem*?” Or do they exist only *in* individuals?—Are they “*universalia in re*?” If neither of these hypotheses be true, then universals must be mere abstractions, or “*universalia post rem*.” Roscellinus (about 1090 A.D.) was, if not the founder, yet the first important exponent of nominalism; Anselm of Canterbury, and William of Champeaux championed realism. The great schoolmen, Albertus Magnus, Thomas Aquinas, and Duns Scotus, were realists in the Aristotelian sense.

So long as universals are considered to be *in re* and *post rem* and not, as by strict Platonists, *ante rem*, realism is not necessarily hostile to inductive research, since it recognises the derivation of valid concepts from experience. Yet, even these modified forms, realism as held by the schoolmen, had, doubtless a tendency to exalt ill-defined or empty ideas above concrete facts. The schoolmen were indeed wonderful adepts in that kind of spurious deduction, which endeavours to draw out of an idea more than has been put into it; a process analogous in the region of thought to the search for

a principle of perpetual motion in the region of mechanics. The attempt to construct a machine which shall never run down, and the attempt to deduce the being of God from the idea of God, are equally specimens of the fallacy that an infinite result may be obtained by finite means.

It was indeed impossible that thought should move freely when fettered by a forced conformity to the dogmas of the Church, and the views of Aristotle. During the second period of scholastic philosophy (1200-1400) "no opinions were defended" in the disputations "which were altogether original and were not supported by some authority."\*

Albertus Magnus was "the first scholastic who reproduced the whole philosophy of Aristotle in systematic order, with constant reference to the Arabic commentators, and who remodelled it to meet the requirements of ecclesiastical dogma."† Alchemist and reputed magician, he may have had some sympathy with the spirit of his master. There is no doubt that a yet and more fruitful sympathy would have been felt by the great Thomas Aquinas, had he lived in another age than that of faith. Schoolman and theologian though he was, he held not only that the mind effects a "purely subjective separation by considering in the individuals only the universal," but also that "there is no knowledge that is innate and independent of all experience."

Even from St. Thomas, it is cheering—and yet saddening—to turn to our own great countryman, Roger Bacon, and listen to the truly scientific spirit of his utterances—a spirit unquenched by the privations of bodily and mental nourishment with which his researches were punished. "But besides these sciences," (alchemy, mathematics, &c.) "there is one more perfect than all, to which all are affiliated, and which in a marvellous manner gives certitude to all; and this is called the experimental science. It neglects arguments because, however strong they may be, they give no certitude, unless the conclusion can be directly tested by comparison with fact."‡ This science, he goes on to say, reaches truths not otherwise attainable; it even includes

\* Ueberweg, § 98. † *Ibid.*, § 100. ‡ *Opus Tertium*, cap. xiii.

knowledge of the future; it shows the falsity of magic, by teaching "the whole possibility of nature and art," just as logic enables us to recognise sophistical arguments, by teaching us the forms which are valid. Before reprobating any statement as false, we should take care to enquire into the facts, "that truth may ever remain inviolate." The experimental philosopher renders possible all the ancillary sciences. His science verifies "by perfected experience; not by arguments, like purely speculative sciences; nor by weak and imperfect observations like the practical sciences."\*

The distinction here drawn between "experimental science" and the special sciences is obviously erroneous. For observation, experiment and induction, form a *method* of research, common to all the sciences, but not in itself constituting a science. That Bacon has not in view the construction of an inductive logic, which should be to experimentalists what Aristotle's deductive logic was to the schoolmen, is evident from the illustrations which he gives. The geometer—or rather, as we should say, the physicist—needs a burning-glass for his investigations. But, Bacon says, the physicist did not invent the burning-glass; this was done by the experimentalist. The example is unfortunate; for the experimentalist must have possessed some knowledge of optics, and thus have joined to his experimentalism acquaintance with a special science; so that the physicist or some of his kin must after all claim credit for the lens. No instance can indeed be imagined in which special training would not be requisite; and the pure experimentalist, turned loose to experiment at his own free will, with the world before him where to choose, would be in a sorry plight.

But, with these qualifications, Roger Bacon's conception of science must be considered as truly marvellous in an age when men believed that they might deduce the laws of nature from the works of Aristotle. Unlike his namesake, the illustrious Chancellor, he sought zealously and untiringly to put in practice what he preached; although his method could not but be tinged with the spirit against which he

\* *Opus Tertium*, cap. xiii.

protests, and for this reason, and also from lack of instruments and opportunities, was doomed to remain unfruitful.

The Nominalist, William of Occam, helped in preparing "the way for an inductive investigation of external nature and of psychical phenomena."\* Sensible perception, he maintained, is "the natural form of our cognition," and, without actual apprehension of particulars, no concept, and consequently no judgment, can be formed. "Abstracted knowledge, on the contrary, justifies no judgment in a question of existence or non-existence." Yet the senses do not give us our most certain knowledge, for we may be deceived in judging of the existence of external objects; but "the intuitive knowledge of the intellect, concerning our own internal states, is more certain than all sense-perception." But only the states, not the essence of the soul, are known in this way. Occam follows Aristotle in the doctrine that "the fundamental principles (of science) are obtained from experience by induction." All knowledge which transcends experience was relegated by him to the sphere of faith. This separation of reason and faith was a step towards the complete emancipation and sovereignty of reason. Erigena had regarded true philosophy as identical with true religion; Albertus Magnus and Thomas Aquinas had excluded "the specifically Christian and ecclesiastical doctrines of revelation . . . from those doctrines which could be positively justified on rational grounds;"† and Duns Scotus confined Natural Theology within even narrower limits. Yet the progress involved some retrogression, since it led to loss of interest by theologians, especially by the Protestant section, in philosophical problems.

But the dayspring was already beginning to dawn through the darkest times, the scientific spirit had been kept from complete extinction by mathematicians, astronomers, physicians and alchemists; most of whom were of the Jewish race, until the unjust decrees which forbade any Jew to practice medicine on a Catholic patient in France and Spain.

\* Ueberweg, vol. I, § 104.

† *Ibid.*, § 101.

As mathematics and medicine had been the parents of science, so now they fostered and nourished its failing life. Progress in the practical arts also had a beneficent effect. "In all cases" says Dr. Whewell, "the arts are prior to the related sciences. Art is the parent, not the progeny of science; the realisation of principles in practice forms part of the prelude, as well as of the sequel, of theoretical discovery."\* It is true that, as he adds, "a practical assumption of a principle does not imply a speculative knowledge of it," but it does imply a *practical* knowledge, in which the speculative knowledge lies latent, ready to be disentangled by the first mind which sees a problem in the familiar facts. Indeed, the inductive process which leads to invention is analogous to the inductive process which leads to discoveries. In the former different ways of doing something, have to be tried till one succeeds; in the latter, different ways of *thinking* something have to be tried till one proves in accordance with fact. But the doing involves some thinking, and the thinking must be verified by doing—that is, by experiment. So that true inductive principles lie hidden in the procedure of the ingenious craftsman, waiting to be brought into consciousness and systematically applied by some intellect more enquiring than the rest.

In the fourteenth and fifteenth centuries there was a great expansion of commerce and increase of wealth, inevitably turning men's attention from heaven to earth, and beginning that secularisation of thought to which all subsequent progress is due. The latter part of the fifteenth and the beginning of the sixteenth century saw mighty changes. The New World was discovered; printing was invented; classical studies were revived, and the authority of Aristotle shaken; culture became everywhere more secular; Averroistic Pantheism predominated in the Italian Universities; the Protestant Reformation exerted its disintegrating influence in the North and West.

The close of the sixteenth and opening of the seventeenth century witnessed the rise of modern science in Europe. It

\* *History of the Inductive Sciences*, bk. IV, ch. v.

was the age of Copernicus, Kepler, Galileo. The telescope and other scientific instruments were invented; the foundations of modern zoology, anatomy, physiology, and even geology, were laid during this eventful period. "Tycho Brahe made a new catalogue of the stars; Gilbert wrote his admirable book on the magnet; Gesner led the way to zoology, taking it up at the point to which the Saracens had continued Aristotle, by the publication of his work on the history of animals; Belon at the same time, 1540, was occupied with fishes and birds. Fallopius and Eustachius, Arantius and Varolius, were immortalizing themselves by their dissections . . . . Piccolomini laid the foundation of general anatomy by his description of cellular tissue. Coiter created pathological anatomy; Prosper Albinus, diagnosis; Plater, the classification of disease; and Ambrose Paré, modern surgery."\*

This new departure of the European mind need not awaken our surprise. Many causes, moral, material, and intellectual, contributed to the decay of theology: and the increase of wealth, the rise of a rich and leisured class, and the consequent cultivation of the arts of life, were enough in themselves to account for the changed direction of thought. Intercourse with foreign countries, the study of a classic philosophy which was not that of the great schoolmen, an enlarged acquaintance with different forms of government and of religion, and the growing abuses of the Holy See, engendering revolt and scepticism, were sufficient to render the change permanent. Besides, the philosophers of the fifteenth and sixteenth centuries had not to begin over again, and frame a completely new method. Though they rejected the authority of Aristotle, yet he and his disciples had indicated the true path of discovery, which had never, since his days, been left altogether untrodden. When that path is once made clear, the common practice and habit of the mind do the rest. For we use inductive reasoning every day of our lives, in the most ordinary affairs; and experience teaches us the precautions to be used when we desire results completely or

\* Draper's *Intellectual Development of Europe*, vol. II, ch. viii.



approximately exact and certain. The invention of instruments, which was a consequence of the new interest in science, reinforced it with hundred-fold power, rendering possible, for the first time, really accurate measurements, and the establishment of quantitative laws, from which verifiable conclusions could be deduced.

## V.

## FRANCIS BACON.\*

WE now come to the great Chancellor, Francis Bacon, Baron Verulam; a writer noble and pregnant, the self-styled inaugurator of the new inductive epoch, and the hero of that myth with which literary men have beautified the origins of physical science. And certainly, if we listen to Bacon's estimate of his own importance, we shall be inclined to credit the myth, and to regard his place in the history of philosophy as higher even than that of Aristotle. He has been called the father of inductive philosophy; let us rather call him the father of English prose; let us regard him as the earliest, if not the greatest, of the literary men, who have believed that this "large-browed Verulam" is, in modern times, "the first of those who know." Instead of subscribing to the current creed, let us remember how successfully he has exemplified his own maxim—"Boldly sound your own praises, and some of them will stick."† Listen to the indictment which he brings, in 1605, against his own age, and to his liberal promises for the time to come.

Science, he says, is "fruitful of controversies, but barren of works."‡ It deals largely in abstractions, but fails when from generalisations it descends to particulars. In consequence it remains stationary, while the mechanical arts "are continually growing and becoming more perfect." "Philosophy and the intellectual sciences, on the contrary, stand like statues, worshipped and celebrated, but not moved or advanced." The reason of this condition of things is to be found in the prevalent servile adherence to authority and

\* All quotations are made from the edition by Messrs. Ellis and Spedding. † *De Augmentis*, bk. viii. ‡ Preface to *Instauratio*.

insufficient study of the facts of nature. Even experimenters pursue no regular system of operations. They seek for "experiments of fruit, not for experiments of light."\* Induction, which should be exhaustive and eliminative, is made by "simple enumeration" of examples. Observers pass at once from this hasty induction to the very highest principles, instead of gradually ascending by way of intermediate maxims. They do not examine into the truth of the first principles of the sciences and the "first notions of the intellect;" nor do they duly test the information given by the senses. When not slaves to words, or to philosophic systems, they are slaves to their own works, building up systems on a few experiments in some special branch of science.

The indictment may be allowed to pass. It was not, as we have seen, fully merited; but it had some foundation. Now for the promise. This is nothing less than the construction of a new Inductive Logic, which is to supply rules for discovery, just as the old Deductive Logic supplies rules for abstract reasoning. Demonstration by syllogism is to be rejected "as acting too confusedly, and letting nature slip out of its hands." "In dealing with the nature of things" we are to "use induction throughout, and that in the minor propositions as well as in the major."† A new path is to be opened, not by "anticipation of the mind," but by "interpretation of nature." "The business is to be done as if by machinery,"‡ so that this mode of discovery "goes far to level men's wits, and leaves but little to individual excellence, because it performs everything by the surest rules and demonstrations."

So much for a panoramic view of the Promised Land. Let us go on to explore it more in detail; or rather, to study the methods of exploration. In the first place, it is to be noticed that Bacon agrees with Aristotle in the distinction between particulars, as prior and more knowable to us, and universals, as prior and more knowable by nature. He even uses the Aristotelian term "form," although in a sense nominalistic,

\* *Novum Organum*, bk. I, Aph. lxx. † Preface to *Instauratio*.

‡ *Novum Organum*, bk. I, Aph. cix.

rather than realistic; and he regards the knowledge of "forms" as at once the object and the instrument of scientific research. "Of a given nature to discover the form, or true specific difference, or nature-engendering nature, or source of emanation (for these are the terms which come nearest to the description of the thing) is the work and aim of human knowledge."\* Again—"For though in nature nothing really exists besides individual bodies, performing pure individual acts according to a final law, yet in philosophy this very law, and the investigation, discovery and explanation of it, is the foundation as well of knowledge as of operation. And it is this law, with its clauses, that I mean when I speak of forms." He then proceeds to show that if we know only particulars, or only accessory clauses, we may empirically argue from special cases known to special cases unknown, but our knowledge cannot be general or truly scientific. "But, whosoever is acquainted with forms embraces the unity of nature in substances the most unlike, and is able, therefore, to detect and bring to light things never yet done."†

From all this it is clear that, whatever flaws may be found in it, Bacon's method is by no means one of pure empiricism. "Enquiries into nature" he holds (though he never exemplifies in practice the pregnant sentence), "have the best result, when they begin with physics and end with mathematics."‡ The particular is to him, as to all real thinkers, the husk of the Universal.

What are we to understand by Bacon's "Forms" and "Nature"? A "nature" is, broadly speaking, any phenomenon, quality, or attribute. "Simple Natures" may be either configurations of matter, as density and rarity, or they may be appetites or motions, as inertia and gravitation. The exact meaning of the term "Form," is less easily explained, Bacon uses the word as synonymous with "Law;" but to him law is not, as to scientific men of to-day, merely the formula expressing an invariable natural sequence. The term has nearly the meaning at present attached to it by

\* *Nov. Org.*, bk. II, Aph. i. † *Ibid.*, Aph. iii. ‡ *Ibid.*, Aph. viii.

pulpit orators and popular authors in general; it signifies a Force, or a Cause, acting in a certain definite manner. It is less realistic than the Aristotelian Form, but more realistic than the Newtonian Law. The conception was probably not very clear in the mind of Bacon himself. A Form may be one of those occult qualities of which Bacon speaks in the *Descriptio Globi Intellectualis* as "those appetites and inclinations of things, by which all that variety of effects and changes, which we see in the works of nature and art, is made up and brought about." It may be one of those "active virtues or motions," which are enumerated in the *Novum Organum* as resulting from the "desires" and "aversions" of matter, such as the "motion of connexion," resulting from Nature's supposed horror of a vacuum, or the "motion of resistance," resulting from the property of impenetrability. It may be merely a special mode of motion, as in the case of heat. Or, again, it may be a mode of arrangement of the particles of matter, as in the case of colour. A Form, then, is a Nature; but a primary Nature, a "Natura Naturans," an essential attribute, which gives birth to accidents. The form of a thing is the very thing itself, and the thing differs from the form, no otherwise than as the apparent differs from the real, or the external from the internal, or the thing in reference to man from the thing in reference to the universe.\* It is important to understand this part of Bacon's doctrine; for his whole theory depends on the assumptions that the "simple natures," whose permutations make up the sum of phenomena, are limited in number, and that their discovery and enumeration is easily within the compass of the human mind, and may indeed be accomplished within the life time of one generation. It follows of course that the "forms" must be still fewer. Since Bacon had what he deemed an infallible method of discovery, he might well believe that the secrets of nature, must in due time present themselves as so many problems, the factors of which are known, so that nothing is needed but patient and diligent working out, according to established

\* *Nov. Org.*, bk. II, Aph. xiii.

rules. It is curious that Bacon's method, which has been reproached as purely empirical, is intended as the path to a purely deductive science, which is to solve the problems of matter as geometry solves those of space.

From Bacon's doctrine of form, we pass on to his process of induction, or the search for forms. The form sought, must not be that of a concrete substance, but that of a "simple nature." "To enquire the form of a lion, of an oak, of gold, nay, even of water or air is a vain pursuit; but to enquire the form of dense, rare, hot, cold, heavy, light, tangible, pneumatic, fixed, and the like . . . this, I say, it is which I am attempting."\* We are to find some nature, which is correlated and convertible with the nature to be explained, and yet can be recognized as "a limitation of a more general nature, as of a true and real genus."† Supposing for instance, that the "nature" heat is expressible as the motion of the smaller particles of bodies; we can rise from this to the higher concept of motion in general. Yet, even this concept is not the highest; for the motion of the heavenly bodies are to be understood, not by mere observation, but by an investigation of the fundamental properties of matter, and deduction from certain "primary and Catholic axioms."‡

The precise method of search has now to be marked out; a method said to "embrace two generic divisions: the one how to educe and form axioms from experience; the other how to deduce and derive new experiments from axioms."§

First, an accurate and comprehensive "natural history" must be prepared; secondly, "tables and arrangements of instances" must be drawn up, and lastly comes the actual work of Induction. The tables of instances are to be made on no especial plan or theory. We are expressly forbidden to harbour any hypothesis which our investigation is to verify or to disprove. The collection is to be a mere amorphous heap, from which the form must be evolved with mechanical impartiality. Fixing our eyes on the nature to be explained, we must make a "muster or presentation before

\* *De Augmentis*, bk. III, ch. iv.

† *Nov. Org.*, bk. II, Aph. iv.

‡ *Ibid.*

§ *Ibid.*, Aph. x.

the understanding of all known instances which agree in the same nature, though in substances the most unlike.\* This is the "Table of Essence and Presence."

As an example, Bacon starts the problem "what is the form of heat?" And draws up an unclassified table, which certainly very well fulfils the conditions he has laid down. We are invited to consider, not only the heat of the sun, of flame, and of chemical combination, but the "heat" of wool and down, and of "aromatic and hot herbs;" also the burning sensation produced by intense cold.

The second table "of deviation, or of absence in proximity," contains "instances in which heat is absent or feeble" in subjects most akin to the others in which it is present and forthcoming. The rays of moon and stars do not give heat, nor do the rays of the sun "in what is called the middle region of the air." The sun's heat is weak at the poles. The *ignis fatuus* has not much heat, and the flame of haloes must be "still milder." Phosphorescence, and cases in which chemical combination apparently produces no heat, are mentioned among other negative instances, and the suggestion is made that spices and acrid herbs might be found on experiment to "dry bacon and meat hung over them, as smoke does."

The third table is of "Degrees or Comparison" showing instances in which the "nature" to be investigated is present in very small or very great degree. "Solid and tangible bodies" are not "originally hot," but have "a certain potential heat." Vegetables are not warm, but "gain warmth by being shut up." Putrefying substances contain elements of heat. Fevers are marked first by shivering, then by burning. The sun gives greater heat the nearer he approaches the zenith. "There are many degrees of strength and weakness in the heat of flame and ignited bodies;" spirit of wine being "the softest" (!)

The office of these three tables is the "presentation of instances to the understanding." Next, "Induction must be set to work, for the problem is, upon a review of the instances all and each, to find such a nature as is always present or

\* *Nov. Org.*, bk. II, Aph. xi.

absent with the given nature, and always increases or decreases with it; and which is, as I have said, a particular case of a more general nature."\*

But Induction must not begin with hypotheses. "Now if the mind attempt this affirmatively from the first, as when left to itself it is always wont to do, the result will be fancies and guesses and notions, ill-defined, and axioms that must be mended every day."† The process of Induction is to be founded on the three tables. Evidently the form cannot be a condition which is absent in any case where the given phenomenon is present; and the first table, "of essence and presence," will teach us what conditions to exclude on this ground. Nor can the form be a condition which is present in any case where the given phenomenon is absent; here we shall be instructed by the second table, of "absence in proximity." The form, again, cannot be a condition which is "found to increase in some instance when the given nature decreases, or to decrease when the given nature increases."‡ This test we apply by using the table "of degrees." We shall now be able to draw up a fourth table, "of exclusions or rejections," which, by a process of elimination, will bring us at last to a knowledge of the true form. We submit the mixture, as it were, to a process of fractional distillation. For instance, in seeking for the form of heat, we reject successively the nature of the elements, of heavenly bodies, of the subtle texture of bodies, of light or brightness, of rarity, and of motion of the body as a whole; because we have considered instances of heat in which these "natures" do not play any part, or do not play a primary part.

It must be observed that this process is infallible only on the supposition that we are able to analyze every instance given in the three tables into its component "simple natures." Unless this can be done, the elimination can never be complete. The residuum left will not be simple, but complex. It will consist of one known condition, and any number of possible unknown conditions, any one of which may be the true "form." Take the examples given by Bacon himself.

\* *Nov. Org.*, bk. II., Aph. xv.

† *Ibid.*

‡ *Ibid.*, Aph. xvi.



He had no conception of the real nature of temperature, of the phenomena of conduction, of the different thermal capacity of different bodies, of the laws of latent heat. He confused the irritation caused by a pungent taste with the sense of temperature. He knew nothing about flame; regarding the "flamy" and the "aery" as two great classes having nothing in common. With knowledge so deficient how could he even approach a correct analysis of the selected examples? How could he understand the significance of the warm feeling of woollen clothes, or how conceive the true relation of light and heat?

Although our knowledge is greatly in advance of his, we can never be certain that we have completely analyzed any natural phenomenon, and that every factor is clear and open to our gaze. The very essence of scientific progress is the discovery of some hitherto unsuspected factor, which has escaped detection in every previous investigation, and would consequently have vitiated the most scientifically conducted distilling process. For we do not, on Bacon's method, distil the very phenomena themselves; we distil *our own ideas*; and if the idea lacks the essential element which we seek, it naturally will not appear in the residuum. In short, Bacon demands a perfect preliminary acquaintance with the integral components of our problems, united with ignorance of their mutual relations. *Then*, we have nothing to do but to try different ways of putting our puzzle together, till we find how the pieces really fit. But, as a matter of fact, we never have this preliminary acquaintance.

Bacon is aware that, until we possess sound notions of the "simple natures," our results must be inaccurate; and he promises, but does not give, aids to the formation of such concepts. Instead, he goes on to a tentative "essay in the affirmative way," which he calls the "Indulgence of the Understanding, or the Commencement of Interpretation, or the First Vintage." As Mr. Ellis remarks,\* this First Vintage is merely parenthetical, and in no way intended as a specimen of Bacon's royal road to truth. It is rather a concession to

\* Preface to Bacon's *Philosophical Works*.

the incorrigible passion for generalisation and hypothesis which besets the human mind. It refers to the tables, but is not founded upon them. The conclusion that "heat is a motion expansive and restrained, and acting in its strife upon the smaller particles of bodies," is certainly fortunate, but it is a lucky guess rather than a real induction. The instances and arguments on which it is founded are not only insufficient, but many of them are fallacious. Nothing, for example, is proved by the quivering of flames, by the boiling of liquids, or by the "increase of heat by bellows and blasts." No hint is given as to any mode of verification. If Bacon's method could be completely carried out, it is obvious that subsequent verification would be superfluous, since nothing could add to the certainty of an exhaustive analysis. But, as I have said, the First Vintage is a divergence from the high-road, an indulgence to weary feet. Bacon promises nine further divisions of his work, as follows: (1) Prerogative Instances; (2) Supports of Induction; (3) Rectification of Induction; (4) Varying the Investigation according to the Nature of the Subject; (5) Prerogative Natures with respect to Investigation; (6) Limits of Investigation, or a Synopsis of all Natures in the Universe; (7) Application to Practice; (8) Preparations for Investigation; (9) Ascending and Descending Scale of Axioms. But of these he gives us only the "Prerogative Instances"—an enumeration of the kinds of observation and experiment best fitted to lead to the discovery of Forms. In this part of the work he shows, perhaps, his keenest insight; and some of the examples are both just and felicitous. But the general principle on which the "instances" are selected is never indicated. Many of them are such as to imply, not a wholly impartial search, but some hypothesis which has to be verified or disproved. In the words of Mr. Ellis: "It is difficult to see how the circumstances which give any instance its prerogative could have been appreciated *a priori*. An *instantia crucis*, to take the most celebrated of all, has its distinguishing character only in so far as it is viewed with reference to two contending hypotheses."\* Bacon's practice,

\* Preface to Bacon's *Philosophical Works*.

indeed, in no single case exemplifies his theory. His "facts" are generally dubious, and spite of his theoretical revolt against authority, are often extracted from Aristotle and Pliny; the hypotheses which he professes to get rid of altogether are, on the contrary, numerous enough, but vague and unfruitful. He never educes a really valid and verifiable general law from his mass of ill-collected and ill-digested material. Read, for confirmation of this criticism, the "History of the Winds," or take the following sentence from the *Novum Organum*, remembering that it was written in the age of Kepler and Galileo: "Those [bodies] which are favourably placed, if they delight in motion, revolve in a circle; with a motion, that is, eternal and infinite. Those which are favourably placed, and abhor motion, remain at rest. Those which are not favourably placed, move in a right line (as the shortest path), to consort with bodies of their own nature."\*

Science has progressed, not by Bacon's method, but by that which he deprecates. That hasty flight of the mind from particulars to the highest generalisations, which he regards as fundamentally unscientific, is the necessary preliminary of investigation. Without some principle of classification, we cannot even marshal the facts to be examined; without some anticipation of Nature, we cannot even frame a question to which she will respond. Unclassified facts, such as those brought forward in Bacon's tables, lie before us every day. No tabulation can give value to the collection, until the discovery or assumption of some definite relationship binding the phenomena together. It is in the formation of this primary concept, which must be clear, exact, and susceptible of comparison with facts, that the true difficulty lies; and here Bacon gives no assistance. He would stifle this concept as an untimely birth; would deny it any right to existence, until after the mechanical processes of enumeration and elimination. What he says of astronomy is very striking: "I would have the History of Celestial Bodies simple, and without any infusion of dogmas, all theoretical doctrine being

\* *Nov. Org.*, bk. II, Aph. xlviii.

as it were suspended; a history embracing only the phenomena themselves (now almost incorporated with the dogmas) pure and separate; a history in short, setting forth a simple narrative of the facts, just as if nothing had been settled by the arts of astronomy and astrology, and only experiments and observations had been accurately collected and described with perspicuity.\* What would have been the progress of astronomy had Copernicus, Kepler, Galileo, and Newton confined themselves to the "simple narrative" style? Bacon says, further, that all present systems are mere hypotheses, not even professing to be actually true, but only to agree with the phenomena, and to be convenient for calculations and for the construction of tables. Here he shows a profound misconception of the value of scientific theory, which consists in organising our knowledge of phenomena, so as to render them both intelligible and predictable. If a theory accounts for all known facts, and enables us to predict new combinations, it is a scientific truth; there is no further test. Absolute truth is unattainable and unimaginable.

Bacon, however, conceives astronomy—and indeed all science—as, in its ultimate form, deductive. "For he who knows the universal passions of matter, and thereby knows what is possible to be, cannot help knowing likewise what has been, what is, and what will be, according to the sum of things."† His error is not the rejection, but the postponement, of deduction.

What then is Bacon's real significance in the history of inductive science? His method was useless; his practical contributions were nought. So far as we know, he has exercised no direct influence on any subsequent natural philosopher. He had not sufficient insight to welcome the Copernican Heliocentrism, the Gilbertan magnetism, or the Harveian discovery of the circulation of the blood; and he very dubiously recognized the value of newly-invented instruments of discovery and measurement. Yet, although his services have been *mis*-estimated, they perhaps have scarcely been *over*-estimated. He it was who first brought distinctly

\* *Descriptio Globi Intellectualis*, ch. v.

† *Ibid.*

forward the idea of an Inductive Method, correlated with the Deductive Method established by Aristotle. Men had reasoned inductively before him, and better than he; experience had been declared by Aristotle, and even by the schoolmen, to be the true source of general conception; but no serious attempt had been made to analyse the process of induction—scarcely a suggestion that it could be analysed. Bacon was the first to bring it distinctly into consciousness. He has no place in the annals of discovery; but in the annals of philosophy his place is very distinct. He is the precursor, not of Newton, who would have done his work just as well had the Baron Verulam never lived; but of J. S. Mill and of Jevons. His writings must also have had a great but indefinable effect in popularising the inductive spirit, and investing physical science at once with dignity and with charm. This indirect influence we cannot estimate; yet we can form some vague idea of its magnitude by turning to the *Novum Organum*, and drawing inspiration from its lofty diction, its noble enthusiasm, its spirit of confident hope, its comprehensive ideal.

## VI.

## THE SCIENTIFIC RENAISSANCE.

TURNING from theories about the method of discovery to that method itself, as exemplified by Copernicus, Kepler, Galileo, and Newton, we find nothing corresponding to the Baconian ideal.

Copernicus was not the author of the heliocentric *doctrine*, in which he had been anticipated by Pythagoras, Seleucus, and others; but he was the author of the heliocentric *theory*. That is, he first worked out the problem mathematically, deduced the consequences of the hypotheses, and compared the supposititious motions with the motions actually observed. His method was not a gradual ascent from particulars to mediate generalisations, and thence again upward to the highest generalisations; it was the assumption of a principle, and its verification by recognition in particulars. Leaving awhile the basis of ascertained facts, he begins anew from the highest point, and passes downward till he comes in contact with fact once more. Even his motives for questioning the Ptolemaic system were drawn less from its defective accordance with phenomena than from the sense that failed to satisfy intellectual demands. "He was dissatisfied, he says, in his preface addressed to Pope Paul III, with the want of symmetry in the eccentric theory, as it prevailed in his days, and weary of the uncertainty of mathematical traditions."\* He sought and found, in the works of ancient philosophers, assertions of the motion of the earth. "'Then' he adds, 'I too began to meditate concerning the motion of the earth: and though it appeared an absurd opinion, yet since I knew that, in previous times, others had been allowed the privilege of feigning what circles they chose, in order to

\* Whewell's *History of the Inductive Sciences*, bk. V, ch. ii.

explain the phenomena, I conceived that I also might take the liberty of trying whether, on the supposition of the earth's motion, it was possible to find better explanations than the ancient ones of the revolutions of the celestial orbs.'"\* This is not a day-labourer's mind collecting facts and endeavouring to sift out principles by an elaborate and cumbrous mechanism; but a great intellect seeking to satisfy its own genius. Yet this subjective craving led to an accord with nature, which the day-labourer's complete objectivity could never have approached.

Kepler is the very type of a discoverer, fertile in hypothesis, rigorous in verification. His guesses were endless, and many of them were wild and seemingly absurd; yet the method was fruitful. The many hypotheses which preceded his discovery of the laws of the planetary orbits, all depended upon the sound assumption "that there must be some numerical or geometrical relations among the times, distances, and velocities of the revolving bodies of the solar system."† Here is an instance in which the highest generalisation is reached first, and for a long time remains alone in its truth. It is reached through the fundamental conviction that all phenomena are subject to law, and that phenomena so closely bound up together in the order of nature must be interdependent in some discoverable and definite way. This is the rash theorising, and the unauthorised deduction, which the soul of Bacon abhors.

Galileo's method was the same, though he has not, like Kepler, given us the full account of his abortive hypotheses. He confirmed the Copernican system in two ways; first, by direct inductive verification, in his telescopic discoveries, and second, by consequences deduced from new and independently verified generalisations. The simplest formula, which could be shown to yield consequences in all respects agreeing with facts, was to him the true formula. He says, for instance: "Bodies will fall in the most simple way because natural motions are always the most simple. When a stone falls, if we consider the matter attentively, we shall find that there

\* Whewell's *History of the Inductive Sciences*, bk. V, ch. ii. † *Ibid.*

is no addition, no increase, of the velocity more simple than that which is always added in the same manner"—that is, when equal additions of velocity are made in equal times. As Whewell points out, this argument from simplicity is insecure, and might be as mis-leading as the argument from perfection, which seemed to Copernicus, and for a time to Kepler, a strong proof of the supposed circular form of the planetary orbits. But the principle is a sound one if kept subordinate to observed facts, and is implied in the "Rules of Philosophising" given by Newton himself.

Newton, in these rules, states clearly the modern conception of Induction, generally expressed in the formula "reasoning from the known to the unknown." No causes, he says, are to be admitted save true causes (*verae causae*), that is, the assumed conditions must not be mere figments of the imagination, but must be based on observation and analogy. Again, the causes assumed must suffice to explain the given phenomena.† "Natural effects of the same kind must be assigned to the same cause, as far as possible." "For the qualities of bodies are known only by experience, hence generalisations are to be made in agreement with experience, which can neither be suppressed nor minimised. Assuredly no vain dreams must be invented contrary to the tenor of experience, nor must we depart from the analogy of Nature, for she is wont to be simple, and always consistent with herself."‡ He proceeds to lay down the test of valid inference. We judge all bodies to possess extension, hardness, impenetrability, mobility, and "vis inertiae," because all that we are able to test possess these properties. We cannot examine all bodies in nature, neither can we examine the ultimate particles of which bodies are composed; but what is proved to be true of all the known we may assert of all the unknown. Hence, from the gravity of terrestrial objects, and from the mutual gravity of the earth and moon, and of all the planets, we conclude "that all bodies mutually gravitate." In the fourth rule, Newton repeats the central

\* Whewell's *History of the Inductive Sciences*, bk. VI, ch. ii.

† *Principia* (*Regula Philosophandi*).

‡ *Ibid.*



truth which shines through the errors of the Baconian method. "Propositions gathered from phenomena by induction, *without heed of opposing hypotheses*, are to be held as either accurately or approximately true, until other phenomena are met with by which their accuracy may be either confirmed or impugned."

Although Newton reprobates the fatal error of putting speculation in the place of observation, and opposing theories to facts—although he even asserts "*hypotheses non fingo*"—yet his method is necessarily as much deductive as inductive. The fruitful idea, that terrestrial gravity is one with the force which binds the planets in their orbits, was the parent of his greatest discoveries. As Jevons points out, Newton's great powers were wholly useless when, as in his alchemistic experiments, he was unguided by a definite hypothesis. "Deprived of all guiding clues, his experiments were like those of all the alchemists, purely tentative and haphazard. While his hypothetical and deductive investigations have given us the true system of the universe, and opened the way in almost all the great branches of natural philosophy, the whole results of his tentative experiments are comprehended in a few happy guesses, given in his celebrated "Queries."\*

The history of the emission theory of light is a good example of the difficulty—in most cases, impossibility—of that exhaustive analysis prescribed by the Baconian method. The phenomena of reflection and refraction seemed equally well accounted for by the rival theories of emission and undulation; while, on either theory, the colours of thin plates seemed to demand a super-added hypothesis. Newton was able to explain polarization on the supposition that the rays had sides, and believed himself able to explain defraction or inflection colour-fringes. So, during about a century and a quarter, the two hypotheses kept up their uncertain combat; until the great name of Newton had almost carried the day. Young's discoveries were greeted with ridicule and opprobrium; although, in proving that the undulatory theory

\* *Principles of Science*, ch. xxiii.

accounts for all the observed phenomena without the introduction of any new supposition, he was carrying out Newton's principle of the simplicity of natural operations. "Whatever may be thought of the theory," he observed, "we have got a simple and general law." But the emission hypothesis was finally overthrown by a crucial experiment. "By simply cutting a uniform plate of glass into two pieces, and slightly inclining one piece so as to increase the length of the path of a ray passing through it, experimenters were able to show that light does move more slowly in glass than in air," as it should do on the undulatory theory, while "the Newtonian theory assumed that the attraction of the dense medium caused the particles of light to move more rapidly than in the rare medium."\* We see from this instance that a hypothesis may be simple, may seem to account for facts, may lend itself to mathematical deduction, may not conflict with any known law of nature, and may hold its ground for generations; and yet a single crucial experiment may suffice for its complete overthrow.

Although the sciences of astronomy, mechanics, and optics, which use mathematics as their instrument, are by that very fact deductive, it may perhaps be imagined that the history of the non-mathematical sciences will exemplify the purely inductive method of Bacon. Nothing, however, can be farther from the truth. Harvey's great discovery of the circulation of the blood was first suggested by a speculation on the "final cause" of the valves of the veins. The evolutionary theory has been throughout its career based on assumptions and analogies. Geology is an interpretation of nature in the light of the uniformitarian theory. Chemistry would be a mere amorphous mass of facts but for the atomic hypothesis, imperfect though that is as a rationale of the phenomena. I shall return later to the advancement of the natural sciences by verified hypotheses; here it is sufficient to indicate the large part which they play in comparison with mere registered observations.

\* *Principles of Science*, ch. xxiii.

## VII.

## DESCARTES AND LOCKE.

THE inductive method of Bacon finds its antithesis in the deductive method of Descartes, Spinoza, and Leibnitz. Although Spinoza carries out this method most elaborately and consistently in practice, yet the theory belongs to Descartes, who sets it forth clearly in his "Discours sur la Méthode." Descartes, therefore, I shall select as the type of the *a priori* school.

Finding deficiencies and obscurities in the current logic, geometry, and algebra, Descartes resolved "to seek some other method, which comprising the advantages of all these, shall be exempt from their defects."\* He lays down four rules, which are as follows: (1) To accept nothing as true except what is self-evident. (2) To analyse every difficult problem into as many parts as possible, and as may be necessary for its complete solution. (3) To think systematically, beginning with the simplest and easiest matters, and rising little by little to the knowledge of the most complex; and to suppose a system even among those which have no natural order of sequence. (4) Always to make enumeration so complete and reviews so general as to ensure that nothing has been omitted.† He took as his pattern geometrical reasoning, resolving to reject as absolutely false everything which seemed in the slightest degree doubtful "so as to see whether after that there did not remain something in my belief which was completely indubitable."‡ This "something" he finds where St. Augustine found it. Whatever is uncertain, the existence of thought is a certainty. "*Cogito ergo sum.*" "I am," he says "a thinking thing, that is a mind or soul or intellect or reason."§ I know myself better than I know

\* *Discours sur la Méthode*, pt. II.

† *Ibid.*

‡ *Ibid.*, pt. IV.

§ *Méditations*, II.

anything external; therefore the fount of truth must be sought in my own innate ideas.

What is it that gives supreme certitude to the maxim "I think, therefore I am?" It is my clear and distinct perception of its meaning and its reality that assures me of its truth. But if so, clearness and distinctness must be the criterion of truth in general; and "I now seem to be able to lay down as a general rule that everything which I perceive very clearly and distinctly is true."\* "I call a perception clear when it is present and evident to the attentive mind, just as we say that we see clearly things present to the looking eye, and affecting it with sufficient strength and plainness; and I call it distinct, when it is not only clear, but is so marked off and distinguished from everything else, that it evidently contains nothing but what is clear."†

Our perceptions are either of things and modes of things, or of eternal truths, such as the axiom of contradiction, and the necessary existence of the thinking subject. *Things* are "thought things," belonging to thinking substance, or material things, belonging to material substance. "From the existence of any attribute we can conclude to an existing thing or substance to which it belongs; but every substance has a pre-eminent attribute, which constitutes its nature and essence, and to which all others relate."‡ Only one substance—that is, God—can be conceived as fulfilling the perfect definition of substance, as "that which so exists, that it is dependent on no other thing for its existence." But both corporeal and thinking substance depend for existence on God alone. The idea of God is the idea which possesses the greatest amount of reality, exceeding the measure of my own reality; consequently I cannot be the cause of this idea, which must come from a really existing infinite substance.

Descartes accounts for all the phenomena of the universe, even including physiological and psychological phenomena, on purely mechanical principles.

If the mind be the fountain of knowledge, it is clear

\* *Meditationes*, III.

† *Principia Philosophiæ*, I, 45.

‡ Ueberweg, § 114.

that all experience, consequently the whole universe, can be explained by means of ideas, so far as it can be explained at all. Induction must be subsidiary to deduction; it is a process which may be useful in filling out and giving life to our innate ideas, but not in presenting us with fresh truth. Hence Spinoza's mathematical deduction of the system of the world from a few abstract ideas is a legitimate development of Descartes' theory, and reveals at once its strength and its weakness. All ideas, which have great extension, have correspondingly little intension; that is, ideas which cover many species can connote but few qualities. The broadest ideas are consequently the emptiest. Spinoza's attempt is to draw out of an abstraction, what was never put into it; to construct the world out of a vacuum.

Descartes' real error lay in his explanation of the certitude of his fundamental maxim. "I think, therefore I am." The proposition is certain, *not* because it is "clear and distinct," but because it expresses the *condition* of all experience and all reasoning. This *a priori* character constitutes it a necessary truth; clearness and distinctness have nothing to do with the matter. Evidently, then, clearness and distinctness are not criteria of truth in general, and we have no reason for accepting everything as true, which is as manifest to the mind as the sun to the eye. The whole philosophy tumbles to pieces like a house of cards.

As remarked by Ueberweg, "Descartes does not distinguish between the innateness of an idea as such, and the origin of an idea, through abstraction, in the act of internal perception, the result of psychical functions, the capacity for which is innate."\* In other words, he does not distinguish between the innateness of actual ideas or maxims, and the innateness of conditions of thought; thus leaving an opening for Locke's misconception of the entire question. His own conception of it was probably not very consistent or definite; although he seems to incline to the more philosophical standpoint. "Our knowledge," he writes in his reply to the Programme of Regius "has its *commencement* in sense, external or internal,

\* *History of Philosophy*, § 114.

but its *origin* is intellect." In this sentence, Descartes appears as a true precursor of the Kantian school.

Locke, although he misunderstood Descartes' position, and therefore did not even touch the arguments which he undertook to refute, did good service to the cause of thought, by showing that concepts are never formed antecedently to experience, or without its aid.

An "idea" means to Locke a fully-formed concept; and it is no difficult task to prove that such a concept is never possessed at birth. Observation shows, that general ideas are formed later than particular ideas; that, indeed, general ideas are abstracted from particular ideas; consequently, general ideas cannot be innate; and no one pretends that particular ideas, as sweetness, bitterness, &c., are possessed independently of experience. This admitted, it follows that propositions formed from general ideas cannot be innate; for if the parts are acquired by experience, the same must be true of the whole. Such propositions are: "What is, is," and "it is impossible for the same thing to be and not to be;" for these involve the abstract concepts of existence, identity, and possibility. "The terms of the propositions," says Locke, "their standing for such ideas, and the ideas themselves that they stand for, being neither of them innate, I would fain know what there is remaining in such propositions that is innate."\* There are many men who never hear or conceive, therefore never assent to these axioms; and, though it is true that all who do hear and understand them at once assent, this is no proof of their innateness, but the reverse; for were they innate, no process of reception and comprehension would be required, or could indeed take place. Before these abstract propositions can be grasped, relatively concrete propositions, as "white is not black" or a "square is not a circle," must be understood.

It is evident that Locke confuses the law of thought with the thoughts themselves. The axioms which he quotes, simply express the fundamental *conditions of reasoning*; but these conditions may never have been the subject of

\* *Essay concerning Human Understanding*, ch. ii, § 23.

reflection, and therefore may not be known to the mind under the form of axiom. The laws of the mind, like the laws of the body, may be absent from consciousness. We can walk without knowing the formula of the pendulum, and we can think without knowing the axiom of identity, of contradictions, or of the excluded middle. These axioms express the principles of our thought; in this sense only can they be considered "innate." The celebrated remark of Leibnitz, that "*Nihil est in intellectu, quod non fuerit in sensu nisi ipse intellectus*," somewhat vaguely expresses this truth. Such a formula reduces "innate ideas" to mere "slumbering notions," and the next step is to identify them, some with hereditary tendencies, some with the essential conditions of mental action.

As I have said, Locke's great merit consists in his derivation of all our conscious knowledge from empirical sources. These are two—sensation and reflection; the latter being defined as "the notice which the mind takes of its own operations." Descartes was a far more subtle thinker than Locke, and his method looks forward toward Kant, as well as backward toward Anselm; but Locke's was far better adapted to an age in which physical science was awakening from a long repose. He was not, properly speaking, a psychologist; yet he laid the foundation of a new psychology. Berkeley and Hume developed Locke's doctrine to its logical issue, on the metaphysical side; Voltaire accepted his psychology, and Condillac built upon part of his foundations a purely sensualistic system, denying the "internal sense" as an independent source of ideas.

## VIII.

## JOHN STUART MILL.

PASSING over in silence the names of many writers and thinkers, as having contributed nothing fresh or nothing definite to the theory of Induction and Deduction, it is of John Stuart Mill that I have next to speak.

His contribution to the subject falls into two distinct and indeed inconsistent parts: (1) The theory of Inference and Generalisation, with which his name is chiefly connected, and the theory of the four methods of induction, and of deduction, in which he unconsciously retracts his empiricism, and shows himself in full agreement with some of his severest critics.

What is a general proposition? Whence is it derived? What mental process does it represent? What is its use in the syllogism, and is it an essential part of inductive reasoning? Such are, briefly expressed, some of the chief queries which Mill professes to answer.

A general proposition, he replies, is derived from our experience of individual cases. "From these all general truths must be drawn, and into these they may be again resolved. A general truth is but an aggregate of particular truths, a comprehensive expression, by which an indefinite number of individual facts are affirmed or denied at once."\* A proposition which relates merely to a *definite* number of known individuals is "no general proposition, but merely that number of singular propositions, written in an abridged character."† True generalisation "is not a process of mere naming; it is also a process of inference."‡ We observe that in all known objects of a certain kind, a given attribute

\* *Logic*, bk. II, ch. iii, § 3.      † *Ibid.*, bk. III, ch. ii, § 1.

‡ *Ibid.*, bk. II, ch. iii, § 3.



invariably accompanies another attribute, so that the latter, where it occurs, leads us to expect the occurrence of the former. We not only *expect*, but *infer*, and register our inference in a general proposition. "From instances which we have observed, we feel warranted in concluding, that what we found true in these instances, holds in all similar ones, past, present and future, however numerous they may be."\* Since, in our experience, attribute A has always accompanied attribute B, we infer that this companionship always exists, and regard B as a mark or index of A. We record these observations and inferences "in one concise expression," and have thus only one proposition, instead of an endless number, to remember and communicate. But our general proposition does not represent any mental function, over and above the multitude of particular observations and inferences which it registers. We have, as it were, set down the fact in shorthand; but the shorthand note adds nothing either to the process of thought, or to the certainty of the conclusion. We do not infer *from* the proposition; we infer *in accordance with* the proposition. We are "merely decyphering our own notes." "The individual cases are all the evidence we can possess," and we cannot make this evidence greater than it is by throwing it into any logical form whatsoever. If then we leave out the general proposition, and conclude directly from particulars to particulars, our inference will be equally valid. This, indeed (according to Mill), is the way in which we habitually reason, since we do not usually, in every day matters, formulate in our minds any "verbal theorems or rules." Uneducated persons seldom or never do so; yet their judgments are often correct. In brief: "All inference is from particulars to particulars: General propositions are merely registers of such inferences already made, and short formulæ for making more: The major premiss of a syllogism, consequently, is a formula of this description: and the conclusion is not an inference drawn *from* the formula, but an inference drawn *according to* the formula: the real logical antecedent, or premiss, being the particular facts from which

\* *Logic*, bk. II, ch. iii, § 3.

the general proposition was collected by induction."\* All we have to do is to interpret our memorandum, and to make sure that each new case possesses the distinguishing mark from which the given attribute may be inferred. The "sole purpose" of the syllogism "is to maintain consistency between the conclusions we draw in every particular case, and the previous general directions for drawing them."† It is, however, to be noted that "whenever, from a set of particular cases, we can legitimately draw any inference, we may legitimately make our inference a general one. If, from observation and experiment, we can conclude to one new case, so may we to an indefinite number."‡ This constitutes a certain safeguard, by enabling us to realise all the *implications* of our inference, which falls to the ground if any of them are manifestly false.

In this last remark lies the virtual destruction of the whole argument. For instead of the seemingly general proposition being really an aggregate of particular ones, the seemingly particular proposition must be really general, since it contains universal implications. Mill has, indeed, succeeded very well in showing that between general and particular propositions there is no fundamental difference; but, instead of arguing that every valid general proposition is particular, he might have argued with greater force that every valid particular proposition is general. In fact, the two statements are the converse sides of one truth; but the latter gives a deeper insight into the conditions of perception and conception. The very fact of regarding two things as "similar," is an elementary generalisation; for the perception of likeness in difference, of the one in the many, is the essence alike of ordinary perception, of conception, and of the most elaborate induction. To attain the knowledge of a relation is to attain a general idea. But of this aspect of the question I shall speak further, in dealing with the work of Professor Green. Meantime, Mill may be answered out of his own mouth: "If we find a second object which presents a remarkable agreement with the first, inducing us to class them together, the

\* *Logic*, bk. II, ch. iii, § 4.† *Ibid.*‡ *Ibid.*, § 5.

question immediately arises, in what particular circumstances do they agree? And to take notice of these circumstances is already a first stage of abstraction, giving rise to a general conception."\*

It must be observed that Mill falls into the error of Locke, in confusing the laws of mental function with consciously known axioms. The burnt child, he thinks, does not generalise his dread of the fire, never having "thought of the general maxim 'fire burns.'"+ But, in fact, the child *does* generalise; for the distinguishing character of generalisation lies not in the manufacture of formulæ, but in the cognition of similarity—or rather, of sameness.

To Mill, the axioms and definitions of geometry, and the truths of arithmetic, are mere inductions from experience. "The points, lines, circles, and squares, which any man has in his mind are (I apprehend) simply copies of the points, lines, circles, and squares, which he has known in his experience." All our ideas respecting them are mere summaries of manifold experiences, and derive their superior certainty, first from the number and perfect agreement of these experiences, and secondly, from the fact that "in the case of geometrical forms we can perfectly, but in most other cases only imperfectly, trust our recollections."‡ In this last clause Mill approaches, though he does not actually touch, the kernel of the matter. It is not our *recollection* only that we can fully trust; it is the original cognition. Of this point I shall treat later.

With Locke, Mill holds that the principle of contradiction is merely a generalisation from such facts as the absence of light where darkness is present, and of sound in the presence of silence. He names, however, as the original foundation of the principle, the law "that belief and unbelief are two different mental states, excluding one another." Surely, if belief and unbelief be taken as including perception and non-perception, the "foundation" includes all subsequent cases, and accounts for all without any need of "observation"

\* *Logic*, bk. IV, ch. ii, § 3.

+ Bk. II, ch. iii, § 3.

‡ Bk. II, ch. v, § 1.

or "induction." Our conscious knowledge of the principle is drawn from facts; but it is the "principle" as a law of the mind, which makes the facts themselves possible. It is true no doubt that "from observation of our own minds" we know or may know the incompatibility of belief and unbelief. But this piece of psychological knowledge is a secondary matter. Unless the primary law were implicit in our perceptions, we should never make "observations of our own minds" or of aught beside; or if we did make them, they would yield us no information.

The third book of Mill's *Logic* deals with induction which he somewhat inconsistently defines as "the operation of discovering and proving general propositions," and again as "the process by which we conclude that what is true of certain individuals of a class is true of the whole class, or that what is true at certain times will be true in similar circumstances at all times."\* He refuses to allow the title to what is commonly known as "Perfect Induction," in which "what seems the conclusion is no wider than the premises from which it is drawn."† Induction must not include inference from the known to the unknown. Again, induction by "parity of reasoning" is no real induction. We conclude that the three angles of every triangle are together equal to two right angles, not because some triangles have this property, "but from the ulterior demonstrative evidence which was the ground of our conviction in the particular instances."‡ Description, or in Dr. Whewell's phrase "colligation of facts" is not induction. Kepler's discovery of the elliptic form of the planetary orbits was not induction, but colligation.

"The proposition that the course of nature is uniform, is the fundamental principle, or general axiom of induction." But this generalisation, though fundamental, "is itself founded on prior generalisations." Unless we had discovered some of the laws of nature, "we should never have thought of affirming that all phenomena take place according to general laws." This principle of the uniformity of nature,

\* *Logic*, bk. III, ch. ii, § 1.    + *Ibid.*, ch. ii, § 1.    † *Ibid.*, § 2.

then, is derived from particular laws, just as all general propositions are derived from particular cases. It is "the ultimate major premiss of all induction."\*

Here Mill again confuses the affirmation of a principle with the immanence of a law of thought. How, it may be asked, did man arrive at the knowledge of any general law whatsoever, since no individual experience can be co-extensive with the operations of nature? Each "law," according to Mill's definition, must have contained an "inference from the known to the unknown;" but why, except on the principle of the uniformity of nature, was such an inference made? And if the laws presuppose the principle, how can the principle be derived from the laws?

To return to Mill's exposition. The validity of "the canons of Inductive Logic," is derived from the Law of Causation; the law that "for every event there exists some combination of objects or events, some given concurrence of circumstances, positive and negative, the occurrence of which is always followed by that phenomenon."† To come under the head of causality, the sequence, besides being invariable, must be *unconditional*. It is needless to say that by this term Mill does not intend to convey an idea of "necessary" causation, in the transcendental sense. He simply means primary, not derivative, not dependent on the concurrence of other antecedents. Thus, night is not the cause of day, because the sequence, though invariable, is dependent on the rotation of the earth, and the continued luminosity of the sun. "We have an experimental knowledge of the sun, which justifies us, on experimental grounds, in concluding that, if the sun were always above the horizon, there would be day, though there had been no night, and that, if the sun were always below the horizon, there would be night, though there had been no day."‡

This evidently is the introduction of a test other than the "invariability of experience," or the cumulative force of particular cases, upon which Mill's empiricism is commonly supposed to rest. The *quality* of instances is recognized as

\* *Logic*, bk. III, ch. iii, § 1.    † *Ibid.*, ch. v, § 2.    ‡ *Ibid.*, § 5.

more decisive than their *quantity*; and we shall see presently that one decisive experiment may outweigh a whole host of registered observations. The "four methods of experimental inquiry," which Mill describes, are really modes of ascertaining the kinds of sequence not the numbers of instances.

These methods recall Bacon's "Tables of Instances"; but Mill's canons have a superior exactness and precision which render them really applicable to experimental research. The Method of Agreement, for instance, corresponds to the "Table of Essence and Presence," but whereas Bacon's collection is a mere amorphous heap, made according to no fixed conception, Mill admits a principle of selection. His "first canon" is "if two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree, is the cause (or effect) of the phenomenon."\* The instances are to be chosen, or produced, in such manner that all possibly disturbing conditions shall be eliminated. He points out that, even with the utmost care, the method is still uncertain, since "it is hardly ever possible to ascertain all the antecedents, unless the phenomenon is one which we can produce artificially;" and also because the effect may depend, not on the one invariable circumstance, but on some special combination among the variable circumstances.

The method of Difference corresponds to Bacon's "Table of Deviation, or Absence in Proximity," except that his vague kinship of instances is exchanged for a rigorous agreement in all circumstances except the one crucial circumstance. The "second cause" is as follows. "If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former; the circumstance, in which alone the two instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon."† This method is especially applicable to artificial experiment, in which we produce our own conditions, make sure of their constancy,

\* *Logic*, bk. III, ch. viii, § 1.

† *Ibid.*, § 2.

and introduce new ones at our own will and pleasure. It is thus more decisive than the method of agreement, because "the nature of the combinations which it requires is much more strictly defined;" and also because its validity is not affected by possible plurality of causes. For although the new factor introduced may not be the only possible cause of the sequent effect, still, if we have really isolated it from all other disturbing forces, it must be the cause, or a part of the cause, in the present instance. Here again, Mill's merit lies in a happy inconsistency. The observed sequence is indeed "unconditional;" but it is made no surer by such repetition as would warrant the inference of its invariability, *on the ground of long experience*. No broad "foundation of experience" is needed to strengthen the conclusion. "Two instances, the one positive and the other negative, are sufficient for the most complete and rigorous induction."\* It is, indeed, desirable to repeat the experiment with added precaution, in order to eliminate all possible sources of error; but, could we assume that these were eliminated at the first trial, no accumulation of subsequent observations could add certitude to the result. Thus we obtain a "general truth" which is by no means "an aggregate of particular truths;" nor is the proposition which records it "a compendious form for recording and preserving in the memory a number of particular facts." The general truth is a particular truth; but a particular truth *accurately ascertained*, and seen in all its relations. Repetition of instances can in no case do more than (1) verify our conviction that we have discovered the true conditions of a given event, or (2) make it possible to select from among the group of phenomena which constitutes the invariable antecedent, one or more which, though perhaps inextricable from the complexus, may be the actual conditions of the sequent. Could the conditions be once completely ascertained, they would be ascertained for ever.

Mill virtually admits this, when he explains why conclusions from the Method of Agreement vary in value with

\* *Logic*, bk. III, ch. x.

the number of instances compared. "If there are but two instances, A B C and A D E, though these instances have no antecedent in common except A, yet, as the effect may possibly have been produced in the two cases by different causes, the result is at most only a slight probability in favour of A; there may be causation, but it is almost equally probable that there was only a coincidence. But the oftener we repeat the observation, varying the circumstances, the more we advance towards a solution of this doubt . . . . We learn from this the true theory of the value of mere *number* of instances in inductive enquiry. The plurality of causes is the only reason why mere number is of any importance."\* If so, it is difficult to understand on what grounds supreme validity is ascribed to the principle of the uniformity of nature, and to the law of causation. Mill admits that the law of causation is founded on the dubious method of simple enumeration. But "the precariousness" of this method "is in inverse ratio to the largeness of the generalisation . . . . As the sphere widens, this unscientific method becomes less and less liable to mislead, and the most universal class of truths, the law of causation for instance, and the principles of number and of geometry, are duly and satisfactorily proved by that method alone, nor are they susceptible of any other proof . . . . If we suppose, then, the subject-matter of any generalisation to be so widely diffused that there is no time, no place, and no combination of circumstances, but must afford an example either of its truth or of its falsity, and if it be never found otherwise than true, its truth cannot depend on any collocations, unless such as exist at all times and places, nor can it be frustrated by any counteracting agencies, unless by such as never actually occur."†

This is plausible. But in assuming possible "dependence on collocations," we make a prior assumption of the Law of Causation; "and, in assuming that independence of collocations means uniformity of action, we are taking for granted both this law, and the principle of the unity of nature. For

\* *Logic*, bk. III, ch. x, § 2.

† *Ibid.*, ch. xxi, § 3.



we imply that, in the absence of disturbing factors, the action of constant factors will be constant ; that, no "counteracting agencies" intervening, there will be no fluctuation in the phenomena ; that, in short, identity of conditions means identity of results. Unless these assumptions are made it is not easy to see, on Mill's own showing, what influence "the largeness of the generalisation" can have on the validity of the inference. What prevents us from supposing that nature is capricious, and that the multitudinous phenomena which we are unable to test might contradict our generalisation. Here, evidently, there can be no question of cancelling certain elements of a complex antecedent in favour of the one element which persists throughout a wide range of observation. If the "plurality of causes" be "the only reason why mere number is of any importance," there is no reason why number should be of any importance in establishing the law of causation or the principles of geometry. For the law of causation has no knowable conditions, and can have none, because such conditions must themselves be subject to the law of causation ; and the principles of geometry depend on conditions which are already perfectly known. Mill, in short, is obliged to assume, as a self-evident truth, that if no "cause" can be found capable of defeating the law of causation, then that law must be universally true ; taking "its place among the most firmly established as well as largest truths of science." That his "proof" assumes what was to be proved, he does not perceive. The point to be noticed here, is that mere number of instances can in no case give other than accessory and confirmatory evidence ; and that where no complex antecedent exists, from which a certain constant element is to be singled out, even accessory evidence cannot be given. Those generalisations, then, which Mill regards as peculiarly susceptible of proof by simple enumeration, are in truth precisely those which are not even rendered probable by application of this method.

Thus, directly Mill enters into the details of his *Organon*, he virtually abandons the pure empiricism to which he

nominally clings. The third, fourth and fifth canons, stating respectively the "joint method of agreement and difference," the "method of residues," and the "method of concomitant variations," really represent special cases of the two principal methods. The last-mentioned recalls Bacon's third table, of degrees or comparison.

We next pass to Mill's exposition of the deductive method. He admits that in very complex cases of "Plurality of Causes," and "Intermixture of Effects," the application of the "Four Methods" is impracticable. We must proceed by *deduction* from known laws of nature and known properties of bodies; thus gaining a clue to the mighty maze, which refuses to yield its secret to mere empirical research. From primary laws and properties, or from their derivatives, when these are fully known to us, we argue downward to phenomena, we "find the law of an effect from the laws of the different tendencies of which it is the joint result." The deductive method "consists of three operations: the first, one of direct induction: the second, of ratiocination; the third, of verification."\* The first step may, indeed, be a prior deduction instead of an induction; "but the premises of this prior deduction must have been derived from induction." In this step, the causes and their laws are ascertained. The second step is to determine "from the laws of the causes, what effect any given combination of those causes will produce."† The third step is the comparison of our conclusions with the results of direct observation.

The deductive method is applied not only to the discovery, but also to the "explanation" of laws, in three ways: (1) By resolution into simpler laws; (2) By discovery of intermediate links between sequent phenomena, and resolution of the laws of the sequence into the laws of the connection of these with the ultimate links; (3) By subsumption under more general laws. In each case, the laws "explained" are resolved into laws more general than themselves; which indeed is the only sense in which "explanation" is possible. "We can no more assign a why for the more extensive laws

\* *Logic*, bk. III, ch. xi, § 1.

† *Ibid.*, § 2.

than for the partial ones."\* Laws not ultimate, and not thus deduced, are empirical, and are of inferior authority; since they depend on collocations which are unknown, and which may be variable.

The hypothetical method is a variety of the deductive method, in which the preliminary induction or deduction is omitted; but the process is legitimate only if the final step, the verification, answers to a complete induction; that is, if it can be proved "that no law, except the very one which we have assumed, can lead deductively to the same conclusions which that leads to."† Obviously, such proof can never be given unless the possible agents are limited in number, and completely known. The given results may doubtless be deduced from the action of a supposititious cause under a known law, or of a known cause under a supposititious law, or of one among an indefinite number of possible causes; but in none of these cases can the validity of the hypothesis be conclusively tested. It may cover the facts, but it still contains an arbitrary element, since it is not shown to be the only conception that will cover them. Still it may "be useful by suggesting a line of investigation which may possibly terminate in obtaining real proof."

Two observations must here be made. First, that Mill narrows too much the meaning of the term "hypothesis." He excludes all theories which start from a prior induction or deduction. Newton's identification of gravity with the central force of the solar system did not, according to Mill, originate as a hypothesis. The law of the moon's attraction, he urges, was "proved from the data of the moon herself," and was not assumed merely because it agreed with the law of terrestrial gravity. Yet it may be answered that the *possibility* of such an agreement had to be assumed before the calculations which proved its truth could be made; and this assumption was a hypothesis. Mill adduces the preliminary discovery of the law of the "central force," as an example of the legitimate employment of the hypothetical method. Newton began by assuming that the force must

\* *Logic*, bk. III, ch. xii, § 6.

+ *Ibid.*, ch. xiv, § 4.

tend directly towards the sun, and that it must vary inversely as the square of the distance; and showed that no other assumption would be consistent with Kepler's laws. But here, Kepler's laws represent the first or inductive step, without which the hypothesis would have been foundationless. The only real difference between the two cases is that, in the latter, the hypothesis is more elaborate and detailed.

A hypothesis never comes into being without some preliminary induction; rude indeed and imperfect, but as a rule clearly traceable. "There is probably," Mill remarks, "no hypothesis in the history of science, in which both the agent itself and the law of its operation are fictitious." But this is to admit, that, prior to the formation of the hypothesis, observations must have been made of the given agent, or of the given law of action; and general ideas must have been at least tentatively formed. This surely is a process of induction; and such a process, on Mill's own showing, must form part of the legitimate Hypothetical Method.

The second observation is, that Mill hardly lays enough stress on the purely formal value of hypotheses, as a means of binding together and organising scattered phenomena. Absolute truth is not sought by the scientific discoverer; it is much if he can reduce to order, and congruity with the rest of nature, seemingly aberrant sets of phenomena, thus satisfying the demands of the synthetic intellect.

I have not space to deal with Mill's account of the Logic of Probability, and of "Approximate Generalisations." His observation that "a very slight improvement in the data" . . . "is of more use than the most elaborate application of the calculus to probabilities, founded on the data in their previous state of inferiority"—is doubtless true; still it does not detract from the value of the calculus, when used as a supplement to the fullest attainable knowledge. No one imagines that the doctrine of chances is a substitute for experiment or for deductive reasoning; but it is certainly a very valuable auxiliary.

Mill's philosophy of Induction, avowedly based on a purely

empirical psychology, is, as we have seen, really noteworthy for its anti-empirical tendency ; for its assertion that *quality* of instances is more important than *quantity* ; and for its distinction between ultimate, derivative, and empirical laws. Setting out to bless the Baconian school, he ended by cursing it altogether.

## IX.

## JEVONS.

THE writings of Professor Jevons form a connecting link between the views of John Stuart Mill and those of the Kantian School; I therefore select him as representing the next stage through which the theory of logic had to pass. He never traces back his principles to their source; his analysis is never ultimate; but, so far as he professes to go, he may be taken as a safe guide.

One of his most important contributions to logical doctrine is his resolution of all inference into the "substitution of similars." "Sameness or identity," he says, "presents itself in all degrees, and is known under various names; but the great rule of inference embraces all degrees, and affirms that so far as there exists sameness, identity, or likeness, what is true of one thing will be true of the other."\* There is, indeed, some confusion of thought in this sentence; for, properly speaking, no "degrees" of identity can exist; but there may be identity in some particulars combined with non-identity in others; and the formula may be amended as follows: "What is true of one thing will be true of another, as regards the particulars which are identical in the two." The principle is otherwise stated: "In whatever relation a thing stands to a second thing, in the same relation it stands to the like or equivalent of the second thing." And: "Same parts samely related make same wholes."† We shall see later how this explanation of "inference" fits in with the Kantian view of induction. Jevons applies it principally to the simplification of deductive logic, according to the rule: "For any term occurring in any proposition, substitute the term which is asserted in any premiss to be identical with it."‡

\* *Principles of Science*, ch. i.      † *Ibid.*      ‡ *Ibid.*, ch. iv.

Jevons differs from Mill in recognizing "perfect induction" as a process of thought, and not a mere shorthand registration of our knowledge; but although he points out its *use*, as the foundation of "imperfect induction," he does not definitely explain why it must stand as part of the reasoning operation. A statement concerning any group of phenomena is more than a simple record of particulars, because it expresses the *general* element which the particulars contain. It is the statement of a *relation*, which binds together a number of facts; consequently, it involves a process not involved in knowledge of the facts as isolated. All our experience is, properly speaking, experience of relations; so that the discovery of any relation is an addition to experience.

But what is induction? And how, from perfect induction, can we proceed to imperfect induction, which deals with cases not examined, and often not examinable?

Induction is "the inverse operation of deduction." It consists "in passing back from a series of combinations to the laws by which those combinations are governed";\* and is more difficult than deduction, just as decyphering is more difficult than cyphering. It always, however, involves "the more or less conscious application of the direct process of deduction." "The only modes of discovery consist either in exhaustively trying a great number of supposed laws, a process which is exhaustive in more senses than one, or else in carefully contemplating the effects, endeavouring to remember cases in which like effects followed from known laws."† Some assumption, however crude, must direct our investigations. "Thus, there are but three steps in the process of induction:—(1) Framing some hypothesis as to the character of the general law. (2) Deducing consequences from that law. (3) Observing whether the consequences agree with the particular facts under consideration."‡ Mill's three stages, it will be remembered, are Induction, Ratiocination, and Verification. Jevons and Mill seem to be contemplating different sides of one truth. For, while induction does generally involve a process of deduction, yet—as I tried

\* *Prin. of Science*, ch. vii.

† *Ibid.*

‡ *Ibid.*, ch. xii.

to show in criticising Mill's account of hypothesis—that deduction involves a prior induction; while the prior induction is framed in accordance with certain primary mental laws. Again, it is not true that hypothesis is invariably a necessary part of inductive reasoning. It may be altogether absent from perfect induction; as when we enumerate the properties of all known metals, and thence form the concept of metal.

How do we leap the gulf which divides perfect from imperfect induction? Jevons' answer is in effect that there is no gulf to leap. Imperfect induction "never makes any real addition to our knowledge. . . . As in other cases of inference, it merely unfolds the information contained in past observations; it merely renders explicit what was implicit in previous knowledge."\* We have to begin with two assumptions, "(1) That our past observation gives us a complete knowledge of what exists; (2) That the conditions of things which did exist will continue to be the conditions which will exist." The former of these assumptions is sometimes justified; on the latter, Jevons observes, "the logician or physicist can have nothing to say." Of the probability or improbability of permanence or of arbitrary change, "our faculties can give no estimate;" because all calculations of probabilities are founded on the assumption of permanence. (I postpone my criticism of this doctrine, as of others which touch the borders of metaphysics).

Having made the two fundamental assumptions, and desiring to pass from the known to the unknown, we must frame hypotheses, until we hit upon one or more fulfilling the three following conditions or tests of a good hypothesis: (1) That it allow of the application of deductive reasoning and the inference of consequences capable of comparison with the results of observation. (2) That it do not conflict with any laws of nature, or of mind, which we hold to be true. (3) That the consequences inferred do agree with facts of observation.† We may find only one hypothesis which passes these tests; or we may be able to show

\* *Prin. of Science*, ch. vii.

† *Ibid.*, ch. xxiii.



that ours is the only possible explanation of the given phenomena. But often there will be two or more rival hypotheses, each with some special merits and some special difficulties. We then have to assign its value to each by an application of the Theory of Probability. For present purposes we will assume that the cause of the given event must be one or other of the hypothetical causes.

What is Probability? Probability belongs wholly to the mind, and the doctrine of chances is nothing but "good sense reduced to calculation." It is really founded on the principle of substitution of similes, and "consists in putting similar cases on a par, and distributing equally among them whatever knowledge we possess."\* There is no creation of new knowledge, there is only a just partition of old knowledge.

This definition of probability does not come within Mill's criticism; since it presupposes that, having already done our utmost to acquire knowledge, we find no prior reason for imagining one of the given events to be more probable than any other. The calculation of chances does not supplant, but only supplements, research. "The theory comes into play where ignorance begins," and shows us how far we go beyond our data.

To return to our rival hypotheses. We must calculate, separately in each case, the probability that, given the cause, the event would follow. Then the probability of any one of the hypotheses must be calculated according to the following rule:—"If it is certain that one or other of the supposed causes exists, the probability that any (given) one does exist is the probability that if it exists the event happens, divided by the sum of all the similar probabilities."† "We accept as most probable that hypothesis which most probably gives the results," but we apportion to the others their calculated value. It is obvious that this process cannot always give accurate results, since we may not be able to take into account every possible, or even every conceivable hypothesis; but it is the only mode in which, when experience fails and

\* *Prin. of Science*, ch. x.

† *Ibid.*, ch. xii.

research can be pursued no further, we can eke out the insufficient knowledge we possess.

The third stage, or verification, is not always possible; but where the deduction is certain, from all the premises being fully known, no empirical verification is necessary. No geometrical proposition, for instance, can be verified empirically; the proof consists in the deduction itself, which proceeds from purely ideal data. Our knowledge of the laws and events of the external world is only probable, because our senses may err, and we may confuse together objects which are really different. I know that gold is insoluble in nitric acid; but how do I know that any particular piece of yellow metal is identical with what I call "gold"? Even assuming that I know fully the *present* laws of nature, I have no certainty for assuming that these laws will always remain unchanged. Conclusions respecting past or future sequences of phenomena must therefore always be hypothetical, and liable to revision.

Jevons differs from Mill in his view of "Perfect Induction;" in his recognition of the necessity of hypothesis; in his admission of deduction as an element in all induction; in the important place, which he assigns to the theory of probability; in his doctrine of "substitution of similars," and in his insistence upon "generalisation" as an integral part of every inference. There is no science of particulars; no reasoning from particulars to particulars, although "the laws of mental association lead the mind always to expect the like again, in apparently like circumstances." Another step leads us to see, in this expectant condition, an unexpressed, unformulated generalisation.

Neither does Jevons acquiesce in Mill's indiscriminate empiricism. He regards the fundamental laws of thought, as "true both in the nature of thought and of things;" but does not hold that they have been acquired by generalisation from experience. Of geometrical truths, again, he says, that being incapable of verification, "they cannot even be learnt by observation," a statement not precisely accurate, yet an advance upon the empirical standpoint.

## X.

## THE KANTIAN VIEW.

A TURNING point in the history of philosophy is marked by the question of Kant—"How is experience possible?" His reference of the conditions even of the barest empirical knowledge to an intellectual origin must work a revolution in our conceptions of induction and deduction. Or rather, leaving those conceptions as they stand, it must alter the central point round which they circle; as Copernicus started from the observed motions of the planets, on which astronomers were agreed, and worked them out on the new hypothesis of Heliocentrism. Prior to experience, we have no knowledge. So much is conceded to the Empiricist. But how, then, do we get our experience? How is it that successive and co-existent sensations are combined into an orderly and comprehensible whole?

Kant's reply to these questions is briefly as follows: our experience is rendered possible by a certain "unity of apperception," by which the perceiving and thinking mind introduces order into the world of sensation, imposing its own forms upon the given matter. Sensation, which is the "matter" of phenomena must run into certain intellectual moulds before it can appear as the object of perception and thought. "There are two stems of human knowledge, which perhaps may spring from a common root, unknown to us, viz., *sensibility* and the *understanding*, objects being given by the former, and thought by the latter."\* Sensibility, the first stem, yields assensations; but it also yields the "pure intuitions" (*reine anschauungen*) of Space and Time, which as they do not belong to the "matter" of phenomena, and yet are essential to its coherence, must

\* Immanuel Kant's *Critique of Pure Reason*, translated into English by F. Max Müller, vol. II, p. 13.

exist in the mind antecedently to experience. These, then, are the *a priori* forms of intuition or perception. The apodictic certainty of all geometrical principles rests on the necessity of an *a priori* representation of space, otherwise they would possess "a relative generality only based on induction."

The understanding, the second stem of knowledge, also yields certain *a priori* principles. These are distinguishable from concepts of empirical origin by the two marks of "necessity," and "strict universality." "Experience teaches us, no doubt, that something is so-and-so, but not that it cannot be different."\* That is, experience cannot vouch for anything outside its own range; so that positive knowledge of the necessity, or impossibility of any conditions whatsoever, can never be given empirically. Phenomena existing in time and space may be successive or simultaneous; but, it is the intellect which imposes upon them the concepts of cause and effect of action and reaction. No experience of mere succession and simultaneity can generate the principles of causality and reciprocity, and the certainty that they are necessary and universal. I need not follow Kant in his deduction of the famous categories. Suffice it to quote, that "as the same function, which imparts unity to various representations in one judgment, imparts unity likewise to the mere synthesis of various representations in one intuition, there arise exactly so many pure concepts of the understanding which refer *a priori* to objects of intuition in general, as there" are "logical functions in all possible judgments."† That is, the same faculty judges and conceives by the same methods; and the fundamental attributes of a judgment correspond to the fundamental conditions of the intellect, by which it orders and fashions the Cosmos.

Knowledge, Kant declares, "begins with" but does not "arise from experience," because experience itself arises from a sentient and cogitant mind. It may be inferred from this, that induction, therefore, contains *a priori* elements, and is not essentially different from deduction, which is useless without an admixture of *a posteriori* information. "Thoughts

\* *Critique of Pure Reason*, vol. I, p. 400. † *Ibid.*, vol. II, p. 70.

without contents are empty, intuitions without concepts are blind.\* Hence Kant is evidently inconsistent in this sharp distinction between mathematical and natural science; for both rest ultimately on *a priori* principles. The rigid line which he draws between sensibility and the understanding is also needless; for since "quantity" and "quality," rank as "categories," surely "time" and "space" might be deemed worthy of that high position. At least, there is no striking disparity. To say that objects are "given" by means of the "pure intuitions" of time and space, and "thought," by means of the "pure concepts" of quantity and quality, is an almost meaningless distinction. It is difficult to understand in what sense an object can be said to be "given" to the mind, while still destitute of unity, plurality, or totality—reality, negation, or limitation!† The same argument may be urged, though less obviously, respecting the categories of relation and modality.

As Kant enters into the details of his system, he becomes more and more the slave of words, and his luminous central idea is obscured by a verbal haze. To analyze the "Critique of Pure Reason," with its cumbrous machinery of "categories" "syntheses," and "schemata" is no part of my plan; but I shall try to explain the manner in which the latest development and simplification of its philosophy bears on my subject.

Before passing to the work of Professor Green, one of Kant's ablest exponents and critics, we must, however, give some consideration to the theory of Whewell, which is deeply imbued with Kantism. His greatest failing is a certain vagueness of thought which made him a fair mark for the criticisms of the empirical school. Yet he had grasped a truth not reached by thinkers apparently more lucid.

The leading idea of his "*Novum Organum Renovatum*" is that "the antithesis of sense and ideas is the foundation of the philosophy of science. No knowledge can exist with-

\* *Critique of Pure Reason*, vol. II, p. 45.

† Subdivisions of the Categories of Quantity and Quality.

out the union, no philosophy without the separation, of these two elements." \* Ideas "give to the phenomena that coherence and significance which is not an object of sense.† But "all facts involve ideas unconsciously." The two cannot be separated; for what is a fact from one point of view, is an idea from another. *Sensations* and ideas can be separated in theory, but not in reality. They "are like matter and form in bodies. Matter cannot exist without form, nor form without matter: yet the two are altogether distinct and opposite."‡ This is very clear; but the clearness is unfortunately not maintained. For, after asserting that every act of perception contains an ideal element, which consequently must be implicit in all our experience, he goes on to fix a great gulf between facts and ideas; seeming to regard the latter as spontaneously produced in the mind, apart from, if not prior to, experience. He commits the common error of confusing the two questions: "How is experience possible?" and "Given experience, how are our beliefs generated?" Experience is possible in virtue of the original constitution of the mind. The thinking and feeling subject unifies its sensations, by referring them to itself. The relations which they bear to each other are constituted by modes of its own activity; and an identical mode may bind together very different groups of sensations. Hence comes that unity in diversity, which renders the world Cosmos instead of Chaos. But, given this possibility of experience, given the experience itself, how are our beliefs generated? Obviously, *from* the experience. The ideal, in short, lies at the base of the empirical; and the two can never be disunited. In some minds, the empirical contains more, in others less, of the ideal; but whatever identity there is must be latent in, or evolved from, the empirical. No antithesis is possible between conceptions and facts; but one man's facts contain conceptions of which his neighbour's are innocent.

Whewell had a perception, but not a clear one, of this truth; and, as he unfolds his scheme, he strays further and

\* Bk. I, Aph. iv.      † *Ibid.*, Aph. iii.      ‡ *Ibid.*, Aph. vi.

further from the axioms with which he begins. "Observed Facts" he tells us, "are connected so as to produce new truths, by superinducing on them an idea: and such truths are obtained by Induction."\* "Superinduction of an idea" should be "evolution" or "recognition of an idea." For the term "superinduction" seems to imply the grafting of an alien scion; the intermixture of an originally foreign element. The source of this element, Whewell never indicates.

His distinction between the "Pure Sciences" and the "Inductive Sciences," is on his own grounds untenable. "The sciences, which depend upon the ideas of space and number, are pure sciences, not inductive sciences; they do not infer special theories from facts, but deduce the conditions of all theory from ideas."† But the ideas here, as elsewhere, are involved in facts, though facts very simple and elementary. True "space is a condition under which the mind receives the impressions of sense;" but these conditioned impressions are facts and, as such, are the only possible source of our beliefs and reasonings about space. Whewell does not sufficiently distinguish between the prior conditions which render experience possible, and the consciously acquired convictions, or consciously framed hypotheses, which are drawn from experience. He approaches such a distinction, when he speaks of the Laws of Motion as "interpretations of the axioms of causation. . . . Our idea of cause supplies the form, experience the matter, of these laws."‡ But, "our idea of cause," as distinct from the intellectual foundation of that idea, is itself an abstraction from experience; and the terms, matter and form, are merely relative, since even our simplest perception is not formless.

Whewell's theory leads him to a curious multiplication of superinduceable ideas. There are the ideas, not only of time, space, cause, and substance, but of polarity, chemical affinity, symmetry, likeness, life, and others. These play an important part in scientific discovery. "The two processes by which science is constructed are the *Explication of Conceptions*, and the *Colligation of Facts*."§ The conceptions

\* Bk. I, Aph. xi. † *Ib.*, Aph. xix. ‡ *Ib.*, Aph. lv. § Bk. II, Aph. i.

must be "distinct and appropriate, and exactly applied to clear and certain facts." Their "explication" has been "affected by means of discussion and controversies among scientists,"\* frequently leading to the establishment of a Definition. In all cases, however, there must be an implied reference to facts—"a tacit assumption of some Proposition, which is to be expressed by means of the Definition, and which gives it its importance."† The speculation of the ancients were barren from their lack of "clear and appropriate ideas."

The second constructive process is the colligation of facts. All facts—that is, all perceptions, are partly made up of inferences and judgments. For instance, "when we seem to see an edifice occupying space in all dimensions, we really see only a representation of it, as it appears referred by perspective to a surface."‡ We cannot exclude ideas from our facts; but we must be careful to get the right ideas, by which facts may be so "bound together," "as to give rise to those general propositions of which science consists."¶ "Science begins with common observation of facts," and gradually attains more accurate methods. The raw materials of knowledge must be decomposed into elementary facts, and these must be observed with precision, and "colligated" by "those exact conceptions which contain the essential circumstances of the case." An Induction, therefore, is not the mere sum of our observations. "The facts are not only brought together, but seen in a new point of view. A new mental element is superinduced."|| The conceptions are at first hypotheses; and for the invention of these no rule can be given. They are happy guesses, proceeding from the native sagacity of the discoverer. They must be rigorously tested by comparison with experience; but even when "imperfect and false," they may explain *some* phenomena and may be useful by thus linking facts in a provisional bond of unity. A principle, when fully established, may itself become a fact to be colligated with others. "The

\* Bk. II, Aph. ii.    † Bk. II, ch. ii, § 2.    ‡ *Ibid.*, ch. iii, § 2.

¶ *Ibid.*, ch. iv, § 1.

|| *Ibid.*, ch. v, Aph. xv.



distinction of fact and theory is only relative. Events and phenomena, considered as particulars, which may be colligated by Induction, are facts; considered as generalities, already obtained by colligation of other facts, they are theories.\*

It is clear that the "two processes" of explication of conceptions and colligation of facts are in reality one and the same process. The conception is part of the perception; is, as it were, the perception viewed in a new light; and only by a "colligation of facts," can the conception be evolved or elucidated. Even the boldest hypotheses must be drawn from some observed colligation. A wholly fictitious agent, or a wholly fictitious law of action, cannot legitimately be feigned. Facts must be combined for the complete elucidation of concepts, and yet concepts are necessary for the combination of facts; but the "circle" is "vicious," only in appearance. Concepts lie latent in facts, but are consciously recognized only when the facts are brought together and assimilated. The generalising or identifying power itself is not a concept, but is simply the mind's consciousness of a subjective unity unaffected by conditions of space or time.

Professor Green represents a much more advanced development of the theory of reasoning. His views are substantially those of Kant, although some of Kant's seeming antinomies are brought into harmony with the general purport of his system.

The empiricists are right in holding that our conscious beliefs are drawn from experience; and so far, that all our knowledge originates by Induction. But they have not asked the preliminary question—how can knowledge be drawn from experience, unless it already lies there implicitly? How can abstraction "take place, when as yet there is nothing to be abstracted?"† How can we get concepts out of percepts, unless in the percepts the concepts are already contained?

\* Bk. II, ch. vi, Aph. xxiii.

† *Works of Thomas Hill Green*, vol. II, § 9.

There can, indeed, be no perception without conception. For we perceive objects only by apprehending their relation to other objects, relations of sequence or co-existence of causality, of inherence, or of sameness. These relations, by which objects are perceived, are likewise the relations by which they are conceived; and obviously, unless the relations already existed in the percept, they could not be distilled from it by any process of abstraction. "The real thing then, is individual because universal: *i.e.* its individuality lies in its relation to all other things, which is a one in all, the common element in all, an *universal*; it lies in this relation, this mere difference from all other things, *as particularised*."\* All science, then, is but a continuation of the mental process involved in simple perception, a progressive determination of objects by relations. "The first step in knowledge is to connect one appearance with another, as forming one object . . . . The next step is to connect objects thus formed; in other words to condition, by mutual relations, the conditions of the first appearances."† Observation, description and induction, are stages in one and the same process, by which the world becomes to us a connected whole. First of all, we perceive phenomena under relation of space and time. Further, we perceive the mutual relations of these phenomena, and "colligate" them into definite objects. But an object can be perceived only by its relation to other external and limiting objects; which thus, although external in a spatial sense become bound up with its very being. To perceive an object, thus means to perceive simultaneities and sequences; to perceive all those conditions which, combined, make the object. Again we go on to perceive, not merely relations of objects, but relations of relations; until we arrive at what are known as the highest abstractions "but which are in truth implicit in our experience, just like the intuitions of time and space."

This view takes away the questionable and hypothetical character generally supposed to distinguish induction; or rather, shows that this uncertainty is not essential to the

\* *Works of Thomas Hill Green*, vol. II, § 28.

† *Ibid.*, § 130.

process, but merely incidental to our failure to apprehend all the relations which would constitute a perfect experience. This will be more evident after an investigation of the real meaning of that well-worn but ill-understood phrase "the uniformity of nature;" or, as Professor Green prefers to render it, "the unity of the world."

The "axiom of the uniformity of nature," which constitutes the ground of inference, is generally "regarded as an assumption that things resembling each other in a great many points will resemble each other also in others, or that what has happened often will happen always, that the future will resemble the past."\* There is, it is said, no ground for such an assumption except "a mere enumeration of instances in which phenomena have appeared in a uniform relative order." From many instances, in which two phenomena have been associated, we assume that they will in all instances be so associated.

But in all this there is nothing to show us that *all* phenomena preserve an orderly sequence. If we have constantly found one phenomenon following another, no doubt "association of ideas" will call up the image of the sequent when we see the antecedent; but this does not account for the conviction that phenomena as yet unexamined must occur in unbroken connexion with other phenomena, according to a fixed law.

The "enumeration of instances" may indeed generate "a bundle of expectations of various degrees of strength, according as the sequence between each series of feelings had been more or less frequently repeated or unbroken;" but a heterogeneous bundle of this kind could have "nothing in common with the ground of inductive reasoning, as it actually exists:" besides, Nature is at first sight anything but "uniform." It is true that on interrogating her "we find uniformity where there seemed chaos;" but why do we make the interrogation, unless we have a preconception of the response?

In truth, the principle of induction "is implied in the

\* *Works of Thomas Hill Green*, vol. II, § 123.

simplest act of knowledge. . . . The unity of the world is the unity of the thinking subject."\* We have to unite a multiplicity of feelings in one object, in order to form the simplest percept; and we are obliged to regard nature as a system, because we can consider its multiplicity only in relation to one thinking subject. Phenomena, which are determined by the same conditions, are to us not merely "similar," but *the same*. They may, indeed, be separate in time and space; but they agree in relations to which the distinctions of past and future, of here and there, do not apply, and which are, therefore, everywhere and always identical.

The combination of conditions, which is spoken of as the "cause" of a phenomenon, really *is* the phenomenon, as the union of oxygen and hydrogen *is* water. Thus we do not predict that the result of this union always *will be* water, from an observation of many instances in which this result has occurred. The two elements, united in certain proportions, *constitute* water; and, if any other liquid resulted, we should know that we had been mistaken in our gases, not that our prediction had failed. Identity of conditions is identity of result.

"The whole business of science is to substitute real identity (identity of conditions) for mere similarity between phenomena. The 'resemblance in certain assignable respects' between the 'all cases' and the 'particular case' must be identity in respect of the conditions on which the attribute predicted depends; and it is the office of reasoning, whether inductive or deductive, to ascertain these. These ascertained, the work is done. There is no further inference from 'some cases' to 'all cases,' or from 'certain times' to 'all times.' It is the statement of the conditions of a phenomenon which is the 'general proposition,' in distinction alike from the 'singular' proposition, which merely states the occurrence of a phenomenon, and from the 'collective' proposition which summarises any number of such propositions."† In short, "there is no inference from known to unknown, except just so far as the unknown become known."‡ The dread leap in

\* *Works of T. H. Green*, vol. II, § 124. † *Ib.*, § 125. ‡ *Ib.*, § 122.

the dark turns out not to be a leap at all—not even to be ordinary pedestrianism—but to be simply a case of standing still. We merely make the identical proposition that  $A = A$ . Whether the given factor *is*  $A$  may be still unknown; and it is here that the function of investigation, and, when this fails, of the calculus of probabilities, must be invoked. But always the axiom of unity must hold, and, granting identity of conditions, there will be identity of effects. We now see that Mill's view of syllogism is essentially misleading. In fact, it is not preferable to the old view; for how can a particular case be proved by a summary of other observed cases, unless it be one of them? And if it be one of them, where is the inference? The problem really is, to find the *conditions* of the given phenomenon; and when we have once found these, no number of subsequent observations can add to our certainty. "Inference lies, not (as Mill says) in the generalisation from observed instances to all, but (*a*) in the discovery of the real conditions of the observed instances; (*b*) in the discovery whether other apparently like instances are really like."\*

We can see also that Jevons's "Substitution of Similars," should be Substitution of Samenesses; that his Uniformity of Nature is not merely a necessary assumption, which may turn out true or false, but a law of the mind; and that his doctrine of the use of Imperfect Induction, in rendering "explicit, what was implicit in previous knowledge," receives a fuller confirmation than that which he contemplated.

The remainder of Professor Green's theory follows inevitably from these first principles. There is no distinction as to validity between propositions given by induction and by deduction. Generalisations are not "summaries of events which have happened very often, and are so far likely to happen again;" they are statements of the relations of phenomena. "Just so far as propositions about nature are general and true at all, they are necessarily true. They represent the relation of a phenomenon to its conditions, and this relation, on the principle that the world is one

\* *Works of Thomas Hill Green*, vol. II, § 119.

(a principle without which there is no knowledge at all) can never vary."\* But we may, of course, be mistaken, and the supposed conditions of the phenomenon may not be the real conditions; or, though real, they may yet be subject to other modifying conditions. In the former case the proposition is not true at all; in the latter, it is not complete, the negative conditions not being fully stated. The difference between so-called "necessary" or "*a priori*," and "approximate" or "*a posteriori*" propositions, is not that the latter are derived from experience, and the former from the intellect, but that the former depend upon conditions, which are fully known and do not admit of modification, while the latter depend on conditions imperfectly known, and subject to interference.

What seemed the complex process of Induction and Deduction finally resolves itself into an act of cognition and an act of recognition; although both acts must pass through several stages when there is a complex group of conditions to be cognized and recognized. If either act be incomplete, the result cannot be absolutely certain; but if both be complete, the certainty of the result necessarily follows. Only when we are assured of such completeness can we point to our conclusion as self-evident. Thus, mathematical propositions are not *a priori*, except as all general propositions are so. The "points, lines, circles and squares," in any man's mind are not merely "copies" of those which he has seen—they *are* those which he sees. Not that a line is a stroke, or a point a dot; but the concept of a line or point "is gained by the detachment of a purely intellectual relation, which was contained in the percept." The "sight" of an object involves a mental synthesis of materials given by sense; and it is by abstracting this mental synthesis from the sensuous materials that we gain our general ideas. As we are attending only to relations constituted by thought, fully discoverable, and not in any way dependent on the qualities or conjunctions of bodies, the propositions we make are apodictically true. The act of cognition and

\* *Works of Thomas Hill Green*, vol. II, § 108.

the act of recognition, which constitute "Induction and Deduction," are just as essential in mathematics as in any other branch of knowledge; the only difference being, that in mathematical reasoning both are complete, while in reasoning concerning natural phenomena both are frequently incomplete.

## XI.

## SUMMARY OF RESULTS.

(a)

INDUCTION & DEDUCTION are involved in the simplest I percept, as in the highest generalisation. The percept involves (1) an act of cognition, and (2) an act of recognition. I see the colour red, and recognize the sensation as identical with previous sensations, which have been cognized as red. I look at a ball, and though nothing but a coloured and shaded disc is presented to my eyes, yet I *perceive* a sphere, because I know the relation between the visible shape and the tangible shape, and recognize the visible shape as the sign of the tangible. As my capacity of thought unfolds, I find yet broader concepts lying latent in my percepts; but the mental process by which I apply them to experience is still the same. I have to recognize the concepts in my new percepts; and so far as I can do this, the percepts become known to me. Or relations between concepts have to be recognized in relations between percepts, or between other concepts. The laws of motion, for instance, may be described as the relations between my concept of motion and my concept of material bodies. They have to be recognized in special cases of material bodies moving from place to place, and also in problems dealing with the actions and reactions of bodies.

What lay implicitly in experience has to be deduced from it, and brought into full consciousness. If I knew only feelings, all my knowledge would be of particulars, and would be confined to the sensations of the moment. But as soon as I begin to know *relations* between feelings, I know something general; for the primary relation, that of identity, renders my sensations and images independent of time and of place. The sensation which I have now I recognize as the *same* sensation



which I had a moment ago; and thus, by the perception of identity, I generalise at once. Then, as I learn to combine sensations into images, and images into sequences and co-existences, I make generalisations at every step. The general idea is not something into which the particular experience is transmuted, by some strange alchemy; it is a relation detached from the particular experience, and recognized as existing not in this only, but in manifold other experiences. It is general because unaffected by time or space.

## (b)

Those stumbling blocks of the metaphysician, the Laws of Causation and of the Uniformity of Nature, resolve themselves into mere "identical propositions." The same agent will always act in the same manner, because always acting in the same manner *constitutes* its sameness. We know objects only by their effects on our senses and on each other. An object, and the conditions in which it is placed, are therefore a bundle of effects; so that it is mere tautology to say that object and conditions remaining the same, all effects will be the same. A universe containing objects which can be grouped *in genera*; that is, in classes the members of which are identical in some fundamental attributes and differ only in minor qualities and conditions, *must* be a universe of "invariable sequence." When we say that a given event or phenomenon must have a "cause," we mean merely that it *is* an event or phenomenon; that it does not differ generically from the rest of our percepts; that it exists under the same relations; that it belongs to our world. The mind has only one way of accounting to itself for phenomena, it must think of them as existing in time, and must therefore go back and trace their antecedents, or rather must trace the continuous series of transformations, by which the past has melted into the present. This uniformity in the operations of the mind is the Law of Causation. Only if we do not think about a phenomenon, or think of it without trying to *account* for its existence, can we imagine that it is uncaused. The idea of

causation creeps in some disguise even into the theories of the stanchest believers in free-will.

It is often said that, in a world in which events succeeded each other in hap-hazard fashion, we should have no conception of cause, and that therefore the Law of Causation is a mere generalisation from experience. As consciously known, the Law of Causation is without doubt a generalisation from experience, but it is gained by the detachment of a relation which underlies all experience. The argument is, indeed, essentially unsound. A thinking being, if he could exist in a chaotic world, would still be a cause-knowing being. He would know objects and discriminate them, and would therefore recognize each object as the *cause* of certain ideas, beliefs and emotions, in his own mind; for the mind would be a Cosmos amid Chaos. There would be identities internally if there were none externally; there would be the identity between an object and a mental image, an idea and a remembered idea. The supposed individual would not be without the concept of causation; nor would he conceive that causation was absent from the world, he would simply believe that partially alike objects were not wholly alike, and therefore acted diversely; or that a given agent was subject to continual change, and therefore could not be counted on to act in a constant manner.

The Law of Causation may be said to be gained by induction, because it implies the cognition of a mode of perception, and its recognition; but it is not gained by induction in the sense of being a summary of what has been observed in many cases, stretched so as to include all cases.

The same may be said of all "necessary truths," whether they are primary laws of thought, as the axiom of Identity and Contradiction, or Mathematical axiom. I have selected the laws of causation and of uniformity as examples, because they seem at first sight to present peculiar difficulties. Time and space are the "forms" of our perception, and discrimination is the condition both of perception and thought; but it may seem that we can quite well imagine a world in which there are no uniformities of sequence. In truth, however, we can

do no such thing, for every thinking mind contains within itself uniformities of sequence. The mind would know a hap-hazard world to be Chaos; but it could not know this unless itself were Cosmos.

For another reason I have selected the laws of causation and uniformity. The latter is usually stated to be the "ground of inductive inference," and its validity must therefore be discussed by every writer on induction. It would be truer to state that the law is a consciously formulated general expression for that perception of identities which constitutes induction. It is not an assumption made in order that we may be able to infer; it is an expression for that relation between concept and concept which is involved in all our experience and all our reasoning.

(c)

Every process of induction and deduction may be broadly described as a cognition and a recognition. But this is not equivalent to saying that induction corresponds merely to cognition, and deduction to recognition. Every induction, as well as every deduction, involves both processes. It is not only that deduction is involved in every induction which passes through the hypothetical stage. Perception itself, as I have shown, consists of cognition and recognition; and every new concept is formed by new colligations of facts, that is, by cognition of phenomena and recognition of them as related. The laws of nature are discovered by cognition and recognition; though a long train of reasoning and experiment has often to be interposed between the primary cognition and the ultimate recognition. This train consists of a series of cognitions and recognitions, and may be called the process of identification. For instance, Newton recognized the law of terrestrial gravity in the law of the moon's attraction. Lyell recognized the work of present terrestrial agencies in the records of the rocks. Darwin recognized the principle of selection in evolutionary history. Young recognized the law of fluid undulations in the propagation of light. It is true that these four recognitions are of varying degrees of validity;

but this depends (1) on the differing completeness of the cognitions which have to be identified, and (2) on the completeness of the identification. In the first case, the law of the moon's attraction and the law of terrestrial gravity can both be fully ascertained, and the identification is perfect. In the second case, the geological record, though incomplete, is full of the required evidence, and present terrestrial agencies can be studied constantly. The identification is satisfactory. In the third case, the evolutionary record is imperfect, and the conditions under which organisms vary are complex and obscure; so that even the phenomena of artificial selection can give no absolutely certain clue. Still, so far as the conditions which exist in nature are equivalent to those artificially induced by breeders, the recognition is valid. In the fourth, the lack of completeness is chiefly in the identification. But all are very complex examples of cognition and recognition.

There is, however, a kind of induction which may, *as a whole*, be termed bare cognition, although its perceptive elements, of course, contain cognitions which are recognized as related to each other. This is the so-called "Perfect Induction," or induction before hypothesis, on which we simply cognize a relation as existing among a certain definite number of examined objects, without going on to recognize the same relation outside that definite number. "Imperfect Induction," or induction after hypothesis, necessitates first the cognition of the principle in one group and, second, the recognition of it in another or others. This is the true distinction between "perfect" and "imperfect" induction. It is not true that the former is no genuine mental operation; nor that the latter "involves another process of inference of a widely different character."\* In all induction, cognition and recognition are involved; but in perfect induction there is recognition only of relations between constituent elements; while, in imperfect induction, there is recognition of relations between groups, or between a group and individuals outside it.

\* Jevons' *Principles of Science*, ch. vii.

(d)

The fundamental assumption in "inductive inference" is *not* that the same event will occur under the same conditions; it is that the conditions in the case, brought together *are* the same. This assumption, and the necessity of verifying it, make inductive results uncertain; for in the majority of cases the precise identity of conditions cannot be ascertained. Observation and experiment, and deductive reasoning, are our only instruments of search and verification. Mill's "four methods" are valid modes of discovery when combined with the "deductive" (or hypothetical) method, which passes from principles to phenomena, and shows: (1) the results which would follow from certain conditions, and (2) the identity of these results with the phenomena under observation. I need not dwell on these methods, as they have been sufficiently described in a former part of this essay. My present object is to show the nature and the justification of empirical laws, or laws which do not deal with ultimate conditions, and to assign their place in the present theory of induction.

Empirical laws are of two kinds. In the first place, they may be mere summaries of cases in which two or more phenomena have some real relation to each other. Such laws are obtained by the "Method of Agreement," and are of slight authority. For instance, the well-known generalization, that all salts are compounded of an acid and a base, was not founded on any discovered relation between this mode of composition and the nature of a salt; and was overthrown by the discovery of the halogens.

Although empirical laws of this kind have slight authority, they do possess a certain probability. Whence, on our theory, is this probability derived? Is the "method of simple enumeration" really of any avail? Because a thing has happened very frequently, have we any reason for expecting it to happen again—for expecting it to happen always?

Number of instances, in itself, affords no ground for prediction. If I throw a certain number ten times running,

that does not make it any more likely that I shall throw the same number again in the course of the next ten throws—supposing I am quite sure that the dice are unloaded. But if I have *not* this assurance, then the probability that the dice are loaded becomes strong, and, therefore, the probability that the same number will be again thrown. This example suggests the solution of the problem. The repeated recurrence of the same conjunction makes it probable that the conjunction is not accidental: for were it accidental, it would obviously be no more likely to recur than any other. Since it happens more frequently than on the doctrine of chances it ought to happen, the probabilities are that its repetition is not an accident, but depends on certain unknown conditions. So that, although we may not be able to ascertain the conditions in any one of the observed instances, we have some warrant for assuming that in all the instances they are identical; that the unknown quantity is a constant factor. On the occurrence of one of the observed phenomena, we shall be justified in looking for the usually attendant phenomenon. The expectation is precarious, because it depends (1) on the probability that the conjunction is not accidental, but is due to constant conditions; and (2) on the assumption that the newly observed phenomenon is identical with the phenomenon previously observed. An empirical law may, however, approach very near certainty, (1) when the phenomena are found constantly in conjunction, and never found except in conjunction; and (2) when there is no reasonable doubt of the identity of our past and present observations.

In the second place, empirical laws may be obtained by the method of difference, and may be really causal, but not ultimate. For instance, we know that iron filings decompose sulphuric acid, and set free sulphuretted hydrogen. If a metal, supposed to be iron, refused to decompose sulphuric acid, we should be sure that the metal was mis-named. But we do not know enough of the laws of chemical affinity to explain in what way the molecules of the iron, and of the acid, act upon each other, or what qualities in each condition the reaction. We know that the conditions of the de-

composition are present in the acid and the iron, but we cannot disentangle these conditions. They are there, but *what* they are is unknown. Nevertheless, so long as the two substances preserve their identity, we are sure that they will continue to react in the same way. The subject of *Classification* is closely allied to that of empirical laws; for classification depends on resemblances which may be merely superficial, or may follow from real, through partial, identity of conditions. The process may or may not be inductive. It is inductive when the class is formed by recognition of identity of conditions among its members; it is non-inductive, or semi-inductive, when the members are assimilated by certain more or less arbitrary marks. Thus the alphabetical classification of an index is not inductive. Professor Jevons remarks that "all arrangements which serve any purpose at all must be more or less natural, because, if closely enough scrutinised, they will involve more resemblances than those by which the class was defined."\* Still, the act of grouping by marks, whose significance, if they have any, is not understood, cannot justly be called a process of induction. In so far as a system is "natural" it is formed inductively; in so far as it is "artificial," it is formed non-inductively.

(e)

*Deduction*, though broadly speaking it is a process of recognition, depends on cognition, and cognitions have to be interposed at every step in a complex deduction.

The syllogism simply states a cognition and a recognition. Take the time-worn illustration: all men are mortal; but Socrates is a man; therefore, Socrates is mortal. "All men are mortal" really means that mortality is not an accidental adjunct of humanity, but the conditions on which mortality depends are part of man's nature. That is the cognition. The minor proposition and the conclusion are really one; for, in declaring Socrates to be a man, we declare that he belongs to the human race in those respects which

\* *Principles of Science*, ch. xxx.

conditions mortality, as well as in others. That is the recognition.

This method of analysis may, of course, be applied to the longest and most complex train of deductive reasoning, since every such train may be expressed as a series of syllogisms. Its validity, therefore, depends on the validity of the cognitions and recognitions. Assuming that these are unconditionally true, the conclusion of the syllogism is, of course, unconditionally true. This is all that we can mean when we speak of the certainty of deductive reasoning. Induction is similarly valid, if the involved cognitions and recognitions are without error. But in considering induction, we are apt to think chiefly of the *matter* of the investigation, because no definite rules can be laid down for its *form*; while, in considering deduction, we think of the *form*, because it can be definitely set down so as to fit any possible *matter*. Form is in itself infallible, as determined by the primary conditions of thought, and is fallible only in its special applications, from accidental confusion of terms or ideas, or from the imperfection of the matter submitted to it. Matter may be incompletely known, and even the attainable knowledge may be misleading rather than helpful. Therefore, that kind of reasoning which fixes our attention on its form rather than on its matter, will always appear the most certain.

(f)

*Hypothesis* is the unverified assumption that a concept, which must be in part derived from experience, but may be in part a mental fiction, can be recognised in another concept, or in a percept. When the recognition is complete, which cannot happen until we are acquainted with all the conditions on both sides, the hypothesis becomes a law of nature. When two or more hypotheses seem to be equally applicable to facts, or when we can imagine that others might be brought forward, this proves that we are *not* acquainted with all the conditions. Unverified assumptions should never be confounded with verified laws; and yet they

H



form an essential stage in scientific discovery. Without a prior conception of some relation between facts there can evidently be no recognition, consequently no progress in knowledge; and where experience does not supply sufficient materials, the lack must be eked out by the "scientific imagination." The imagination must of course not be unbridled; it must contain an element of true cognition; it must be in part, at least, what Newton understood by a "*vera causa*." According to Mill's maxim, either the agent or the law of its action must be known to exist in nature.

While knowledge of nature is still in its infancy, valid hypotheses cannot be formed, because the mutual relation of objects are as yet but little investigated. Men grope about, inventing imaginary relations, and seeking to recognize them in real objects; until forced by practical necessity to study objects in an unprejudiced manner, and to find out their real relationships. When, by the failure of the first method and the partial success of the second, they are directed into the right path, they begin at last to elicit from their percepts approximately true concepts, and to bring these to the test of experience.

But the genesis of every individual hypothesis, if we go sufficiently far back in the history of the mind from which it sprang, resembles the genesis of hypothesis in general. The mutual relation of objects are gradually discovered, not at first by intentional experiment, but by the slow evolution of thought which keeps pace with daily experience. Thus a rich crop of cognitions springs up as though spontaneously from the soil, and is harvested by degrees. When we wish to account for some new or seemingly abnormal phenomenon, we search through our store for applicable instances, and try to deduce the phenomenon from laws already known to us. Or we seek to frame some new combination of old conceptions which may give the phenomenon as its resultant. In other words, we form a concept which we can recognise in the conditions of the phenomenon. This recognition may involve a chain of subsidiary recognitions, including both deductive reasoning and verification by new observations

and experiments. Recognition usually consists of two processes—the preliminary deduction of the phenomena from the hypothesis, and the subsequent practical verification.

Bacon's error lay in misconceiving the nature and narrowing the scope of recognition. According to his theory, proved laws are to throw light on the special facts from which they have been elicited, and on all evidently related facts; but we are not to assume and to seek to recognize in the given phenomena a law elicited from doubtfully related facts. It is, however, the verification of a *doubtful* relationship which constitutes advance in knowledge.

The early cosmological philosophers fell into an opposite kind of mistake. They identified on insufficient grounds, finding identity where there was but apparent similarity. The affinities, which they imagined, were slight, and often merely fanciful. The Platonist and Neo-Platonist schools may be said to have omitted the prior cognition altogether, and to have *recognised* in facts, simply their own arbitrary fancies.

The value of hypothesis in science and the mode of its growth, are very well exemplified by Darwin's account of the manner in which the principle of Natural Selection shaped itself in his mind. Noting the geological relations of the present to the past animal population of South America, and especially the extinction of the gigantic sloth and armadillo-like animals, and the great pachydermata, he ran over mentally the usual explanations given by naturalists in similar cases. The hypothesis of great geological catastrophes, of violent changes in climate, and of the agency of man, were successively rejected; the observed phenomena not being explicable as the result of any one of these conditions, or of their combination. The supposed causes could not be recognised in the given effects. Darwin concluded that "causes generally quite inappreciable by us," but doubtless dependent on some slight difference in climate, food, or number of enemies, "determine whether a given species shall be abundant or scanty in numbers."\* Still he did not

\* *A Naturalist's Voyage round the World*, ch. viii.

cease his search; and, turning to a group of instances resembling in some obvious respects those under investigation, sought for conditions common to the two groups. From "a careful study of domesticated animals and cultivated plants,"\* he gained an insight into the Principle of Selection; and, returning to his problem, elaborated the identification of the principle as carried out by Nature, with the principle as carried out by man.

The history of the Darwinian theory resembles, *mutatis mutandis*, the history of every advance in Science. The only way in which phenomena can be "explained," is by identification of the previously unknown with the known.

(g)

Briefly, all Induction which passes (in common phrase), "from the known to the unknown," does so by "parity of reasoning."

The new formula for the mutual relations of Induction and Deduction must run as follows—Induction is a process of cognition involving recognitions. Deduction is a process of recognition involving cognitions.

\* *Origin of Species*, Introduction.

## EVOLUTIONARY ETHICS.

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WHEN the storms begin to beat, and the winds to blow, and the rains to fall, it becomes foolish—nay criminal—to rest content with the very lordliest pleasure-house built on a shifting foundation. There is no time to be lost in looking out for a secure site; otherwise, great may be our fall. We are told that life is not “worth living” unsupported by doctrines which are visibly crumbling away, and that Justice and Benevolence are but pensioners of the blind old monarch, Faith. But instead of resigning ourselves to the grievous alternative of moral atrophy or intellectual darkness, let us examine the ideas of a great thinker, who claims to find the root of virtue deep in the mind of man, and organically one with his nature.

The “Data of Ethics” forms the top-stone of Mr. Spencer’s philosophy; or, at least, the highest stone yet placed. It appears, as the author tells us, out of its place, since it constitutes the first division of the “Principles of Morality,” with which the system should end; while the second and third volumes of the “Principles of Sociology” are as yet unpublished. “The night cometh, wherein no man can work,” is in substance the pathetic reason given for this departure from the natural order of precedence. This last part of the task it is to which the Synthesist regards all the preceding parts as subsidiary. “My ultimate purpose,” he says, “lying behind all proximate purposes, has been that of finding, for

the principles of right and wrong in conduct at large, a scientific basis. To leave this purpose unfulfilled after making so extensive a preparation for fulfilling it would be a failure, the probability of which I do not like to contemplate, and I am anxious to preclude it, if not wholly, still partially. Hence the step I now take."

All who would range far in the regions of ideas and of action, will do well to follow this example.

Having ascended the highest summit of the mountain range, we shall take our bearings, and shall be able to use the knowledge in subsequent ascents of the lower peaks or in excursions in the valleys.

That the problems which we are about to approach are important will be denied by none; but perhaps there are many who do not realise how transcendently important they are at the present stage of thought and belief. On this point I must again quote from the preface to the "Data of Ethics:" "The establishment of rules of right conduct on a scientific basis is a pressing need. Now that moral injunctions are losing the authority given by their supposed sacred origin, the secularisation of morals is becoming imperative. Few things can happen more disastrous than the decay and death of a regulative system no longer fit, before another and fitter regulative system has grown up to replace it." This truth is strikingly illustrated by a passage from Ellis's "Polynesian Researches," quoted by Mr. Spencer in his work on "Ecclesiastical Institutions." It is as follows: "The sacrificing of human victims to the idols had been one of the most powerful engines in the hands of the government, the requisition for them being always made by the ruler. . . . An individual who had shown any marked disaffection towards the government, or incurred the displeasure of the king and chiefs, was usually chosen. The people knew this, and therefore rendered the most unhesitating obedience. Since the subversion of idolatry, this motive has ceased to operate, and many, free from the restraint it had imposed, seemed to refuse all lawful obedience and rightful support." Well, we are not South Sea savages, and our

spiritual and temporal chiefs have not kept "the wretch in order" by condemning him to actual immolation at the shrine of an offended fetich. Still there have been modes always precarious, and now growing obsolete, of keeping the wretch who knew how to evade the laws in order, if not in very good order; and it is time to teach him that to be a wretch is bad evolutionary policy. It is time for all of us to look to the basis of our moral creed, and to make sure that, while beliefs may come and beliefs may go, morality must abide as an organic part of human nature.

Although we do well to climb the mountain, we must come equipped with some knowledge of the hills and valleys, or we shall not perfectly enjoy or understand the view from the summit.

The inhabitants of our ponds and hedgerows live "without a conscience," if not without "an aim;" and the physiological conditions or concomitants of justice and mercy are not determinable by the most assiduous microscopist. Yet the simple conduct of the lowest organism is linked by a myriad gradations with the conduct of the highest; and until we understand those great biological generalisations, which are as true for the *amæba* as for man, we shall never truly comprehend any part of those sciences of mind and morals, which are themselves but sections of the science of life. "Just as, fully to understand the part of conduct which ethics deal with, we must study human conduct as a whole; so, fully to understand human conduct as a whole, we must study it as a part of that larger whole, constituted by the conduct of animate beings in general."\*

It is, indeed, chiefly in this breadth of foundation that Mr. Spencer's system differs from the empirical utilitarianism of Bentham and John Stuart Mill. All utilitarians must, in the last analysis, estimate conduct by results. Conduct is good, if in the long run it promotes happiness; bad, if in the long run it decreases happiness. On this all are agreed; this is the common ground of optimist and pessimist; this, as Mr. Spencer shows, is virtually accepted even when

\* *Data of Ethics*, ch. i, § 2.

verbally denied. Whether we estimate conduct by its relation to abstract virtue, to an ideal perfection of character, or to rectitude of motive; whether we invoke the Divine sanction, the legal sanction, or the sanction of conscience, our theory still involves an implicit reference to happiness as the ultimate end and aim.

Theories differ by the varying degree in which they recognise the laws of natural sequence, and the interdependence of all departments of nature. Empirical utilitarianism, for instance, takes no account of the established principles of biology, but seeks to confine itself to an induction which never can be complete. It is as though, declining to accept the law of gravitation, we were to insist on using Attwood's machine to prove experimentally the rate at which every apple falls to the ground. Attwood's machine is most useful for learners, and as a means of verification, but there are a great many objects to which it cannot be applied, and physics certainly never would have become a science unless physicists had been willing to reason downward from law or from hypothesis to phenomena, as well as upward from phenomena to law.

This view is so important that I must quote Mr. Spencer's own words, contained in a letter to Mr. Mill: "I conceive it to be the business of moral science to deduce, from the laws of life and the conditions of existence, what kinds of actions necessarily tend to produce happiness, and what kinds to produce unhappiness. Having done this, its deductions are to be recognised as laws of conduct, and are to be conformed to, irrespective of a direct estimation of happiness or misery. Perhaps an analogy will most clearly show my meaning. During its early stages, planetary astronomy consisted of nothing more than accumulated observations respecting the positions and motions of the sun and planets. . . . But the modern science of planetary astronomy consists of deductions from the law of gravitation—deductions showing why the celestial bodies necessarily occupy certain places at certain times. Now, the kind of relation which thus exists between ancient and modern astronomy is analogous to the kind of

relation which I conceive exists between the expediency-morality, and moral science properly so-called.\*

In this scientific and rational conception will be found the true answer to the objections so often and so forcibly urged against utilitarianism. It is repugnant to common sense and common feeling to assert that everyone is or ought to be at every moment consciously engaged in the pursuit of happiness, either for himself or for society. We know very well that many of our actions, although they may have pleasure as their impulse, yet have not pleasure as their conscious goal. "Every man, acting voluntarily, does what he under all the circumstances prefers to do," is a perfectly true saying. But the seeming corollary, "he does it *because* he prefers to do it," is really ambiguous, and stealthily introduces a new and questionable idea. It is the seemingly innocent little word "because" which must bear the blame. For a confusion at once arises between the *final* cause and the *efficient* cause of the action; between the inclination which prompted it, and the object towards which that inclination was directed. My inclination prompts me to paint a picture or write a poem; but I do not take the inclination twice over, and make it into an object. My *object* is not satisfaction to myself, but the true expression of my thought. This expression will indeed bring me satisfaction, but I shall not work so well if I think very much about the ultimate end. Not only are we apt to take the pleasure twice over, but we often take it three times over, confusing together the inclination, the object, and the results of the action. The results of my picture or poem, if it be good work, will be, let us say, beneficial to society; and yet benefit to society was not my object. In short, the *inclination* is always in the direction most pleasurable or least painful; the *results* of the action, if it be a moral one, are such as in the long run, and on a large scale, must increase happiness; but the *object* of the action need not be connected in the mind of the actor with any thought of happiness, personal or general.

Now it is the aim of rational utilitarianism to show, first,

\* *Data of Ethics*, ch. iv, § 21.



how inclination can be directed to an object not capable of gratifying any selfish desire; and second, how it comes that objects sought without any mental reference to general welfare are yet correlated with general welfare. Thus the way will be smoothed for a reconciliation of egoism, or care for self, with altruism, or care for others. I can but very briefly trace Mr. Spencer's solution of these problems.

Evolution has been possible only by the correlation of pains with injuries, and of pleasures with benefits. For if an organism persistently preferred what was hurtful to it, and disliked what was beneficial, that organism would have a very small chance of surviving, and transmitting to offspring its suicidal peculiarity. You cannot, for instance, transmit liking for starvation as a family trait. To a certain extent, then, the simple sensations are true and safe guides. But the evolutionary progress is towards increased length and breadth of life; and with every fresh adjustment to the environment, involving new developments both of structure and function, the mental and bodily activities grow more coherent, more definite, and more heterogeneous. That is, acts are no longer isolated, but are connected into series; they are more delicately adjusted to ends; and they are more varied in kind. In order to preserve this continuity, fitness, and variety, the simple and presentative feelings must be restrained by complex and representative feelings; foresight must be exercised, and many immediate pleasures renounced, for a greater but more remote good.

Three "external controls" of conduct are generated by the conditions of primitive life. The savage acknowledges the "religious control" by hurting or maiming himself to avert the anger of his fetish; the "political control," by risking his life in obedience to the command of his chief; and the "social control" by incurring similar danger to win a reputation for courage.

And here, indeed, we are "tracing the genesis of the moral consciousness," the main feature of which is Self-control. This self-control is evolved within and by the religious, political, and social controls; but it differs from

them in referring to the *intrinsic*, that is, the necessary, while they refer to the *extrinsic*, that is, the incidental, effects of actions. The three external controls co-operate primarily for securing success in war, and secondarily for restraining aggressions within the community; they preserve the society from foes without and from foes within. But the savage obeys his chief's command, or sacrifices to his fetich, or to his primitive "Mrs. Grundy," not so much from any perception that the natural consequences of non-conformity will be disastrous, as from a fear of its incidental consequences. He refrains from hurting his neighbour, not because he is unwilling that his neighbour should be hurt, but because he does not want to be punished.

In time, however, the united influence of the political, religious, and social controls engenders a type of character which does spontaneously what was at first done under compulsion. From accumulated racial experiences of utility, moral intuitions are developed, and the pain which was of old connected simply with the punishment now becomes connected with the action to be punished. By the principles of evolution, it is as clear that this *must* happen as that individual pleasures must be correlated with individual benefits, and *vice versa*; for if the being best fitted to the physical environment is the most likely to survive and to leave offspring which may inherit its endowments, not less is this true of the being best fitted to the social environment. There are laws which impose penalties on me if I rob, or maim, or kill. If I have a nature sufficiently sympathetic to make me shrink from the intrinsic as well as the extrinsic effects of robbing, maiming, or killing—not only from the pain I may probably suffer, but also from the pain I shall certainly cause—then I am less likely to subject myself to punishment, and, so far, more likely to live and prosper.

*Duty* is an abstract sentiment, deriving its authority from a sense of the usually superior guidance given by re-representative feelings, and its compulsiveness from racial experience of the three lower controls, aided by a recognition of natural penalties.

It is, then, already clear that to a certain extent evolution tends to the growth of unselfish motives, and that, broadly speaking, "true self-love and social are the same." No society can exist unless internal aggressions be restrained; unless, further, there be co-operation among its members, involving approximate equity, and performance of contract; and it is difficult to imagine the existence of any society without some degree of beneficence or spontaneous effort on the part of some of its members to promote the welfare of others. All this may happen without any thought being expended on *universal* welfare, or "the greatest happiness of the greatest number," which must always remain an Ideal rather than a definite object of endeavour.

Half-blindly, slowly, with no set purpose, mankind has already worked out the main conditions of happiness, and embodied them in its moral code—Be strong, be just, be kind. Rational utilitarianism takes these results; and aims, not straight at happiness, but at the essential conditions of happiness. It endeavours to conform "to certain principles which, in the nature of things, casually determine welfare," and which are generalisations from past racial experience, rectified by present intelligence. The law of justice, for example, is a statement of the most fundamental conditions of happiness. Equity must always be maintained, whatever may be the immediate consequences; because the permission of a seemingly beneficial injustice makes the foundations of happiness insecure, while seeming to adorn the superstructure. The evolutionary moralist must therefore insist on conformity to principle as strongly and as sternly as any believer in the Categorical Imperative.

But still, we have not reached a complete reconciliation of the claims of egoism and altruism. It is very evident, "that a creature must live before it can act," and that, "unless each duly cares for himself, his care for all others is ended by death; and if each thus dies, there remain no others to care for."\* Survival of the fittest has been the law of evolution, and works for general as well as for individual happiness,

\* *Data of Ethics*, § 68.

by ensuring the survival of the healthiest, and therefore of the happiest. It is our duty to be both healthy and happy; for our fitness or unfitness will be transmitted to future generations; and besides, excessive unselfishness not only fosters selfishness directly, by accustoming others to receive and expect undue sacrifices, but it also fosters selfishness indirectly, by tending towards the non-survival of the unselfish. A certain degree of egoism, then, is not only justifiable, but actually imperative. Try to imagine a state of things in which everyone cared for everyone else, and no one cared for himself; in which everyone, neglecting his own dinner, ran about with tit-bits for his neighbours, while they in turn besieged him with their own tit-bits. Clearly if all were purely altruistic, givers would be baulked by finding no recipients; or else unwilling recipients must *pretend* to be pleased, in order to afford pleasure to the givers. Again, sympathy is only a representative feeling, and can seldom be quite so vivid as the original feeling which it represents; so that if egoistic pleasures and pain should fail, their sympathetic reflections must fade away and vanish. The image in the mirror will not remain when the imaged body is withdrawn. Then, although we may strip ourselves of happiness for the sake of others, we cannot give them all that we renounce. Bodily health, the joys of success, and all intimate and individual feelings, are as non-transferable as a railway ticket.

And yet altruism has been as necessary as egoism to the preservation of the race. Consider its earliest manifestation—parental love and care—which “in its simple physical form” is “absolutely necessary for the continuance of life from the beginning,” and which develops in complexity and duration with the development of higher organic types. This parental care has become an instinct—an insistent, imperative instinct—often overpowering the strongest egoistic cravings. Where there is family altruism, social altruism has a chance of evolving; and we have seen that men living in society are obliged to be to some extent altruistic. Their individual welfare depends largely on the welfare of the community.

To be just, to see justice done to others, to maintain and improve the agencies which administer justice; this is the true policy of every citizen. But to crown his joy, he must be spontaneously kind and beneficent, as well as just, for thus only can he know the pleasures of friendship and sympathy; thus only can he renew his youth when he is old, his strength when he is infirm, and feel all his lost delights by proxy.

But if egoism is essential, and altruism also essential, and yet the two conflict; what is our hope? Will the weary battle go on for ever? Is there no prospect of a final peace?

There is such a prospect. We have already seen that evolution works towards perfect adaptation to the environment. Pleasures and pains are not fixed and absolute; they are relative to structures and to the states of structures; and as organisms adjust themselves physically to the conditions of their life, they must at the same time adjust themselves psychically. That is, every mode of action demanded by social conditions must eventually become pleasurable to social beings, and as parental love is already an instinct, so the broader love, not only of country, but of the race, will in time become instinctive. Sympathy, hitherto stunted by adverse conditions, will develope; and as human nature improves, the natural language of feeling will be less restrained; looks, words, tones, will all grow more expressive, and the power of interpreting them will strengthen and sharpen by use. As the sphere of sympathetic gratification widens, the sphere of self-sacrifice will diminish; for, with growing efficiency and increasing welfare, there will be fewer troubles to assuage, fewer pangs to partake. No one will be willing to accept benefits at the cost of pain or privation to others. It would be curious to speculate on what might happen if the balance began to descend on the altruistic side, and love for one's neighbour grew actually more potent than love for one's self. Then the moral dangers and hence the moral judgments of mankind would be reversed. The egoist would then possess a rare but desirable virtue, and so be

counted a saint; self-seeking and self-assertion might be reckoned as attributes of holiness, and even the thief might be looked upon leniently, as endowed with an overplus of the unusual quality of acquisitiveness. The heaviest censure would be reserved for vicious excesses of generosity, humility, long-suffering, renunciation, charity.

But leaving this quaint possibility, there is certainly something inspiring in the contemplation of a future merging of generosity in equity; of a perfectly pleasurable altruism; of a state in which all actions should be "absolutely right." To-day, most actions are only relatively right; that is, are partially wrong; for most are attended with some degree of pain, either to self or to neighbours. An absolutely right action is one which produces pure, unadulterated pleasure; but this can happen only when evolution has perfectly adjusted desires to conditions. And at present, such perfect adjustments are possible only or chiefly in the lower part of our nature, which has been moulded to its environment before social evolution began. A healthy mother suckling her infant, a father playing with his boy, are not performing duties of a very high order; but what they are doing is in itself absolutely right, being a source of mutual pleasure. In time, the higher part of our nature will be similarly perfected; and a foreshadowing of this ultimate development may even now be seen in the almost or entirely unmixed pleasure afforded by certain æsthetic and benevolent activities. It is this conception of the completely adapted man in the completely evolved society with which moral science must deal, just as physics and astronomy must assume in the first place certain ideal conditions, making allowance subsequently for actual incidental conditions. The rigid and weightless lever is a fiction; the ideal man is a fiction; but both are fictions which have a direct and practical bearing on reality. Only, while the physicist's lever can never become a reality, the moralist's man may yet tread the earth in flesh and blood; ethically adult, having outgrown that sense of self-control and self-compulsion, which is so often painful to the best of us; no more conscious of the demands of duty than he is

conscious of the beatings of his own heart. Here philosophy and poetry meet and clasp hands; for the picture drawn by Mr. Spencer cannot be distinguished from that drawn by Wordsworth in his "Ode to Duty."

"Serene will be our days and bright,  
And happy will our nature be  
When Love is an unerring light,  
And joy its own security.  
And they a blissful course may hold,  
Even now, who not unwisely bold,  
Live in the spirit of this creed,  
Yet find that other strength, according to their need."

This is a beautiful, and let us hope, a prophetic picture. It may be that the dream of the "Golden Age," will yet be realised, and that the world will at last be peopled with just men made perfect. But, as we listen to the predictions of philosopher and poet, we must beware of lending too easy an assent, beguiled by hope and desire. I therefore venture to urge a few criticisms.

It is quite true that complete adaptation to the environment is the goal of evolution. But this does not necessarily mean that the organism becomes more highly developed, or approaches more nearly to what may seem its ideal form. All this depends on surrounding conditions, which may favour the less complex and less ideal stage. The organism will then retrograde, losing its embryonic eyes, brain and backbone, and retaining only the essential stomach. In a word, given an environment which demands progress, and progress will be made; but given an environment which requires degeneration, and degeneration will ensue.

Mr. Spencer's assumption is that conditions are, at the present day, in advance of conscience. Man lives in society, and yet is not a completely social being; therefore, he must become more social—that is, more altruistic—before he can be perfectly adapted to the complicated whole of which he forms a part. "The type of nature to which the highest social life affords a sphere such that every faculty has its due amount, and no more than the due amount, of function and accompanying gratification, is the type of nature towards

which progress cannot cease till it is reached"\* This sounds not merely plausible but incontrovertible, when taken as an abstract proposition ; and it is only in testing words by facts that we are able to discover a flaw.

The error seems to arise from an equivocal use of the terms "society" and "social." Different values have been unconsciously given to expressions which ought to be of equal value ; and the idea conveyed is that an imperfectly social animal lives under conditions which, if not perfectly social, are yet so far evolved as to demand a corresponding altruistic evolution on the part of the said animal. Now the proposition thus stated, is no longer self-evident.

The conditions under which civilised man exists, are to a large extent of his own making. It is true that he still has to win from Nature the means of life ; but he is no longer a clinging dependent, without arms against her cruelty, or power to extort what she is reluctant to bestow. He can now assert himself as master of energies which once held him in slavery ; so that his non-human surroundings are in great part under his control. Human society is the chief element in the environment of every individual ; and since human society is composed of individuals it can be as a whole neither better nor worse than the average man. If his social qualities are imperfect, the same imperfection will appear in the social qualities of the community.

Let me pause to explain in what sense I use the word "average." The social state may be spoken of as an equilibrium of forces. The shorter arm of the balance carries the greater weight, for those who are above mediocrity in intellect, knowledge, or force of character, exercise a power disproportioned to their number, while the hosts who are in every way below mediocrity are merely so many units. But the average man stands at the centre of gravity, and round him oscillate the morals of society.

The influence exerted by men of intellect, energy and knowledge, is not to be estimated by the counting of heads. That kind of superiority, however, which consists only in a

\* *Data of Ethics*, § 67.



higher morality, is apt to handicap its possessor in the struggle for existence, the man who in this respect rises much above the average, is as little adapted to his surroundings, as the man who falls much below it, if both are in other respects equal, and continue to live under average conditions. In the evolutionary sense of the term both are "unfit," and do not merit "survival." The dishonest tradesman may get a bad name, and end his days in penal servitude. His neighbour, by scrupulous honesty, may bring himself and family to starvation. Society is man-made and is truly called "society," only so far as man is truly called "social." The world, in short, is under moral subjection to *the tyranny of the average man*. This tyranny might become a worthy rule were the average raised, which might happen either by improvement of the mediocre and sub-mediocre many, or of the intellectual and energetic few.

It will doubtless be objected that my argument proves too much. Although in primeval ages, man was rather the subject than the sovereign of nature, he very early began to shape his own life, and to form unwritten codes for its guidance. The religious, political and social, controls are all human in origin and development. How did the race transcend its own laws, and bring forth conscience from blank utilitarianism? How has humanity progressed morally amid moral surroundings generated by itself? How is it that, at the present day, a sensitive conscience can pass beyond the ordinary standard of right and wrong, and live in its own ideal world?

Before the "controls" began to exist, man was not man, as we now know him; for the lowest savage has his fetish, his chief, or his tribe, and generally all three. Even when the controls were beginning their period of slow materialism he was, according to Mr. Spencer's view, barely human, since he had as yet no morality. The moral control being the product of the other controls, it could not crystallize while its elements were still in a state of ferment. This incomplete human being did not then make his environment in the sense in which I have already used the expression.

He only set in motion certain forces which for a time were his lords and masters. Impelled by physical necessities, acting on instincts confused by the first glimmerings of thought, he found safety in gregariousness and subjection, not knowing whither these beginnings would lead him. Nature, not man, must at first have been his best friend and bitterest foe; and not till the "controls" were approaching maturity could he feel the predominating influence of humanity. Only in the ripening stage of society will the "average man" be our tyrant. Till that time, the growing necessity of cohesion and organization, and the growing sense that mutual aid is desirable, will oblige him gradually to improve his moral code. I do not assert that he has entirely escaped this obligation; but I shall try to show that it is no longer enforced by the religious, the political, or even by the social control!

The religious and political controls, at least, may be considered to have nearly finished their work in this direction. Supernaturalism is declining day by day, despite flickering revivals which lend hope to the worshippers of celestial fire. Not only do the clergy, assembled in Congress, virtually abandon the authenticity of the Old and New Testaments; but the very apologists of religion base their strongest plea upon strictly utilitarian grounds. Instead of regarding this world merely as "a state of probation," they appear to prize the belief in a future life chiefly as conferring additional value on the present life. Dogmas such as Predestination and Election, the Fall, the Atonement, Everlasting Punishment, cease to be credible as soon as they are felt to be useless. Morality no longer depends on the religious sanction; it is religion that depends on the moral sanction.

The political control must be a permanent factor in all coherent plans of life; but it is not an enlarging factor. State Authority, in western nations at least, reached its zenith some time ago, and now remains stationary where it does not verge toward decline. Measures such as the Factories Acts, Compulsory Vaccination, Compulsory Education, State Endowment of Research, and the Industrial Dwellings Act,

are pointed to by Mr. Spencer as insidious precursors of State Socialism; yet all have been brought forward by representatives of the people, for the popular benefit, and subject to popular approval; so that "political control" of this kind can last only so long as it suits the interests and wishes of the democracy. That is, it resolves itself into a form of the "social control," of which I now proceed to speak.

The force of public opinion has been enormously increased by the wide and rapid circulation of news by steam and electricity. Every one can now sit in judgment upon statesman, soldier, priest, or criminal, because everyone can read the account of their doings in the morning papers. And though the majority of these impromptu judges may be unworthy to ruffle the composure of the meanest Olympian deity, yet their united voices are sometimes able to silence the thunder of Jove himself. But it is the ordinary private individual in whom the immense potential energy of the "social control" may be expected, as it becomes dynamic, to work the greatest changes. At present, the public opinion for which he cares is often but the opinion of his family and friends—of his town, parish, or sect. His political notions, taken from a favourite newspaper, do not materially affect his conduct. Yet the fractional influence which he can exert upon the destinies of his country, and even his position as an irresponsible judge of matters deep and high, must in time react upon his mind. He can, if he will, see and experience for himself, much that would have seemed to his grandfather unreal as a fairy tale. The sayings and doings of the outer world now form part even of the dullest existence; and the average life is increasingly full of colour and variety, because brought more and more into contact with the spirit of the time. We read strange books and travel in strange lands, and so make acquaintance with standards of morals and habits of thought alien from our own. The public voice speaks to us, and every year it speaks louder and more insistently. At last we catch its tones, and echo them, perhaps with a provincial accent, but with growing apprehension of their import. It may be long,

indeed, before this incipient cosmopolitanism reaches its perfect development.

Still, the public voice will be only that of the average man, even when the average is no longer that of any one city, or country, or even continent. The quality of the opinions formed may be improved by the necessary dropping of local prejudices; but no definite moral advance is produced except in an indirect way which I shall try to explain later. The human environment which rules every individual is becoming greater in volume, and less specialised in type; but we cannot infer that it tends to be essentially wiser or better.

To Mr. Spencer's three primary controls I venture to add a fourth, which may be called the *Natural Control*. I mean that self-guidance which follows from a more or less definite knowledge of natural processes, and consequently of the natural or "intrinsic" effects of human actions. In the "Data of Ethics," the natural control is undistinguished from the moral control, the main characteristic of which is said to be that it refers "not to the extrinsic effects of actions but to their intrinsic effects." Now, I believe it is possible to detect two flaws in this statement, and to show: first, that the moral control, in common with the social, political and religious controls, is concerned with both intrinsic and extrinsic effects; and second, that the main characteristic of the moral control lies not in the class of sequences to which it refers, but in its constitution and etiology.

I am deterred from committing murder, let us say, not by imagining the pains of hanging, and the consequent destruction of my own life, but by imagining the pain inflicted on my victim, the dead stop put to his activities, and the distress felt by his family and friends. In this case, which is the one selected by Mr. Spencer, the evils contemplated are such as in any state of society must inevitably follow from my deed, and are therefore its intrinsic effects. But suppose that, instead of refraining from murder, I merely refrain from placing a man in a position where he will incur some kind of undeserved penalty, or perhaps only some form of social

odium. The immediate effect of my action is here of the extrinsic order; although its remoter effects, consisting in shame, sorrow, or physical suffering, are undoubtedly intrinsic. But if I simply contemplated my own personal hanging or ostracism, my mind would be filled with the same mixture of intrinsic and extrinsic effects. For while the punishment is an *incidental* result of my crime, the disgrace or absolute annihilation follows as a *natural* result of the punishment. No sharp line, indeed, can be drawn between the intrinsic and the extrinsic, and the division is empirically useful, rather than philosophically valid. There is no custom or belief, however arbitrary and irrational, which is not the necessary outcome of certain social conditions; and these conditions are in all cases the natural results of evolution. Even if we consent to treat the matter empirically, it is often difficult to decide how far any given event or sentiment results from the special conventions and laws of a society, and how far it results from the original constitution of human nature. Neither from the philosophical nor from the empirical stand-point can we draw this clear boundary line between the domains of nature and convention. Still the distinction is convenient, and we may continue to employ it as an evolutionist continues to speak of genera and species, while recognizing the partially artificial character of these conceptions.

The natural control, then, concerns itself only with intrinsic effects, while the religious, political, social and moral controls deal with effects of both kinds, intrinsic and extrinsic. Depending as it does on the exactness, range, and organisation of our knowledge, its power is ever growing with the advance of science. It is, indeed, the most conspicuous development of the present age, and even the superficial observer who understands little of its real significance is struck with wonder by its achievements. Everyone can be eloquent about the marvellous subjection of nature to man, though all do not see that its essential antecedent has been the intelligent submission of man to nature. So far, the nineteenth century is justified in singing its own praises.

Yet even the natural control does not necessarily elevate

morality. It is, alas, possible to foresee the natural consequences of wrong actions, and yet to act wrongly. The good man uses his science or insight well, and the bad man ill; each is rendered more competent to fulfil his own purposes, but neither is radically changed. The main characteristic of the moral control cannot therefore be its reference to "intrinsic" effects; for in that case it would coincide with the natural control, which, in its direct working, is morally indifferent. There must be some more profound and vital distinction by which morality is separated from other guiding influences.

We have seen that, in all probability, the religious and political controls have passed their zenith of power; and that the social and natural controls, although capable of indefinite expansion, will not effect a vital transformation in the character of mankind. In another direction, however, there is light which may help not only to complete my answer to a supposed criticism, but also to render less obscure both the past and future of morality.

Before testing any fresh solution of our problem, let us return for a moment to Mr. Spencer's account of the origin and constitution of the moral faculty. The "abstract consciousness of duty," he says, is compounded of two elements—the element of "authoritativeness" and the element of "coerciveness." The former is derived from a general sense that it is wise to sacrifice temporary gratification for the sake of permanent well-being. "This conscious relinquishment of immediate and special good to gain distant and general good, while it is a cardinal trait of the self-restraint called moral, is also a cardinal trait of self-restraints other than those called moral—the restraints that originate from fear of the visible ruler, of the invisible ruler, and of society at large."\* From such fear, and from an added aversion to the *intrinsically* evil results of crimes of aggression, springs the other constituent element of the sense of duty—coerciveness.

This rationale seems incomplete. It provides for the framework or skeleton of morality; but hardly for the

\* *Data of Ethics*, § 44.

sensitive nerves and nutrient blood. We can understand that if crime usually incurs punishment, either from man or from nature, it may, in the lapse of generations, come to be an object of horror, without conscious mental reference to the punishment incurred. But, on Mr. Spencer's theory, it is not equally easy to explain why the *intrinsic* consequences of crime, so far as they affect others and not ourselves, should ever become the chief ground of this sentiment of aversion. Hatred of crime might, conceivably by inherited association of ideas, produce dislike of the suffering which it entails upon its victims; but this would be a late consequence, not a generative condition, of the moral control, and could not play any part in racial development until hatred of crime had become a fixed element of racial character. Under such circumstances it is probable that, even after long ages of evolution, the "intrinsic" results of actions would take only a secondary or rather a tertiary place in the formation of moral estimates.

Further, it must be granted that when the community becomes stable, the interest of the majority of its members lies in preserving this stability, and that acts of aggression will therefore be opposed even by individuals not in danger of direct injury. The public feeling thus created forms an admirable safeguard to life and property; but it is calculating and unimpassioned, and generically unlike the hot indignation often awakened even in natures not especially sensitive, by tales of injustice or cruelty. The monstrous birth of a passion from a sentiment of enlightened self-interest, is not explicable even on the principles of the Synthetic Philosophy.

It is true, again, that actions conclusive to individual or to family benefit may in the course of time become independently pleasurable. The means to a desirable end come to be desired for their own sake, in cases where the end is a matter of comparative indifference. Animals take pleasure in the mere exercise of their limbs and jaws, apart from the acts of seeking and devouring prey; the merchant takes pleasure in the details of business; the mother in suckling and nursing her child. From such instances Mr. Spencer



argues that, since co-operation to a certain extent is essential to the very existence of society, and since a greater degree of co-operation will promote both general welfare and individual prosperity, the activities called into play by co-operation will eventually become pleasurable. It is good policy on the part of individuals to perform kindly offices for their neighbours, who will be inclined to show kindness in return. Beneficence, and even self-denial, when at length dissociated from the idea of ultimate private advantage, will in this way develop joy-giving instincts. And evidently that community, whose members co-operate best, and are most altruistic, will have the best chance of survival in the struggle for existence.

These generalisations, however, do not bear reduction to their concrete elements. A very small amount of altruism is sufficient to serve the interests of the average man. Altruistic in some measure he must be or seem, and if he can really *be* so, it saves him the trouble of *seeming*. But the necessary measure is limited, and to pass very far beyond it is often to incur very serious practical disadvantages. Nor does an entire community always flourish in proportion to the mutual benevolence of its members. Cohesion there must be, but the cohesion need not be so perfect as to exclude vigorous and often unscrupulous competition. How can this cold and colourless "ego-altruism" transform itself, even for a select few, into an object of passionate love and adoration.

Perfect goodness and happiness, no doubt, is the fruit of perfect sanity. It is not rapturous, not self-conscious, but is taken simply as a healthy man draws his breath and eats and takes exercise. Such is the ideal type; but it is a type which has never been attainable amid the growing complexities of life. It has not been accepted by the vast majority of those who have thought noble thoughts, and lived noble lives; because it was practically incompatible with the conditions under which they had to work. Epicureanism, truly so called, is an ideal not too low, but too high and remote for wide acceptance; while Christian and other forms of self-devotion and self-sacrifice have been found practicable by many votaries, some of whom have been inspired by genuine



love and pity for their kind, and have risen to heights of true heroism.

Can such men be truly described as tending towards a "harmonization of constitution with conditions?" Was not the "constitution" out of all proportion to the "conditions"? and does not its ideal form imply the existence of an actively hostile world? The conditions of life can hardly have generated that joy in heroic well-doing with which they are so evidently in conflict.

In Mr. Spencer's account of the genesis of our moral consciousness, we meet with no really effective factors except "fears," "controls," and "restraints." There is no suggestion of spontaneity. Devotion to truth, heroic self-sacrifice, enthusiasm for the welfare of humanity, all things that are lovely and of good report, spring from a primary appetite hunger—and the basest of passions—fear. Though it is credible that such were the beginning of prudence, moderate honesty, mutual forbearance, and even some mutual helpfulness, we cannot believe in mere "restraint," as even the remote ancestor of spontaneous and exalted joy. This must be the instinctive verdict of most students of Rational Utilitarianism; and many, doubtless, are driven by the aridity of its data to seek a theological or transcendental theory of emotions, which refuse to be accounted for, on grounds so purely negative as want of food and want of courage.

Yet it may be said that the synthesis, in his "Principles of Psychology," has indicated a method of filling up this hiatus in his ethical system. The "Data of Ethics" itself contains scattered sentences, which may help to solve our problem. For I must not be understood as questioning the substantial truth of Mr. Spencer's ideas. My view is simply that he has not shown both sides of the medal with equal distinctness; my aim is, so far as may be in this brief essay, to bring the neglected side into greater prominence.

"The limit of evolution," he tells us, is not reached by the social being "so long as there remains space for the growth of faculties which, by their exercise, bring positive

benefit to others and satisfaction to self.”\* These, as we learn from the context, are the altruistic faculties. They are integral parts of human nature; but whence did they originate? Are they the offspring of “restraints” and “controls,” as we should suppose from previous pages of the “Data of Ethics;” or had they some other ancestry as our own reflections have led us to conjecture? Mr. Spencer answers this question in the remarkable sentence—“Sympathy is the root of both justice and beneficence.”†

Our next enquiries naturally are “What is the germ of sympathy itself?” and, “How are justice and beneficence traceable to sympathy, as their common origin?” These points are not touched upon in the “Data of Ethics;” but are partially dealt with in the “Principles of Psychology;” and I will now summarize the conjectural derivation there given of human fellow-feeling from brute gregariousness.

The herd is the embryo of the community; for creatures must become gregarious before they can become social. The habit of flocking together conduces to the welfare and survival of the species, and the proximity of its kind becomes in some degree pleasurable to each member of the herd. “Among creatures led step by step into gregariousness, there will little by little be established a pleasure in being together.”‡ This, however, does not suffice to generate anything like sympathy. Besides blind, unintelligent pleasure, there must be some community of feeling, which implies not merely the possession of like feelings, but sensibility to their outward signs. Among gregarious animals, a rude and inarticulate language, expressive of pain and pleasure, naturally arises. The whole flock is liable to be “simultaneously affected by surrounding conditions,” of a favourable or unfavourable kind, and therefore to feel alarm or distress, or physical satisfaction collectively, and to express their feelings in concert. Thus each member of the flock comes to associate certain cries and movements of its companions with certain sensations of its own, and to recall the sensations at every repetition of their visible and audible correlates.

\* *Data of Ethics*, § 54. † *Ibid.* ‡ *Principles of Psychology*, § 504.

In the course of evolution, experience is stored up in heritable nervous structures, so that each individual, almost from birth, responds to signs which have become racially associated with certain feelings. The human infant smiles in response to the smile and caresses of its mother, and cries when it hears a harsh voice, or sees a frowning face, thus instinctively rehearsing ancestral emotions. "In the past experiences of the race, smiles and gentle tones in those around have been habitual accompaniments of pleasurable feelings, while pains of many kinds, immediate and remote, have been continually associated with the impressions received from knit brows and set teeth and grating voice."\* As the child grows older, the pains and pleasures received in this way, become more vivid and definite, because reinforced by personal experience.

The child's history is an abridgement of the history of the race; for the power exerted by the social, political and religious, controls is traced to the one principle of association of ideas, or rather sensations and emotions. "One of the things that come to be strongly associated" in the mind of the young savage "with smiling faces, which are symbolical of pleasure in general, is courage; and one of the things that come to be associated in his mind with frowns and other marks of enmity, which form a symbol of unhappiness, is cowardice."† So with the imagined anger or satisfaction of the god, or spirits of ancestors, which is simply a transfigured form of human anger or satisfaction. So far, the representative feelings evolved are "ego-altruistic" evoked by manifestations of feeling in another; but "representing feelings likely to be undergone by self." They are, however, accompanied by emotions, which, like them, originate in "the association which experience has established, mainly in the race, but partly in the individual," but which represent the pain or pleasure that "are being actually undergone by another." The sight of a happy face, for instance, not only arouses a vague expectation of pleasure, but it also produces an emotional image of the inward pleasure manifested by this outward and visible sign.

\* *Principles of Psychology*, § 520.

† *Ibid.*

The two groups of feelings—the ego-altruistic and the purely altruistic always co-exist, but they “may be variously proportioned to each other.” The growth of sympathy, and hence of altruism, has been favoured by the influence of sexual and parental relations. “In their common relation to progeny, parents are liable to have certain pleasurable and painful feelings called out from them, by the same cause, at the same time, in marked ways,”\* and thus they enter into intimate bonds of sympathy. In like manner, the parent will frequently share the suffering or well-being of its offspring, and will thus cherish the sympathetic faculties. Social conditions, under which the welfare of the individual coincides in the main with the welfare of his neighbours and of the State, also tend to foster altruism. On the other hand, its growth has been retarded by those “destructive activities, offensive and defensive,” by means of which “each society has had to maintain itself in the face of external inimical agencies, partly animal, but mainly human.” These activities, being conducive to the preservation of the tribe or nation, inevitably continued to be on the whole pleasurable, and sympathy, therefore, could not be highly developed. The militant stage of society is the egoistic stage; and which is gradually merging into the altruistic period of peace and co-operation. “The industrial régime is distinguished from the predatory régime in this, that mutual dependence becomes great and direct, while mutual antagonism becomes small and indirect.”†

At this point I may insert a few words of criticism, before proceeding to investigate the basis of Mr. Spencer's theory.

It is doubtless true that in youth, and in the earlier stages of society, family ties favour the cultivation of sympathetic feelings. But in later life, and at a later period of social development, such ties frequently help to narrow and specialise the sympathies, setting bounds beyond which they cannot easily pass. This, while valuable in preventing shallow natures from frittering uselessly away what little feeling they possess, is often injurious to deep natures, causing them

\* *Principles of Psychology*, § 508.

† *Ibid.*, § 525.

to pour into some narrow channel an intensity of emotion, which might have fertilised broad regions of life.

The sentence quoted about the "industrial régime" will move most readers to a sad smile. What is our "peaceful" system of competition but a bloodless war, in which the vanquished are not slain on the battle-field, but suffer a more cruel because a more lingering death from hunger and heart-break, or live a joyless and degraded life, far more terrible than death itself? Commerce, like the Church, knows how to kill "without shedding of blood."

From this brief digression, I return to Mr. Spencer's description of the causes which promote or retard sympathetic evolution. These include, not alone domestic and social, but also intellectual conditions.

"The degree and range of sympathy depend on the clearness and extent of representation. A sympathetic feeling is one that is not immediately excited by the natural cause of such a feeling, but one that is mediately excited by the presentation of signs habitually associated with such a feeling. Consequently it presupposes ability to perceive and combine these signs, as well as ability to represent their implications, external or internal, or both. So that there can be sympathy only in proportion as there is power of representation." \*

A certain minimum of intellect is needed to form a coherent conception even of the simplest object; much more to translate a group of varying symbols into their emotional equivalent. So long as the imagination is comparatively inactive, the feelings will remain callous. "The relatively slow development of sympathy during civilisation, notwithstanding the high degree of sociality and the favourable domestic relations, has been in a considerable degree due to the slow development of representative power"—that is, of ideality. Something is therefore to be hoped from that mental progress which, on evolutionary grounds, is certain to take place. "Increase of intelligence is one condition, though by no means the sole condition, to increase in extent of sympathy."

\* *Principles of Psychology*, § 507.

The whole theory may be summed-up as follows: Everything has been accomplished by the repeated association of a given sign with a given emotion of pleasure or pain, which has at last established an organic connection between the idea of the sign and the idea of the emotion. Some degree of "representative power" has been essential to the formation and continuance of this nexus. But, as community of feeling among members of one flock or tribe was born of that "gregariousness" which conduced to their common welfare, so it cannot expand and flourish when it interferes with social survival. We have, however, progressed so far that "moral discomfort" is associated with acts of aggression, and "sympathetic gratification" with acts of beneficence. Utility, which presided over the birth of sympathy, guides the advance of altruism. Thus "even sympathy and the sentiments resulting from sympathy may be interpreted as caused by experiences of utility." The most striking characteristic of this hypothesis is its unadulterated empiricism. Sympathy is not an integral part of human nature; it might conceivably never have come into existence; it stands in certain relations to the intellect, but those relations are not fundamental. In "association" of perceptions and emotions, not in the primary perceptions and emotions themselves, we are to seek the germinal point of altruistic morality. This, of course, is a perfectly comprehensible position; and it may be admitted that the processes described by Mr. Spencer have in all probability taken place, and have determined the lines on which altruism has developed. But as there are reasons for rejecting as insufficient a purely utilitarian system of evolutionary ethics, so there are reasons, at least of equal validity, for refusing to be content with a wholly empirical moral etiology. In the latter instance, criticism assumes a constructive rather than a destructive aspect, and, by laying bare the central principle of human knowledge, reduces the empirical rationale to its proper accessory position. Consequences of the greatest importance naturally flow from this rearrangement of ideas, and among them we may find the complement of Mr. Spencer's principle of utility, so that

what has hitherto been the dark side of his Synthetic Philosophy may be rendered clear and luminous.

The sensible and intelligible world is constructed by the sensibilities and the intellect of the human organism. We may speak of light waves and of luminiferous ether, but these are only mental images which cannot even be conceived except as modifications of actual percepts, and which, therefore, pre-suppose the phenomena which they are intended to explain, and do not bring us nearer to any real external "cause" of light. A light-wave, that is, would be inconceivable unless we already possessed the concept of wave-motion, which could only be gained from experience of visible and tangible waves. Absolutely nothing is known of the cosmic *fons et origo* of light; but we do know that light is the peculiar sensation produced by every stimulation of the optic nerve. Farther than this we cannot pass; our highest abstractions being merely the ghosts of phenomena, as the luminiferous ether is the ghost of ordinary matter. The optic nerve, with its retinal expansion, is the maker of the visible world. Had its special sensation been of some other kind, the world must have differed correspondingly; for a creature, existing so close to us that we could touch and handle it, would, if endowed with a set of sensations unlike ours, live in a world totally different from the one we know and inhabit. What is true of sight is true not only of the other senses, but of the capacity for reason and for emotion. Another kind of brain would construct another kind of cosmos; and the laws of nature are in reality the intellectual conditions according to which we group our perceptions. Experience, in reality, is the exercise of the mind, which cannot develop its minute powers by any other means, just as a child kept always in swaddling bands could never develop its muscles, or learn to walk. The organ is perfected by the function, although it must pre-exist in an inchoate state to render the function possible.

Besides making the so-called "real" world, man is commonly said to be the fashioner of an "ideal" world. There is, however, no clear distinction between the two; our

commonest sensuous perceptions containing some ideal or "representative" element, supplied by memory and imagination. A flower seen growing in a field would be a mere spot of colour if we were ignorant of the meaning of light and shade, or if we did not supplement the part which we actually see—perhaps the exterior of the corolla and calyx—by the parts which we remember having seen and touched; and the perception would still be incomplete if we forgot the fragrance.

The ideal or "representative," like the real or "presentative" world, has another aspect, neither sensuous nor intellectual. It possesses an *emotional* aspect. Of few, if any, sensations can it be said that they are neither painful nor pleasurable, but absolutely neutral, although the pain or pleasure is, in many cases, so slight and fleeting as to be barely perceptible. Thought, at first sight, appears as if opposed to emotion; yet, admitting that our thoughts about common objects and about high abstractions often seem to be perfectly colourless, it must on the other hand be admitted that even the briefest *train* of thought leaves some faint impression of mental comfort or discomfort. No subject can be *dwelt upon* without to some extent affecting the equilibrium of feeling; since the one motive for such lingering is the intrinsically pleasant or painful attraction of the subject, or its practical influence upon some concern of daily life.

There is one class of ideas which bears not only this general relation to the emotions, but a special and definite relation; the emotional accompaniment being essential to the completeness of the representation, and, indeed, constituting its matter in the same way in which visible, tangible and other sensible properties are said to constitute the matter of an ordinary perception. I refer to the class of *ideal emotions*; that is, of emotions not directly experienced, but mentally imaged. Berkeley incontrovertibly remarks that nothing can resemble a sensation except another sensation; and it is equally true that nothing can resemble an emotion except another emotion. Our images of emotions in others must therefore be essentially emotional.



The thought of a fellow creature carries with it the thought of his feelings; and here, at last, we reach the germ of sympathy.

Mr. Leslie Stephens' "Science of Ethics" throws much light on this side of our problem. He says: "I do not really think of a man till I have interpreted the external signs by the emotions which they signify. Till I do that, he is for me merely a coloured and moving statue. . . . I must put myself in his place, feel what he feels, and measure his conduct by the analogy of my own behaviour under similar circumstances. The process is the same which is implied in every intellectual process;"\* for we cannot think coherently of any object without conjuring up a set of "ideal perceptions" representing aspects not at the moment within the field of sensation.

Mr. Stephen's sentences which I next quote deserve to be deeply pondered. "Hence it would appear that sympathy is not an additional instinct, a faculty which is added when the mind has reached a certain stage of development, a mere incident of intellectual growth, but something implied from the first in the very structure of knowledge. . . . To realise the world as a material whole, I must have representative perceptions of time and space. To realise the world of thought and feeling, that world upon which my life and happiness depend at every moment, I must have representative emotions. 'Put yourself in his place,' is not merely a moral precept; it is a logical rule implied in the earliest germs of reason as a description of reasoning itself, so far as it deals with other sentient beings."

This simple, and perhaps faint, representation of the feelings of our neighbours are, of course, very far from the highly developed emotion to which we usually restrict the name of sympathy, and farther still from a settled and enlightened altruism. Yet the fact remains that every thought which attempts to mirror the mind of a human being contains a nascent sympathetic element, often obscured by the necessity of thinking, and therefore feeling "in shorthand," and often more than neutralized by some an-

\* *Science of Ethics*, ch. vi. § 2.

tagonistic passion, but still existent as a seed which only awaits its budding and blossoming time. That the power which lies at the "root of both justice and beneficence" should belong to the very essence of the thinking faculty, is certainly a truth of hopeful augury; for such a power may indeed be stunted and etiolated, but cannot be finally destroyed except by the extinction of thought itself.

Every man must continue to fashion his own cosmos, and the dwellers therein. As his senses give birth to the forms and colours, and his intellect to the laws of nature, so his inner life, emotive and ideal, constitutes all he knows of humanity, individual and collective. Were it not for this ideal and emotional capacity, the moral development traced by Mr. Spencer could never have taken place, because the experiences which fostered it would have been impossible and inconceivable. The potentiality of sympathy must exist antecedently to such experiences, since they all presuppose its existence.

Man might go on *associating* sensations and emotions for ever, but he would never *interpret* the symbols of feeling, or form mental representations of other minds, did not the very structure of his being compel him to animate with his own life the surrounding statues of flesh. In his earlier stages, he thus animates stocks and stones, the sun, the moon, and the stars, either directly by reasoning from the analogy of his own doings and impulses, or indirectly, by attributing similar doings and impulses to the spirit of his ancestor, now resident in the celestial or terrestrial object of veneration. Thus he creates the religious control. The origin of the political control may be chiefly explicable by the brute power of strength and cunning; but even here is a distinct emotional element in the admiration and emulation of the chief's courage and other high qualities. The social control involves a double transfer of feelings. I interpret my neighbour's approbation of my conduct, and turn it into self-approbation; I interpret his scorn, and it is at once self-contempt. For the time he has been admitted to the precincts of my mind, and he has planted there part of himself.

Sympathy has now been traced to its origin; and its subsequent developments may have taken place under the guidance of utility, very much as Mr. Spencer describes. I must, however, devote a few pages to a very brief consideration of the questions "How is sympathy related to altruistic morality? In what sense can it be described as the root of both Justice and Beneficence?"

It will easily be granted that sympathy is the basis of beneficence and benevolence. To assent to the feelings of another is to be pleased by his pleasure, and pained by his pain, and in energetic natures the feelings become powerful motives, so that the benevolent man obeys—sometimes too literally—the law "Do unto others as ye would that they should do unto you." Egoism and altruism are not merely conciliated, but identified; the petty image of self being only a single figure among the throng inhabiting the greater mental self. Highly imaginative persons, indeed, are not always actively beneficent, even when their interests are chiefly human, and it is generally supposed that absorption in the ideal world is incompatible with practical helpfulness. But this is due to one of two causes. Imaginative power, combined with a sluggish temperament, may spend itself in mere contemplation of the smaller self, of the fictitious joys and sorrows of romance, or of the romantic element in real joys and sorrows. Or, with a more ardent but still unpractical nature, ideality may exhaust its forces in painting vivid pictures of human life, beside which the living original seems pale and uninteresting. When practical and ideal power are united the latter is apt to attract less notice, because the action is patent to the world, while the inner motive is unseen; so that the idealist who can work out his ideals, gets less credit for imagination than the dreamer and the poet. Yet active benevolence and dramatic genius spring equally from the sympathetic imagination; in the one case spending itself in contemplation and creation, in the other seeking to modify the conditions of life.

The sense of justice is of more complex origin than the impulse to beneficence. Primarily it arises from sympathetic

anger against aggression, regulated and nurtured by inherited experiences of utility. In its more developed but still embryonic form it may be constituted, as Mr. Spencer supposes, by "representation of a feeling that is itself highly representative," and therefore of comparatively late growth; that is the love of personal freedom. Sympathy with the love of freedom is likely, however, to become sympathy with the love of license; and the outlaw to shine as the hero of the hour. At an early stage in the growth of morality, the most vivid, not the most weighty, ideal emotion will carry the day. We are liable to be impressed with the woes of our neighbour because he *is* our neighbour, and to forget that he may have incurred just punishment for some offence against the general interests of society. Impulse may dictate actions which in the end react injuriously even on the object of our solicitude. This tendency is in some degree corrected by the regulative influence of the political and social controls, which enforce the claims of the community and the authority of law and custom. Indeed, it would seem at first sight that the controls play a greater part in the origin of the sense of justice than can be played by sympathy; since our ideal representation of "the love of personal freedom" may, if unguided, impel us to inequitable conduct, while the very rigidity and lifelessness of a broad unpersonal law will favour equity.

We have, however, seen that the social control, upon which the political control is at all times more or less dependent, is itself founded on sympathy. Without sympathy, there could be no mutual understanding, and therefore no concerted course of action. Even the simplest machinery of the "social control" could not exist, much less its more subtle and potent energies. Experiences of utility have of course been indispensable factors in the moulding of public opinion; but public opinion itself could never have come into being without ideality. Nor, without ideality, could it live for a day. So far as we are governed by the prevailing standard of duty, our emotions and judgments are not mere products of the emotions and judgments of the community; they are reproductions, pictures, reflections as in a mirror. The most rigid

conservative is sensitive to the social atmosphere. He likes to be with his kind, for the multiplication of his own image makes him feel a host in himself; as indeed he is, seeing that he has assailed a circle of acquaintances and counterparts. So far as the social control exercises regulative functions, it may fairly be said that sympathy is controlled by its own offspring.

Influences which favour mental expansion are also favourable to moral equity.

Changes in material, and consequently in social, conditions, although unable, as we have seen, to exalt the character of the social control are able to strengthen and modify it in such a manner that its pressure on our sympathies, in different directions, tends to be more and more equalised, to the great advantage of our moral equilibrium. As tribes and clans become compacted into nations, and as inland and foreign communication becomes easier, the best minds are enabled to take a wider range. Private and vivid sympathies lose their irresistible power, and yield to the superior mass of those generated by attention to the interest of great bodies of men. The desires and needs of a community cannot be so vividly conceived as the desires and needs of an individual; but the conception, with its attendant emotions, may more surely impel to action, because its object is felt to be of supreme importance; and the very idea of a great nation or a great cause must inspire and exalt, since it expands, for the time, the Microcosmic Ego to a Microcosm. Justice is broad and enlightened sympathy crystallised into principles; beneficence is sympathy still fluent, and immediately responsive to represented pain and pleasure. In order that our conceptions of duty may be fitted to the changing environment, fresh portions of sympathy must gradually be crystallised; or, in other words, the moral aspirations of one age must become the positive duties of the next. That there may be materials for such an advance, the scope of fluent sympathy must be enlarged by widened knowledge and experience, allowing the imagination to concern itself with broader issues, involving the welfare of hitherto neglected sections of the community, or of the human race in general.

To sum up, the moral faculty and the moral emotions are explicable as the raising to a very high power of an essential constituent of human nature, as the exaltation of a feeling which, though regulated and partially organised by "controls" and "restraints," is not *created* by religious awe, by political necessities, or by the merely utilitarian elements of public opinion. All these have helped to shape and fashion the ultimate product; but they have not evolved it out of nothing. Even primitive man was not a sheet of white paper; he was not a creature endowed with indefinite possibilities of variation; for his embryonic mental power foreshadowed a definite moral development, and, in his language of signs and of speech, a superior being might have read the promise of sympathy, bringing forth justice and beneficence.

We can now return to our original problem: What hope is there for the future of morality? Rejecting as insufficient our former grounds of confidence, what comfort can we extract from remaining probabilities? There is a power *within* ourselves "making for righteousness;" but it is not omnipotent, and is frequently held in check by adverse forces.

Sympathy, whether crystalised into principles and ideals, or still in the fluent stage of spontaneous feeling, constitutes moral vitality; and no moral advance can take place except by means of rationally guided sympathy. This, again, depends on the natural strength and acquired comprehensiveness of the ideal faculties in their practical relations.

Since altruistic ideality is "implied from the first in the very structure of knowledge," there must be a distinct relation between intellectual and moral progress; and, since vivid and coherent imagination requires a considerable development of intelligence, no human being who does not fulfil this requirement can be really sympathetic. But when the mind has once attained and passed this necessary minimum, intellect and its accompanying ideality tend to be more and more specialised, and that particular function distinguished in common parlance as *imagination*, the image making and portrait painting function does not

necessarily become stronger. The ideal mind need not fill itself with vivid images of objects or of emotions; it can find occupation in giving reality to abstractions, and in passing from phenomena to their possible causes or results. No great reinforcement of the imaginative power, considered simply with regard to its native qualities of strength and vividness, is to be expected from the progress of education and enlightenment. We must place our trust in the setting free and utilisation of sympathies at present latent or mischievously employed, rather than in any direct intensification of the innate sympathetic power of our race. It would be a difficult task to estimate the amount of stored up or wasted energies which may yet be turned to moral account, but some clue is afforded by the history of noble endeavours and failure in past ages.

At every period moral genius has been a phenomenon as conspicuous, though as rare, as genius of the purely intellectual or artistic type. There have always been men and women whose ideality concerned itself chiefly with their fellow creatures, and thus took the form of sympathy, often transformed into religious fervour by concentration upon a deified man or a humanized God. St. Francis of Assisi, and St. Catherine of Siena, are familiar examples of this kind of character, and the Christ whom they served and worshipped possessed the rare original power, which not only vivifies and transfigures old laws, but creates new laws by the force of its own sympathies, and says to dying and to unborn principles—"Let there be life."

The highest moral genius has, perhaps, never been found associated with the highest intellectual or practical genius; probably because no human mind has either the energy or the time for development on all sides to its utmost possible limits. Asymmetry is the rule; perfect symmetry, in all probability, does not exist even as an exception. Besides, the clear perception of practical or logical necessities often compels to words and deeds which seem to war against ethical axioms, and are consequently considered immoral. Yet a man of powerful intellect, and of force of character

sufficient to obtain for him wide or penetrating influence, generally has a large and many-sided nature, possessing moral faculties far above the average. His fibre is less fine, his feelings less ardent, than those of the saint or martyr; but, while they waste their lives in fruitless endeavours, he goes straight to the mark. Men of this stamp have set their impress on mankind for good and for evil; perhaps as frequently for evil as for good. But in few cases have their aims been distinctly bad and selfish; more frequently the pure metal of their motives has been weightier than the alloy which made it workable; and the evil effects of their action have been incidental, not foreseen in the original plan, or foreseen as lamentable but inevitable accessories.

Standing on a lower level are thousands of ordinary men who, so far as their lights direct them, would be glad to place themselves on the side of righteousness. They help to prevent the moral average from sinking greatly, but they do not raise it; indeed, their influence is chiefly on the side of conservatism, unless some reformer or fanatic sweeps them along in his train; in which case, their good but blind intentions are likely to lead to disastrous results. This, however, is due to a cause which not only baffles incompetent goodness, but too often nullifies genius and heroism.

The facts and laws of nature, and of individual and social life, are not learned by intuition; and the spiritual seer cannot divine by his inner consciousness the simplest physical or physiological truth. The knowledge necessary for the right guidance of conduct is acquired by study, extending not through a single life-time, but through generation after generation. Even the plainest sanitary conditions are but just beginning to be widely understood; and the laws of mental, social and political health are still obscure, even to profound students, although rays of light are gradually permeating the darkness. And yet, without accurate data for his convictions, no one can or rather ought to be sure that he is acting rightly. So much violence has been done to truth by the true, to humanity by the humane; so many have retarded the world's progress, who were most



eager for its advance ; so many of the right-hearted have been hopelessly wrong-headed, that the possession of " every virtue under heaven " cannot be considered as a guarantee against the misuse of those virtues to the world's disaster. Ignorance, prejudice, misconception of facts, false generalisations, have been as deadly foes to practical morality as lust and aggression. Nor, in the cases of which I am speaking, has deficiency of insight been always or generally due to natural defects of intellectual vision. There is such a thing as " invincible ignorance ;" but the ignorance to which I refer has been unavoidable, because its only corrective, Science, was in an embryonic stage of existence, or at best, was still on probation as a satisfactory director of thought. It was inevitable that the intellect should wander in celestial circles, before it descended to the study of earthly things, associated with common and ignoble uses. While the body was regarded as a brute beast, clogging the ethereal " spirit," the relation between physical and moral sanity was inconceivable. When the family and the state were looked upon as divine institutions, the utilitarian basis of politics and sociology could not be examined, nor any provision contemplated for the modification of existing structures.

We are now in a state of transition from the old theological to the new scientific period ; and though much knowledge must be gained and many changes wrought, some with pain and violence, before the process is complete, yet our faces are turned in the right direction, and we know the lines on which advance must be made. Physical Science affords accurate information hitherto unattainable, and provides a sure starting point for reforms of thought and of practice. The intricate social problems which touch us so nearly and yet seem so far removed from our mental grasp—which *must* be solved and yet seem impossible of solution—are now for the first time brought within the pale of rational consideration. That their unravelment is only a question of time, may be confidently predicted ; for it is always harder for the human mind to make a radical change in its methods of working, than to carry out those

methods successfully when the initial revolution has once been accomplished. The secularisation of thought and the humanisation of morals are achievements more difficult than any special applications of the new principles. That the spirit of the age is increasingly secular, may be gathered from the tenor of life and thought, common even among the orthodox. I have already remarked that the former relations of heaven and earth are inverted; the celestial being now merely the complement of the terrestrial, instead of winning the devout to beatific contemplation by its own independent glory. This earthward tendency of the mind naturally makes purely human affairs of greater importance, and more worthy of serious attention, quite apart from their bearing on "spiritual" interests. Consequently, they can be studied with more singleness of aim and to better purpose. No one, probably, would now declare with Sir Thomas Browne, "I give alms not to satisfy the hunger of my brother, but to fulfil and accomplish the will and command of my God." Most would admit that indiscriminate almsgiving, from this or any other motive, is absolutely criminal; that philanthropy is not a means of gratifying the feelings or satisfying the conscience in the easiest way possible; and that we should take the greatest pains both to render our schemes practically efficient, and to understand the fundamental conditions of success and failure.

This increasing predominance of the natural control over the religious control; this growing acquaintance with the laws of our dwelling place and of our own bodies and minds, render practicable a closer approximation to absolute rightness in our conceptions and conduct. "Where there's a will there's a way" is too often a false proverb, because there are too many ways, and an unguided will cannot choose the right one. But the way being made comparatively clear, and the will remaining unchanged, we may rationally hope that good intentions will no longer pave the road to the infernal regions. If I have medical knowledge, I shall not poison my friend when I wish to cure him; and when legislators and philanthropists know something about scientific politics and

sociology, they will not poison the race when they would fain administer healing medicine.

It is granted, then, that in past ages none but the simplest and most instinctive kinds of conduct had a fair chance of being right, and that in the future we shall be more and more able to adapt our actions to the conditions of the environment, so that the right will ensure the right deed. Granting this, the further question arises—"Where shall we find the stored-up moral energies which are at length to be diverted into their true channel?" I have suggested an answer in anticipation, but it is worth while to dwell a little on the subject.

Our tyrant, the average man, cannot escape untouched by the new learning. So far as it affects him, it does good; making him more careful in matters of health, and perhaps more anxious that his children should be cultivated as well as comfortable. But he has no chance of initiating any reform, for he is hardly pressed by competition, which keeps down his altruistic instincts, and makes high morality unworkable. Besides, he has no originality; and were he freed from material obstacles, could only work on in the old grooves, or follow at a distance more soaring spirits. The direct elevation of the average man, by scientific culture, counts for very little; though by public opinion and practical reforms, generated in higher spheres, he may be benefited and moralised.

The moral genius must, of course, gain much by mental enlightenment; but, unless he is intellectually as well as morally great, he will not be able to utilize the new resources to their utmost limits, either within his own mind or in the world of action. He finds his complement in the man of large nature, and of great intellectual and practical energy, which must find an outlet in mischievous or beneficial activities. It is in the person of this potential destroyer or constructor that the new forces must be incarnated. The aims of a strong and many-sided character can never be purely selfish; for pure selfishness implies a contracted, not an expanded, horizon. Often strength takes the form of egoism, crushing down opposing wills; but this seeming

cruelty is an incident in the carrying out of some great purpose, which so engrosses the emotions and the intellect, that smaller sympathies seem mere disturbing elements rightly swept away from the path. That minds capable of adapting ideals to the world, and the world to ideals, should receive the new light, and so be enabled to work together with nature for the evolution of beneficent and enduring results—this is the brightest hope, the noblest promise, of the coming day.

I must not be misunderstood as advocating hero-worship, or the "great man" theory; according to which the ideal form of government is the rule of a demi-god over adoring disciples and blindly obedient slaves. Such a rule is degrading rather than ennobling, because the worshippers, by their very subservience, make themselves unlike what they worship. Free development is an essential condition not only of greatness but of moral vitality; and the more closely we imitate any example of conduct, the farther we are separated from its real spirit and signification. At the same time, there must be leaders and followers so long as the majority of minds are unoriginal and weighed down by custom, or almost crushed in the struggle for existence. The moral initiation must evidently come from those whose natural and acquired powers have given them both personal freedom and influence over the community. It is by their developed ideals, and by their practical reforms, that the "average man" can be morally elevated. Improved conditions of life, produced by the application of newly-gained knowledge; a truer conception of the means by which happiness may be won; a more rational ethical standard; all these will combine to lift the burden at present borne by the greater part of our race, and to give sympathy space for growth and fruition. The wider scope of the "social control" renders the diffusion of thought more rapid and more easy, and brings the enlightened few and the groping many into closer contact. For this reason we must not be discouraged by the slowness of past progress; since there never were such opportunities as at the present moment for the rationalisation

of the higher minds, and the filtration of new ideas from high to low. The raising of the moral average thus occasioned must, in its turn, react on those who gave the impulse, allowing them freer play, and empowering them to mature yet nobler ideals, which, in turn, will clear a path for sympathetic developments in hitherto stunted natures. Thus, by action and reaction, continuous progress may be ensured, and "the completely adapted man in the completely evolved society" may pass from the region of dreams to that of concrete reality. What woes the human race must yet suffer before this consummation can be achieved, what revolutions are to find place as incidents in this crowning evolution, cannot be foretold. But we may seek consolation in the prospect of a final unification of egoism and altruism, under the control of reason and science.

In the former of these two classes, it is clear that we cannot look for justice in the human sense of the word, and that all attempts to find evidences of retribution will end in the false teleology, which ascribed the Tay Bridge disaster to the vengeance of God against Sunday travelling. But the teleology is not less false which accuses nature of injustice. If the heavens are as adamant to the good and the wise, at least they have no partiality for the foolish or the wicked. If uprightness will not avert the earthquake or the whirlwind, neither are they to be bribed to quiescence with dishonest gains.

Every man's life is painted on a background of physical and social circumstance. He puts in the figures, heightens the lights, deepens the shadows; but, if there be a join or a rent in the canvas, there is no compensation for him. He must deal with it as best he may. There is this consolation only—the flaw has been made by no malevolent hand, but has simply occurred in the ordinary process of manufacture.

## THE PHILOSOPHY OF THOMAS CARLYLE.\*

From the *Journal of Science*, June 1882.

"L'idée de Dieu est une forme de l'idée de l'infini."—M. PASTEUR.

"Le but du monde, c'est l'idée; mais je ne connais pas un cas où l'idée se soit produite sans matière."—M. RENAN.†

THE distinction between deductive and inductive systems of philosophy is best represented by their practical interpretation of the terse command "*Know thyself*." To the former it means—"look inward; take what seems best or most beautiful in thine own mind, and proclaim that as the law of the universe." The latter replies—"Not so. Look outward; by unwearied research and rigorous analysis investigate the succession and co-existence of physical phenomena; then turn inward, and apply the same method of inquiry to mental phenomena, noting their observed connection with the material world; till at length all seemingly heterogeneous knowledge is welded into one homogeneous and organic unity."

Doubtless all thought is originally deductive; that is, it must begin by assuming the validity of certain primary mental operations. To reason in defence of reason is to perpetrate a *petitio principii*; to reason against reason is to commit suicide. It is also true that colours, sounds, and

\* *Thomas Carlyle: a History of the first Forty Years of his Life*. By James Anthony Froude, M.A. Longmans & Co.

† Discours de Reception de M. Louis Pasteur. Réponse de M. Ernest Renan (Séance de l'Académie Française du 27 Avril, 1882). Calmann Lévy, Éditeur. Paris, 1882.

odours, as perceived by us, are creations of the brain—phantoms not less ideal than the flimsiest metaphysical abstractions. But impressions which succeed each other in a certain irreversible order, co-exist according to certain fixed laws, and are practically the same for all mankind, afford a far surer field for observation and experiment than those intricate, fluctuating, and apparently capricious states of consciousness, differing widely in each individual, which we denominate thought and emotion. To arrive at a sound conclusion we must eliminate, as far as possible, all mutable elements, and fix our attention upon the constant and stable residue. Having attained some comprehension of the simple and regular, we may hope in time to understand the complex and variable order of things. This is the only rational method of all true science in every age, and must be adopted by the moralist and historian, not less than by the chemist, physician, and astronomer. Only the poet may still delight us with revelations of that purely subjective truth whose evanescent glory—not visible to all, not constantly realised even by its creator—depends less upon value of substance than upon perfection of form. Poetry may be personal; philosophy (world wisdom\*) must be universal. He who, in these days, forgets or wilfully ignores this distinction has failed to master the characteristic lesson of his epoch. His very earnestness will exercise a reactionary influence upon contemporary speculation and progress, by fettering living emotion to dying or dead thought.

The noblest recent representative of this reactionary obscurantism is faithfully pictured in the volumes before us. Mr. Froude has executed his tragic task in so sympathetic, yet so impartial, a manner, that we become more intimate with Carlyle than with the hero of perhaps any other biography of our century. No detail of temperament, of constitution, and of habit is unimportant, since all were factors in the growth of his mind; but our attention must here be confined rather to the completed philosophy than to its process of development. What we learn of his belief is

\* *Weltweisheit* of the Germans.

briefly this: \* He held that all religions have been evolved from human experience, shaped by intellect, and coloured by feeling and imagination. No special revelation has ever been delivered; no special miracle ever performed. The natural and the supernatural are one, and their course is immutable. Man has in all ages created and uncreated his deities; but, if gods are illusions, God is "the fact of facts." The constant forces of nature are manifestations of the Divine will, and are distinguished as not "mechanic," but "dynamic" energies. It is not difficult to discover the general signification attached by Carlyle to these terms, although their antithetic use is radically unscientific and inaccurate. With him the machine is the antithesis of the organism, for he fails to perceive that both organism and machine are alike members of the universal Family Automata. Broadly speaking, he regards Nature as inspired, not impelled,—as a growth, not a contrivance,—his view being essentially a protest against the Theism of Butler and Paley, which finds its most noteworthy expression in the argument from design.† Analogical inferences are discarded for an appeal to intuitive sympathy. Man is not bidden to compare nature with art; he is exhorted to disregard detail, and to recognise in the pervading cosmical vitality a glorified prototype of his own higher life. God is no longer without, but within; no longer transcendent, but immanent. "For matter, were it never so despicable, is spirit, the manifestation of spirit; were it never so honourable, can it be more?‡ Earth and heaven are the time-vesture of the

\* See especially Mr. Froude's masterly Synopsis of the Carlylean Doctrine at the commencement of vol. ii.

† Bishop Butler's *Analogy* is probably the most profound apology for Natural and Revealed Religion in any language. Yet it loses all validity as soon as we arraign what is misnamed "Nature" for imperfection and cruelty, and thus impossibly the "creation" of a Divine Being at once omnipotent, omniscient and benevolent—natural science evidencing that pain and disease, physical and moral, enters into the inmost constitution of sentient existence, animal or human. The Germ Theory of modern medicine, and the Survival of the Fittest, are conclusive refutations of a superhuman tutelary or providential "*Anima mundi*."—R. L.

‡ *Sartor Resartus*, bk. I, c. x.



eternal"—no lifeless textile fabric, but a sentient garment of incarnate deity. The Pantheism thus summarised, if lightly held as a sublime hypothesis, need not be inconsistent with scientific materialism. It unifies the psychical and the physical,—the *noûs* and the *hyle*,—and all beside is a mere question of nomenclature. If the dust of the earth, and therefore the body of man, is divine, no separable soul is necessary or conceivable. Save to the vulgar dualist, who believes in an *external* deity, it can signify little, at least in theory, whether we name our "first cause" matter or spirit, save that the former is a modest confession of ignorance, the latter an arrogant affectation of supreme knowledge.

But Carlyle's mental atmosphere was dim, and the objects of his thought ill-defined, as though seen through the floating clouds of smoke which issued so copiously from his pipe. He never gained a clear vision of his own creed. "The theories which dispensed with God and the soul"—which refused to proffer explanations of what he himself had confessed to be inexplicable\*—Carlyle utterly abhorred. Physical science, and what he called the "mud-gods" of the age, he regarded with ignorant disdain; materialism was to him the "Gospel of Dirt." A perplexed disciple might well inquire, must we then take "dirt" as the type of matter, merely because unscientific housewives apply that name to certain disagreeable, but necessary, material forms?† To the pantheist dirt is a manifestation of the deity, but the deity is not therefore dirt. We again turn to Teufelsdröckh, who tells us, in an eloquent passage, "The withered leaf is not dead and lost; there are forces in it and around it, though working in inverse order; else how could it rot? Despise not the rag from which man makes paper, or the litter from which the earth makes corn;" or, we might

\* "This dreaming, this somnambulism, is what we on earth call life, wherein the most indeed undoubtedly wander, as if they knew right hand from left; yet they only are wise who know that they know nothing."—*Sartor Resartus*, bk. I, c. vii.

† Lord Palmerston's genial definition of "dirt" as "*Matter in the wrong place*" may be profitably contrasted with the nebulous fanaticism of Carlyle.—R. L.

add, the brain tissues which produce human thought and direct human action, which fashion the kingdoms of heaven and earth, and evolve the forces by which both are overthrown.\*

The limitations and impatience of Carlyle's intellect are well exemplified by his total failure to penetrate the Kantian philosophy, and his final contempt of its "transcendental moonshine"—a truly ludicrous misnomer if applied to the "Kritik der reinen Vernunft." Yet here and there we find an insight into the subjective character of all our experiences, which should at least have kept him clear of dogmatic animism.† Many passages might be adduced from "Sartor Resartus," but it is in his private note-book that we find the least ambiguous and most authentic record of his intellectual gropings, sometimes guided by a sudden gleam of daylight, but always swerving sooner or later from the illumined path. Thus he says, in 1827, "For the present, I will confess it, I scarce see how we can reason with absolute certainty on the nature or fate of anything, for it seems to me we only see our perceptions and their relations; that is to say, our soul sees only its own partial reflex and manner of existing and conceiving."‡ Of course this is immediately followed by denunciation of "most utilitarians, moralists," and the whole tribe of "materialist metaphysicians." Again, three years later, he *thinks* he has finally "got rid of materialism," to which his intellect must at one time have inclined, though prejudice strove successfully against its reception. It is evident that he felt the logical force of Hume's arguments, which at first deepened, but afterwards aided to nullify, this tendency. The scepticism of the great Scotch philosopher, which really denies nothing but the possibility of demons-

\* It may be here noted that there are no terms to express supernatural or superhuman concepts. "Spirit," etymologically, is itself matter; and the same rule applies to all analogous transcendence of mundane ideas.—R. L.

† For a correct notion of the term Animism (affirmation of spiritual existence) see the article so named in the last editions of the *Encyclopædia Brit.* and of Chambers's *Encyclopædia of Universal Knowledge*.—R. L.

‡ *Life of Carlyle*, vol. i, p. 373.

trating first principles, seemed to him a deadly weapon with which he might slay the "mud-gods" and annihilate the "frog-spawn." Such German thought as he afterwards imperfectly assimilated confirms this belief; and he never saw clearly that materialism and idealism play into each other's hands, and that while we are compelled, as a foundation for all subsequent reasoning, to postulate some independent reality, or "*Ding an sich*," our total ignorance of its nature admonishes us to adopt the simplest and least imaginative terminology.\*

The suggestive, and in many respects, beautiful fragment entitled "Spiritual Optics" illustrates this defect of vision. The fact that the Human is the parent of the Divine, that all supposed miracles have their being only in the mind of man,—as the apparent rotation of the heavens is due to the actual rotation of the earth, or as the onward rush of a landscape exists only in the brain of the traveller who dashes through it in an express train,—is insisted upon with strenuous eloquence. But in the following sentence springs up, with renewed vigour, that hydra-headed fallacy which cannot be destroyed even by the keenest and brightest metaphors. "The delirious dancing of the universe is stilled, but the universe itself (what scepticism did not suspect) is still all there. God, heaven, hell, are none of them annihilated for us, any more than the material woods and houses."† The analogy indicated here is a real one, but its

\* It may provoke a smile to find a professed Materialist like Professor Tyndall a zealot in this school of Agnosticism. But philosophy or logical consistency is not the *forte* of our genial and skilled Royal Institution Empiric. Extreme pains have been wasted in explaining to him the Hyló-phenomenal theorem of Existence, which he obstinately persists in confounding with Absolute Idealism. From the standpoint of vulgar Realism he ridicules, as mere moonshine, the sole legitimate creed of Science.—See the chapter of Lange's *History of Materialism* in Thomas's translation *On the Physiology of the Sense Organs and the World as Representation* (Phenomenon).—R. L.

† If God, Heaven, Hell and all things, or nothings else, are resolvable into ideas, into states or conditions of consciousness, inseparable from the organism which ideates them, the Animism indicated by Carlyle and all other transcendentalists, religious or secular, is shown at once to be illusive. Monistic Somatism is seen to be the only alternative. No

signification may prove to be other than that contemplated by Carlyle. In his haughty neglect and scorn of Physical Science, he missed certain elementary physiological truths, which lend a concrete basis to abstract Idealism. In what sense can it be said that the "material woods and houses" continue to exist? Around us the world is throbbing with its myriad pulses, varying in kind and in degree. These pulses strike the delicate epidermal surface of the body, and each, according to its kind, is taken up by a set of specially modified nerve structures. Here the distinctive character of the impulse, is lost and a uniform vibration is transmitted by distinct channels to distinct sensory ganglia. In these ganglia, and not in the external eye or ear, or in the world with which eye and ear directly communicate, are manufactured the trees and the solid earth which we behold, the blue sky, and the sun which illumines all. Looking yet deeper, we find that the waves of air, or of ether, with which we started were themselves mere intellectual representations of the unknown, fabricated in the cerebral hemispheres, and having no better claim to objective existence than the visible and tangible pageant. We must and do assume that there is "something" which exists independently of perception; but of its essence we can know nothing. If, then, "God, heaven, or hell, are none of them annihilated for us," they can only have their being on the same conditions as these "material woods and houses." The ideas are true so long as they claim none but ideal worth; but false when they arrogate the status of objective realities. So far from possessing any peculiar certitude, they lack even that authenticity which belongs to simple sensations, experienced by all mankind. Compounded from those impressions which are most vivid to the individual mind, inspiring the greatest terror, ecstasy, or hope, these transcendentalisms do not furnish any *rationale* of the subjective world as a whole. Other stimuli, not less real, though at present less keenly felt or less willingly remembered, are left out of the calculation.

verbiage can possibly be more anti-scientific than Dr. Huxley's privative term Agnosticism—science and gnosis being synonyms.—R. L.

Underlying Carlyle's fiery protestations of belief there was, as we have seen, a deep and constant scepticism. He admitted to J. S. Mill that his doctrines were incapable of logical proof, and shrank from conversing with Emerson upon the immortality of the soul. But, revolting against the philosophy of compromise and convention which characterises a sophisticated and transitional state of society, he confounded moral earnestness with religious faith, and supposed that the two were bound together in organic union. Had he carried the clothes philosophy a step farther, he might have seen that "God" and "the Soul" are but symbols or "garments" of conscience, and that the thing typified can exist very well without its hieroglyph. Spiritual creeds are based not on too lofty, but on too low, a conception of man and nature. It is imagined that the visible and tangible is necessarily vile, unless animated by the Invisible, Intangible, and Unknowable. *Omne ignotum pro magnifico*. The vital interest of the known is held to lie in the idea that it is the mere vestibule of the unknown. Trees and flowers, beasts and birds, with all their beauty and complexity of structure, are either the living vestments of God or must be classed together as "dirt." The thoughts of man, however sublime or fruitful they may be, are priced as of little worth except as manifestations of an indwelling spirit.\* The value of all is extrinsic, not intrinsic. Yet a truer appreciation of the facts of life might teach us that the supposed vestibule of the temple is really the sanctuary itself, and that all seeming vistas of further glory are only reflections of its own lustre by mirrors lining its walls. No generous action or lofty principle can be less generous or lofty because it is the coinage of a material organism. No glorious landscape can be less glorious because the mind which informs it with meaning is human, not Divine. That nature is unspeakably wonderful we not only admit, but assert, and therefore do not seek to transcend the sphere of

\* When rightly considered, it will be found that Theism, or Deism, is only a sub-section of the wider concept Animism, or Ghostism. All "arrogance" and presumption disappears from the Vedantic and Prota-

her wonders. Carlyle characteristically says, "that the supernatural differs not from the natural is a great truth, which the last century (especially in France) has been engaged in demonstrating. The philosophers went far wrong, however, in this that, instead of raising the natural to the supernatural, they strove to sink the supernatural to the natural. The gist of my whole way of thought is to do not the latter, but the former."\* The fallacy of this mystification lies in the assumption that "the natural" requires to be "raised," and that human thought is capable of such a superhuman operation. Since man can know nothing but phenomena, his first attempt to realise the noumenal makes it phenomenal, and so brings it within the domain of nature. His imaginings may certainly be vague and incoherent; they may ignore the relation of "cause and effect," and may at pleasure conjoin incongruous attributes and functions; but they cannot originate anything not already present in his own character and experience. All his ideas of beauty and virtue are drawn from mundane models, and gain nothing by being transferred to an extra-mundane Divinity. The supernatural must therefore "sink" to the natural by the mere fact that it is conceived in a human mind.

In the address recently delivered by M. Pasteur before the French Academy, and cited at the head of this article, a similar error may be detected. He justly asserts that "the idea of God is a form of the idea of the Infinite," but does not perceive that the Infinite—instead of including "more of the supernatural than is to be found in all the miracles of all religions," is simply a synonym of Nature. It is true that we cannot represent to ourselves any "flaming wall" as the boundary of existence; but although our conceptions of the universe are necessarily indefinite and boundless, that is surely no reason why we should prostrate ourselves

gorean thesis when we discard Absolutism for Phenomenalism (Relativism), and disclaim for the human mind the power of penetrating to first, last, or any real causes whatsoever.—R. L.

\* *Life of Carlyle*, vol. ii, p. 330.

before the fetich of our own ignorance, and give it a local habitation and a name.\*

Prayer—as Carlyle virtually admits—is an aspiration towards the “type of perfect” in ourselves, which is not impaired by the recognition of its subjective character. The feeling of immortality is in like manner independent of any actual future existence, and explained in part by our incapacity of conceiving any future event without tacitly positing ourselves as present spectators,—in part by that sense of immutable continuity of time and space, unaffected by the succession of superficial impressions, which is experienced by all constant and concentrated minds. This truth would be more generally recognised, but for that suspension of the laws of morality and common-sense, as well as of physics, which seems to take place in the domain of the Supernatural. An illustration may be found in an anecdote, related by Miss Martineau, of Mr. W. E. Forster, the late conscientious and able Chief Secretary for Ireland. In her last letter to Mr. Atkinson (so honourably distinguished as a fearless advocate of the cause of reason and liberty of thought) she writes: “I well remember the passion with which W. E. Forster said to me, ‘I had rather be damned than annihilated.’ If (she adds) he once felt five minutes’ damnation, he would be thankful for extinction in preference.” Further comment on what may be called the moral insanity thus displayed by an otherwise high-minded man is superfluous. The one absorbing subject of meditation is a fixed centre, which alone seems real, while the play and change of perceptions, whence we extract the notion of time, is an illusive dream. “Thus, while eliminating the chimera of resurrection from the dead,

\* The predication of an occult “Cause of Causes” to “explain,” on absolute data, seeming antinomies in a phenomenal or apparitional system of things is the unpardonable sin in rational science. It pretends to “explanation” of one difficulty by the introduction of a *Deus ex machina* still more obscure and unverifiable. It is a clear heirloom from primeval animists, and, until foreclosed, no scientific progress in the highest department of human knowledge, viz.: Self-knowledge, is to be hoped for. Religion excludes reason, and *vice versa*. Not to mention the *impossibility* of worshipping an unknowable mystery.



and a sense of personal identity in other states of being, reason provides a complete substitute in the idea of immortality possessed by us in our present bodies.\*

The two modes, already indicated, in which philosophers have sought to obey the injunction "*Know thyself*," are strikingly typified by the two modern thinkers, Carlyle and Darwin. The former indeed repudiated that maxim, in words though not in spirit, substituting for it "*Know what thou canst work at*";† but he was ever seeking to solve the higher problem of self-knowledge, and at last came vainly to imagine that its solution was in his hands. The intensity and the genius with which this belief was enforced are beyond all question, and the honesty with which it was held, spite of certain painful misgivings, is equally unmistakable. Yet it will scarcely be denied that this self-anointed prophet failed in his high mission. His converts to a virtually unintelligible and incoherent mysticism were at best equivocal, and perhaps he has left behind not one thoroughly assured disciple. He was a portent in the skies for a season; but his influence upon human welfare is not less problematic than the influence of a meteor upon the agriculture of our planet.

Far different was the destiny of that great scientific philosopher whom the world has more lately lost. Patient, modest, impartial, Darwin was not content to cross-examine nature, and to interpret her answers in accordance with his own prepossessions; but he lived in communion with her, and disdained none of her dwellings because it was common or unclean.‡ Every truth thus brought to light he regarded not as a solitary phenomenon, but as related to all other truths, known and unknown, and sought—still by the same method

\* *Life and Mind on the Basis of Modern Medicine*. By Robert Lewins, M.D.

† A formula evidently suggested by Goethe's "Do the thing that lies next you."—R. L.

‡ Even on the super-human theory of existence, it seems clear that the division of the creatures of an All-perfect Demiurge into clean and unclean, sacred and profane, is a libel on the divine character and attributes. Pantheism really differs not essentially from Atheism.



of experiment and research—to discover the grand generalisation which unites all particulars. The mind of Carlyle was medieval and theocratic, imbued with the parental Calvinism, which was practically embodied in his matured thought; that of Darwin, on the contrary, was essentially secular and modern. There was no place in his system for that remnant of Animism which Christian admirers would fain interpolate.\* He himself could never have cherished the “sure and certain hope” expressed over his grave, nor could he have harboured any fear, such as one would think must sometimes haunt even the clerical mind when it meditates upon the “future state” of unorthodox savants.†

The theory of natural selection owes its epochal character to the nature of the evidence adduced in its support, and affords a perfect example of the potency of induction and the impotence of *à priori* reasoning. From the earliest times, evolution has been a constantly recurring commonplace of philosophy. Without referring to early Greek speculations, we may mention the names of Descartes, Leibnitz, De Maillet, Goethe, and Lamarck. But the principle was fruitless, because rootless. The data on which it was based were inadequate, and often fallacious, thus constituting an

\* See the Sermons preached on the occasion of his death by the Bishop of Carlisle, and by Canons Liddon and Farrar. The absence of any representative of the Royal Family at his funeral seems to imply that clearer vision is possessed by the hereditary Head of the English Church. A similar insight into the heterodoxy of the Darwinian theory was displayed by the Archbishop of York, in a lecture delivered in St. George's Hall, May 25th, 1871. For a forcible criticism of this lecture see the first of a series of tracts written by a well-known scholar and divine, under the pseudonym of “Julian,” for whose work Dr. Lewins stands sponsor.

† And yet Darwin himself was so far Anti-Darwinian Dualist and Animist, when he speaks of the Creator “breathing life” into several, or even one, species or form of living creatures; just as Newton was Pre- and Anti-Newtonian outside the sphere of ideal physics. Of Faraday, who was a fanatic Sandemanian, it seems idle to speak in this connection. As also of the present President of the Royal Society, who is also President of the Victoria Institute, established to reconcile science and revealed religion.—R. L.

ingenious hypothesis rather than a sober synthesis. The idea remained sterile for lack of verification. As soon, however, as fresh facts supplied this essential element of scientific demonstration,\* Darwinism became a power which profoundly modified the direction and line of modern thought. In every department of knowledge its influence is manifest.

The moral is clear, the contrast significant. Instead of docilely surrendering himself, like Darwin, to the guidance of truth, Carlyle erected his own subjective standard in the fore front of the battle, and expected truth to follow his lead.† In the pre-scientific "Ages of Faith," the use of such a method was, if not a positive virtue, at least a venial sin; but at the present day it is an actual crime against human nature, and involves a corresponding Nemesis. Carlyle despised the spirit of the age; but the age had its revenge, and he his reward. Like the forgotten theories of evolution, his anachronisms only represent one phase of a primæval, but quite obsolete, ideal, to which they fail to impart any fresh vitality. They, too, are without root, therefore without fruit.

\* Not by Darwin alone, but also by Lyell, Haeckel, Wallace, &c. The first-named, who proved the unhistorical character of Genesis, sleeps in Westminster Abbey; of the second—pronounced Materialist though he be—Darwin has expressed the most decided approbation.

† Carlyle, like Dr. Johnson, well illustrates the saying of Dr. Reid, the "common-sense" Scotch moral philosopher, that it is "genius, and not the want of it, that corrupts mankind." Both were reactionaries from the true spirit of their respective epochs.—R. L.

# THE BRAIN THEORY OF MIND & MATTER ;

OR

## HYLO-IDEALISM.\*

From *The Journal of Science*, March, 1883.

"The Vedic poets dimly recognised their Gods as only symbols of the ultimate power that manifests itself in the world,—the Atman or Self—the Self of all things—the Self in which each individual must find rest."—Max Müller, *India, What can it teach us?* †

IT is not seemly that an artist who has painted any part of a picture, even though his share be confined to the background or the accessory figures, should present himself as a critic of the completed work, nor that one member of a Beaumont and Fletcher partnership should undertake to point out the merits and defects of a jointly-written drama. Yet, if the picture or the play deals with some forgotten legend, or shadows forth some unfamiliar truth, nothing can be more natural than that its meaning should be clearly and publicly set forth by one of its fashioners. What is permissible in the field of art may become imperative in the

\* *What is Religion? a Vindication of Free Thought*, by C. N. Annotated by Robert Lewins, M.D. With an Appendix on Hylo-Idealism ; or, the Brain Theory of Mind and Matter, the Creed of Physics, Physic, and Philosophy. London : W. Stewart & Co., 41, Farringdon Street, E.C.

† Professor Max Müller quite identifies Hylo-Idealism, which is nothing else than the thorough outcome of the relativity of human knowledge, with Vedantism, and considers that a case has been quite made out for the unity of "think" and "thing." Hylo-Idealism, however, quite gets rid of the Vedantist confusion between Self and the higher Self, or Brahm ; though even this nominal Dualism resolves itself ultimately into Self Unity.

region of scientific verity, where the substance of the work is everything, and the style nothing, save as a more or less efficient vehicle for the conveyance of ideas to the understanding. I need therefore not apologise for this brief exposition of the main thesis contained in a *brochure* to which I am one of the contributors.

The standpoint of Hylo-Idealism cannot be wholly unknown to readers of this journal, since from time to time letters and articles on the subject, by Dr. Lewins and myself, have appeared in its pages, some of which are reprinted in the tractate before me. At the base of the whole philosophy lies one fact adumbrated by many,\* realised by few, but contradicted by none; for those who attempt to disprove it invariably mistake the object of attack, and manfully hew away at the shadow of the tree, while its roots still strike deeply into the earth, and its trunk and branches tower and wave above these would-be assailants. No one has ever been able to deny, though many have fancied that they were denying and confuting, the proposition that man is the maker of his own Cosmos, and that all his perceptions—even those which seem to represent solid, extended, and external objects—have a merely subjective existence, bounded by the limits moulded by the character and conditions of his sentient being. It is admitted by all whose opinion is of any value that colour exists only in relation to the eye, sound to the ear, touch to the skin, odour to the nose, and taste to the mouth. Nor has anyone yet asserted that (in the case of man and of the higher animals, our data not enabling us to deal with possibilities of sensation in lower forms of life) these elementary feelings can be generated in the absence of a percipient brain, which focuses converging

\* Such adumbration may be remarked even in the writings of so staunch a religionist as Cardinal Newman. In a passage from the "Grammar of Assent," quoted in the current number of the *Westminster Review* (March, 1883), he says: "*Everyone who reasons is his own centre, and no expedient for attaining a common measure of truth can reverse this truth.*" Again, "*There is no ultimate test of truth besides the testimony borne to truth by the mind itself.*" The reviewer well observes that the Cardinal's theory is indistinguishable from that of Protagoras.

rays of sense from all parts of the body, and unites them into the white light of consciousness. But the most rigorous analysis can extract from the "external" world nothing save colour and form, sound which develops into music or degenerates into discord, tastes, and odours, with harmonies and dissonances of their own, and impressions of touch, whence arise those ideas of solidity and extension, which to the unreflecting seem conclusive proofs that the Universe must at least possess tangible objective reality, even though its visible, odorous, and sapid complement be but a brain-created panorama. In these days of physiological research and of popular scientific instruction it should be clear to any person, who takes the slightest trouble to think about the matter, that the phenomena of all the senses possess precisely the same degree of validity, and that this validity is purely internal and individual. "The whole universe of things and thought is thus only an *automorphosis*, each Ego being to itself, as Protagoras postulated, the measure and standard of all existing things, of all thought and objects of thought whatsoever."\* The profound Protagorean maxim is frequently attacked, with complete misapprehension of its import, by philosophers and scientists of the shallower sort, who appear to suppose that it implies an ignorant disdain of all existence which is not human, instead of a recognition of the solidarity between Man and the Universe, animate and inanimate, sentient and senseless.† A more than usually amusing example of this misconception is afforded by that popular writer Grant Allen, in a recent work reviewed last

\* *What is Religion?* p. 38. Appendix No. 1.

† Even J. S. Mill, who in his definition of matter as a "permanent possibility of sensation" virtually adopts the Auto-centric position, inconsistently condemns the axiom of Protagoras as "a scandal to philosophers," evidently quite misapprehending its real import: as indeed does also G. H. Lewes. Plato was the first ignorantly to misconstrue the Abderite sophist's formula, as is still done by special scientists when they repudiate Anthro- and Auto-morphism for a fanciful "impersonality;" following Lord Bacon, who blames men for "spinning webs, like spiders, out of their own entrails," as if they had any other choice.—R. L.

month in the "Journal of Science." It is evident, from his patronizing approval of wind-fertilised flowers, and his vehement attack upon the poppy, the convolvulus, and the "unlovely" *Gloxinia*, that if the mind of man in general cannot claim to be "the measure of all things," yet the mind of Mr. Grant Allen in particular conceives itself well entitled to that proud pre-eminence.

Let us see in what sense every man is, to himself, the standard by which "all thought and objects of thought" must be tested and classified. A colour-blind person has perceptions which are quite as true as those of the most subtly discriminative landscape painter; but the retinal "colour-box" of the former has no tints corresponding with the green and crimson, which the latter differentiates into a thousand delicate gradations. The unknown force which we call Light, and picture intellectually as a series of ethereal vibrations, without thereby advancing a step towards the knowledge of its essential nature, acts impartially upon the retina of both. That its internal manifestations are diverse depends upon the special organization of the two individuals. One has, and the other has not, colours in himself. Light, then, is not a simple gift from the sun, but is a product of mental metabolism, which fashions all that we know of brightness and darkness. Beyond this there is practically nothing, for our wildest imagination cannot overleap the boundaries of Self, and depict an invisible cause of Light. The very terms which we must use, if we wish to imply that such a thing is possible, demonstrate by their contradiction its impossibility. But supposing for a moment that this inconceivable power could be gained, its possessor would probably perceive nothing which could distinguish the origin of light from the origin of sound or odour. It is well known that one and the same cause, such as an electric shock or abnormal distension of the capillaries, will produce different effects in the various organs of sense. The eye may see flashes of lightning; the ear may hear the sound of a gong; the skin may feel acute pain; or rather the brain may transmute identical stimuli, conveyed to it by different

channels, into results which are not only dissimilar, but actually have nothing in common. Since the dissimilarity does not come from without, it must come from within; therefore, we arrive at the conclusion that the world-vision, to which alone the mind has access, is made inside, and not outside the cerebrum. Although rejecting that Absolute Idealism which will deny the existence of aught that is corporeal, even of the sensifacient hemispheres and the sensiferous nerves, we are forced to accept that Relative Idealism which declares that the only Cosmos known to man, or in any way concerning him, is manufactured in his own brain-cells. Far more truly than the painter "creates" the picture from elaborated materials already provided for him by "Nature," every one of us creates Nature herself, in a tiny cerebral studio, without pencil and without pigment. We make the mountains, and the sea, and the sun himself; for sunshine is nothing if not visible, and if there were no eye and no brain, there could be no sunshine.

These truths are so self-evident that it seems superfluous to quote authorities in their support. It may, however, not be altogether useless to refer my readers to the recent translation of Kant's "Critique of Pure Reason," by Professor Max Müller, and also to a very able, though not perfectly consistent, article on the great German philosopher in the current number of the "Edinburgh Review." The following sentences from the latter are especially applicable:—"Kant's whole system throughout is nothing but the question underlying all philosophy, and which Hume had made clear as day, in language for ever intelligible to all educated minds—the question, namely, whether we can really know things or only thoughts, whether our knowledge is objective or only subjective. It cuts up by the roots for ever, when understood, the empirical pretensions which have again imposed on so many minds in our time." Again—"Kant answers the problem, How is Science possible? or, as he elsewhere puts it, How are objects or judgments of experience or synthetic judgments *a priori* possible? thus: 'The only way this can be done is to recognise from the first

that thought and things are not diverse or dualistic. The one does not exist apart from the other. Objects are not passively apprehended by the mind as something distinct from it, *but are actively constructed by it.*" \*

As I have already stated, the Absolute Idealism of Fichte and Hegel is by no means adopted by the authors of this treatise. They consider, with David Hume himself, that the real existence of Matter can be denied only by a metaphysical quibble, which carries no conviction to any sane mind. Matter, so far from being a nonentity, is the *fons et origo* of all entities. In this connection, two of the annotations appended by Dr. Lewins, may profitably be studied. "It must be steadily kept in mind—a fact too apt in discussion to be lost sight of—that Hylo-Idealism, which deals alone with the relative, ignoring the absolute as utterly beyond human *gnosis*, in no sense denies the objective, but only contends for *identity* of object and subject, proved as it is by natural Realism itself, from the doctrine of *molecular metamorphosis*, which shows the Ego continually undergoing transubstantiation with the "Non-Ego," and *vice versa*, so as to form *one* indivisible organism."† Again—"I have always striven to render intelligible the significance of Hylo-Idealism by the following illustration:—Our bodies and the so-called "external universe,"—*i.e.*, the Ego and "Non-Ego," or, in other words, subject and object,—resemble a porous vessel of ice, filled with water, immersed in an infinite ocean. What is within and without, and the septum that seems to divide the two, are all three consubstantial or

\* One remark that, "with all his originality, Kant *never* disengaged himself from much of the traditional nonsense of philosophy," is susceptible of a far wider and deeper application than that intended by the Edinburgh reviewer. Kant started back in terror from the obvious consequences of his own principles, and endeavoured to rebuild in the *Critique of Practical Reason* what the *Critique of Pure Reason* had pulled down. The persistently dualistic character of his thought is well illustrated by his famous confession of the awe inspired by *two* things,—the order of the starry heavens and the moral law in the human mind. A consistent Monist must have felt that these "two" are essentially one.

† Page 48.



identical, and, owing to the porosity, always interchanging particles. So that, in reality, the seeming three are, like the mystic Athanasian Trinity, virtually one, and essentially indivisible. It is thus a distinction without real difference to speak of division between substances homogeneous and virtually *solidaire*.\* Thus it is seen that man is distinct from his environment only as a cell may be said to be distinct from the matrix, or intercellular matter, which forms its home, and supplies it with nutriment.† Take, for example, a cartilage cell. It lies in the midst of a territory of its own, homogeneous with itself in origin, essential structure, and chemical composition. Through this domain runs a series of branching canals, by which nutritive fluids may pass to the centre. These fluids, again, are composed of the same elements as the physiological unit whose vitality they help to support, and are derived from the blood, which bathes and permeates every tissue just as the "external" environment bathes and permeates the body as a whole. Between man and the cell a very instructive parallel may be drawn. In one sense a unit, in another a complex, organism; in one sense separate from surrounding matter, in another most intimately fused and blended with it; in one sense a permanent individual, in another losing identity, by change of form and material, from day to day, from hour to hour, from moment to moment,—all this must be said of man, and all this of the animal or vegetable cell. Life, in every case, is correlated with those natural forces from which it springs,

\* Page 26.

† On the voyage to Egypt, as later in the cases of La Place's *Mécanique Céleste*, and *Système du Monde*, Napoleon objected to the Materialism of Modern Science, by pointing to the stars, and asking: "Who made all that?" The answer of his *savans* was probably: "No one. They are eternal." But, on the Autoplastic synthesis, the all-sufficing response is: "Yourself. What you see is a vision, or organic function, of your own *sensifacient* organism." The error of the Corsican conqueror was quite on a parallel with Dr. Johnson's "refutation" of Berkeley by kicking a stone, or with Kant seeing, in the planetary system, a phenomenon apart from, and not a part of, his own Egoity. All Perception is, when traced home, Apperception, *i.e.*, conscious or unconscious Self-Perception.—R. L.

and to which it returns; or, more correctly speaking, life is due to the co-operation of all the Protean forms of material energy, which, as in azoic Nature, work automatically, and require no "spirit" to accelerate or control their activity.\* The phenomena of voluntary motion and individual character no more testify to the presence of an immaterial Archæus than does the spontaneous and distinctive action of a chemical reagent. Add solution of caustic soda or potash to mercuric chloride, and a bright yellow precipitate is thrown down, while a bright blue mass results from a like experiment with soda and cupric sulphate. Here, as in human thought and deed, the activity proceeds, not from external compulsion, but from internal constitution. Objective conditions, as temperature, atmospheric pressure, &c., may be the same in both experiments, but, to speak in terms of human personality, the subjective character of the compounds tested is dissimilar, and their behaviour corresponds with this inherent heterogeneity. No doubt the laws which determine the conduct of a sentient being are far more complicated than those which govern chemical union and decomposition. But this is just what might have been expected from *a priori* considerations. The animal organism receives, assimilates, and finally breaks up and parts with a thousand complex and unstable chemical compounds; but these are only its raw materials, which are mingled in varying proportions in every microscopic fragment of the body. Minute cells are built up whose very nuclei contain an intricate network of almost inconceivably delicate fibrils. These cells are again combined into tissues adapted to the performance of their several functions, and these tissues are in

\* Since the artificial manufacture, in the laboratory, of the organic substance *Urea*, more than sixty years ago, by Wöhler, it seems quite patent to the least instructed mind, apart from the immemorial denial, by Medicine, of a "*Vital Principle*," that no real partition separates the organic from the inorganic world. Organic chemistry thus resolves itself into the chemistry of the carbon compounds. Hence, spite of the present prevalent theory of Biogenesis (*omne vivum ex vivo*), originally under more propitious meteoric conditions, both the vegetable and animal creation *must* have sprung from the inorganic elements.—R. L.

their turn moulded and interwoven to form the different organs of this wonderful Microcosm. Finally, all the organs are subordinated to the rule of two sovereigns, acting with complete concert—the cerebro-spinal and the sympathetic nervous system. When we learn that a single nerve trunk is composed of hundreds of fibres, varying from 1-14,000th to 1-2,000th of an inch in diameter, that each of these fibres probably transmits its own special message from periphery to centre, or from centre to periphery, and that every message exerts some influence upon the thoughts and doings of man, we need not marvel that his ways are often incalculable, and his cogitations past finding out. To regard the intellect as an entity, separable from the myriad factors, which unite to produce and to direct it, is not less absurd than to consider as actual beings those personified abstractions which we meet with in poetic diction,—to believe, *e.g.*, that Gray beheld in a literal “vale of years” the “painful family of Death, more hideous than their queen,” or that Milton’s Satan ever conversed with Sin and Death at the gate of Hell. The following note by Dr. Lewins well elucidates my meaning :—“In medicine symptoms are the synonyms for phenomena. They can always be traced to their source in an organ, and are intensified, diminished, modified, or removed by acting on the organ. In no case can they be isolated and dealt with *per se*.”\* Now the aggregate of normal cerebral symptoms, functions or phenomena, which we call mental sanity, no more constitutes a separate entity than does the aggregate of abnormal symptoms, which we call insanity.

Facts and inductions like these are evidently fitted to revolutionise, not only our manner of regarding the physical Universe, but also our habits of thought and action with respect to all the higher problems of mind and of practical life. New and great ideas, if duly assimilated, must modify our views of all “things” previously known or imagined, and many a cherished illusion must fall when the “Auto-centric” “Autoplastic,” “Autopsic,” or “Hylo-Ideal” theory

\* *What is Religion?* p. 40.

is finally established. The world of sense is a picture, a poem, a melody. Granted; but what, then, shall we say of the world of intellect and emotion? Is this the more real of the two, or is it merely a vision of the painting, a reminiscence of the lyric, an echo of the music? The answer is not far to seek. We believe that matter is the ultimate reality beyond which it is impossible to penetrate and that its most elementary, most general, and most easily verified manifestations are found in simple physical and psychical, *i.e.* vital phenomena. From combinations of these phenomena, all our conceptions must be exclusively drawn, and by similar combinations they must be corroborated or disproved. All ideas, notions, or fantasies, are of course equally subjective, since none can boast an origin higher than the human brain; but some may be in harmony, and others in open discord, with the observed course of nature, while a third group may stand apart from facts altogether, assuming a position neither of amity nor of enmity.\* The two latter classes are alike illegitimate, the one being false, and the other simply irrelevant. A proposition which can neither be denied nor affirmed is for all practical purposes rejected, for, in reason, as in law: "*De non apparentibus et non existentibus eadem est ratio.*" No one can prove by induction or deduction that witches never ride on broomsticks through the air, or cast malignant spells over children and cattle; that fairies have never danced by moonlight on the green, or that the Lorelei never sat singing on her dark rock, and luring unwary travellers to destruction; yet all these fictions have imperceptibly passed away from popular belief, to a limbo prepared for dogmas and legends not less unscientific, but hitherto more tenacious of life and power. It is time that the pseudo-science of Ontology should be superseded by physiology and psychology, and that the vain search for final causes, to which all religion may be referred, should be renounced by those whom reason

\* It must ever be kept in mind that the term "Nature" is only a mental concept, like Fate and the Olympian Pantheon. All that we can know of "her" is from our own monistic, *i.e.* Egoistic, exegesis.—R. L.

must teach to behold in the orderly arrangements of the Cosmos only a supreme glorification of matter, the universal mother, and of man, her child. In the grey cells of the cerebral cortex are generated, not only the visible heaven, "this majestical roof, fretted with golden fire," but the poetic sense of its beauty and harmony, and even the conditions of time and space which correspond to the revolution of its spheres. For, without the intellect, time and space, infinitude and eternity, which are at present abstract concepts formed by the brain, would, in the form in which we know, then be annihilated. Matter would still, as in geologic and pregeologic ages, continue its immortal existence; but matter, untouched, unseen, unperceived by sensation or thought, must be a void and formless chaos,\* until the first living eye gives it shape and colour, the first living organ of touch endows it with tangible solidity, the first living ear wakes the dumb to speech and song.

\* Is not even the term "chaos," which is only Cosmos "in the making," too much? The word used above, "*void*," best describes the *nullity* all is to us outside consciousness.—R. L.

# HYLO-IDEALISM:

## THE CREED OF THE COMING DAY.

From *Our Corner*, May, 1884.

"The world is to each man as it affects him : to each a different world. Fifty spectators see fifty different rainbows, and all believe they see the same one. Nor is this unanimity delusive, for 'the same' here means the similarity in their states of consciousness."—G. H. Lewes in *Problems of Life and Mind*.

PHILOSOPHERS set problems which poets and artists, and everyday men and women and little children, unwittingly solve. Symbol and song and healthy sensation yield a clue not always grasped by the weary metaphysician who wanders amid a crowd of ideas which have too often outgrown all resemblance to their parent facts, and of words which have forgotten their ancestry of ideas.

The average "natural man" would probably be less startled by the Salvationist's inquiry as to the eternal welfare of his soul than by the psychologist's question : "What is mind, and how is it related to matter?" And yet the Salvationist takes for granted the acceptance of a whole host of unthinkable dogmas, which he may be supposed to believe on the ground of their absurdity; for the boast of Tertullian—" *Credo, quia impossibile est* "—is not yet out of date.\* The Spirit, the Ghost, the Pneuma, which originally signified neither more nor less than that human breath which ceases with human life, is transmuted from a

\* Hylo-idealism is, *inter alia*, only the legitimate development of the right of private, or individual, judgment and conscience, as postulated by Luther and other Protestant reformers. "The solitary monk who shook the world," and yet who was anything but a clear thinker, unlike his "dear master," Occam the Conceptualist, held that "we learn by

mere gas, bound by the laws of pneumatics, to an immaterial being, cased and prisoned in the body, influenced by physical needs and physical desires, tainted by inherited sin, the slave and the lord of matter, the offspring and instrument of an omnipotent deity, yet withal free. If any mortal intellect has power to receive and digest a doctrinal *olla podrida* of this kind, and glibly to answer questions about it, surely there is no reason to be alarmed by the far more simple demand of the psychologist.\* He asks only for a summary—a concise statement—of elementary experiences, familiar to everyone who possesses a mind at all. Everyone has the compound in solution; we want to see it crystallised. It is quite possible to be acquainted with common salt in a dissolved state and a powdered state, and to know its taste and its general properties, and yet to have no idea of its crystalline structure, and to be quite ignorant of its chemical formula. So it is quite possible to have an exceptionally active mind, and yet to be very hazy in one's notions of its contents and limits.

Let us begin at the outer courts, where things are plainer, and better “understood of the people” than in the central Holy of Holies. But we have entered no Jewish temple, or Christian church, or Mohammedan mosque. Overhead, the blue sky; underfoot, the green earth; around, the invisible air, the Spirit or Pneuma of the world. This is a universe built of light and colours, of sounds and odours, and impulses multitudinous, different in every part, varying every instant, yet still preserving a certain unity and continuity. Here is a telegraphic code which all understand; a language of pictures and signs, plain to everyone who can be warmed by the sun or burnt by fire.†

experience that God takes no interest in the present world,” and that “where philosophy ends physic begins.” When Descartes was asked for his library, he pointed to his dissecting room.—R. L.

\* In the strict sense of the term, as in reality, there is no distinction between psychology and physiology (biology). Both really connote, etymologically and virtually, the same idea.—R. L.

† Sir H. Davy, in his ejaculations, during the *hyperæsthesia* induced

"But," the natural man observes with some bewilderment, "we were at once to enter the courts of Self. Surely we are still tarrying without the precincts." Not so; for this pleasure-house of poets, this playground of children, this closet for the mystic, this market for the merchant, this laboratory for the chemist, is in very truth but a part of your mind and of mine. It is a changing vision, which changes, not according to caprice, but according to law. It is a solid fact, whose very solidity and certainty are part of the universal dream.

Again a difficulty is suggested. Each man's mind, Ego personality, is peculiar to himself. It is his own inalienable heritage. Neither enemy nor friend can ever cross the threshold of this sanctuary, except, indeed, in a special sense to be later considered. There is no danger that this estate will ever be nationalised. If then the Ego be encompassed by impregnable barriers; if between man and man a great gulf be fixed, which none can pass over; how can the common earth and sky, which belong to the whole human race, be an integral part of any individual mind? These, one would think, must be outside, not inside. Their phenomena must be due, not in any way to the observer, but solely to their own inherent qualities. They yield their meaning, not to one pair of eyes and ears, but to all who have hearing and vision. We all see the same sun, stars and flowers; we all hear the same thunder, the same music. How else were conversation possible? How else could we carry on the ordinary business of life?

Science steps in with a solution. She keeps a preparatory school for students of philosophy, and patiently teaches us our A B C until such time as we can read without spelling. She says: "You are wrong. No two people ever see the same sun; and no one person sees the same sun for two minutes or two seconds together. There are as many suns as human beings, as many earths as brains. *Quot mentes tot mundi.*" Then she tells how a myriad ethereal waves, by nitrous oxide gas, bating some redundancy, reduces the universe to a similar hylo-ideal, strictly cerebral, concept.—R. L.



of inconceivable minuteness, enter the tiny window of the eye, and beat against the delicate lining of its darkened chamber. The pulsations are taken up and transmitted along the optic nerve to the base of the brain, and thence to the grey thought-cells of the cerebral hemispheres; and in these grey thought-cells lives the God who says, "Let there be light," and there is light. If the optic nerve be an inefficient messenger; If, maimed or paralysed, it fail to convey the vibrations received from without, the creative fiat will never be issued, and the world will remain for the God of that one cerebrum without form and void. He is not a First Cause, since a stimulus is needed to set him in action; but he is certainly the only authentic Creator of the world as yet discovered by science, philosophy or religion.\*

Each inner deity requires a special stimulus to himself, and a new stimulus every instant. Look at the jewelled arch of the rainbow. It is built of countless rain-diamonds, and the waves of reflected and refracted light issuing from each are sorted according to their lengths. But your eye receives only one set of light-waves at a time from one drop; while a friend, half a head taller, will receive from the same source quite a different set of waves, corresponding to a different colour. The drop which is red to you is yellow or violet to him. Everyone sees his own rainbow; everyone *makes* his own rainbow, for the sensations of light and colour are products of the thought-cells. The how and the where of perception are purely subjective; not less subjective is the when. We do not get the very latest intelligence even from our chief luminary. If you walk briskly for about half a mile, and then stop to look at the sun overhead and the pavement underfoot, the pavement will give you a nearly instantaneous report of its present state; but the sun telegraphs an account of its condition at the time you began your walk, about  $8\frac{1}{4}$  minutes ago. Jupiter takes *circa* 40 minutes to send

\* And yet, though as justly stated above, this object-stimulus is essential, yet as it is not cognized until asselfed, the unity of self and the universality of Selfism is thereby not one iota invalidated—dualism quite merging in monism (solipsism).—R. L.

his despatches, and Sirius takes more than 20 years, while you may receive telescopic messages which have taken centuries or millennia in their transit. So that our universe is a chaos of shreds and patches, not even contemporaneous. Here is a patch of present time ; there is a patch a day old ; and here is yet another which may date back to the Norman Conquest, or to the birth of the Infant of Bethlehem. But mind weaves and stitches them all together into a seemly garment.

I have spoken of the God within the hemispheres almost as though he were a separable being ; but in truth this was mere "poetic licence," and the cerebrum is its own God. Paralyse the brain, and you paralyse the intellect ; intoxicate the brain with opium, and you create within it a wondrous new heaven and earth ; make the brain dead drunk, and you degrade the inner deity to the lowest of brutes.\* By stimulating certain parts of the brain of a dog or monkey, you can produce movements of the limbs such as are usually the sequence of volitions. Electricity plays the role of will. We thus have evidence that physical forces can direct and modify thought, imagination, action. We have no evidence whatsoever that there is any other kind of force which gives like results. Reasoning from analogy, we may justly conclude that thought, imagination, action, are normally directed and modified by physical forces. The God within is simply the energy stored up in the thought cells ; and this energy is no separable spiritual being, but a specialised form of that cosmic vitality which is inherent in matter called dead, as well as in matter called living. The plant, alive but unconscious, wins its life from earth, air and water, which in ordinary parlance are not even alive ; it yields that life to nourish the tissues of thinking and feeling man. Some goes to feed his muscles, and is consumed in muscular work ; some goes to enrich his blood, and to form the various secretions ; some goes to renew his brain, and is burnt up in cerebration. One process is just as natural and just as

\* The abuse of tobacco (nicotine) by Carlyle and others, so common in our age, induces a similar *narcosis*, quite fatal to clear, colourless, daylight thought.—R. L.

material as the other. The circle from inorganic to organic and back again—from death to life, and from life to death—is never interrupted. Nowhere can we point to a manifestation of energy, and say:—This is the work of the pure *nóús*, the spirit; *hyle*, the physical agency, here finds its occupation gone. The hylic parent of light, sound, odour, also generates the fairest imaginings of the poet, the grandest generalizations of the scientist or thinker, the noblest deeds of hero and of saint.

But here comes the most critical point of the enquiry. If the universe be simply a more or less coherent vision; if its very solidity and extension be but parts of the “realistic” drama, how are we to know that there is any such thing as matter? Objective existence of light-waves and sound-waves does not, perhaps, much concern us; for these conceptions are only convenient modes of classifying certain phenomena.\* But how are we to be sure that the brain itself really exists, and that the all-generating cells are not mere illusory appearances? Matter, in its anxiety to escape from the tyranny of spirit, may possibly resemble the Irish snakes, who “all committed suicide to save themselves from slaughter.”

The puzzle, however, is not so hard as it looks. The uttermost sceptic tacitly assumes the possibility of argument; that is, of a course of reasoning, in which every step is dependent on the preceding step, while the origin of the

\* That the visible, or sensible, universe is to us, on the relational plane of existence, merely an optical and cerebral image, or *spectrum*, seems scientifically certain from the simple fact that the retinal cones and rods, the essential factors in vision, are turned from, and not towards, the light of the outer world. So that what we envisage is only the reflection (creation) of our own optical apparatus—a subjective luminous image, or *phosphene*, formed at the base of each individual eye, and not any object apart from this organ. The conversion, or translation, of the inverted image on the retina to the erect one tells the same tale of the purely esoteric character of vision—object only becoming cognizable after transformation into the subject—self. Each Self or Ego is thus Agonist and Agonism, Creator and Creation, *Natura naturans* and *Natura naturata*. “All things [*i.e.* thinks] are made by it, and without it is not any ‘thing’ [subject object] made, that is made.”—R. L.

whole is some group of observed facts. If this be a delusion, and the last step stands in no kind of casual connection with the first, evidently argument is impossible, and the sceptic's lucubration shares the general invalidity. A succession of mere mental phenomena, of mere inert pictures, cannot constitute reasoning, because one inert picture cannot produce or condition another. If a mental state possess no property except the property of being perceptible, it is obviously purely passive, and exerts no real influence upon subsequent mental states. Now, as this position is utterly unthinkable, and is not less destructive to scepticism than to materialism, we are obliged to assume the existence of some active basis of thought, that is, of something which thinks. What we assume of the individual self we extend analogically to other men, who are to us other selves. And having seen that sensation and motion follow upon excitation of the brain, and are suspended or destroyed by paralysis of the brain, we are justified in restoring our thought-cells to their proud creative eminence, and in proclaiming that they constitute this "active basis of thought"; that they think, and therefore exist.

From the material proplasm of consciousness we argue by analogy to a material proplasm of the objects of consciousness, and therefore to a real world which existed before man was, and may exist when man is no more. But this does not concern us, except as a matter of speculation. *Our* universe is made up of sensations; for even thought may be described as the special sensation of the cerebral cortex; and beyond sensation we cannot pass; even *hyle*, the "substance," the "unknowable," if you will, must be defined in terms of thought; so that we may accurately enough style ourselves "hylo-idealists."

Practically we may say of self, as Paul of Christ: In it are all things created, in the heaven and upon the earth, things visible and things invisible, whether thrones or dominions, or principalities or powers; all things have been created through it, and unto it, and self is before all things, and in self all things consist. I hasten to forestall any

ingenious antagonist who may nickname this the gospel of selfishness.\* My imaginary foe is welcome to the epithet; but its meaning will have to be considerably changed before it can be appropriate. Self, in common parlance, signifies a little private enclosure, jealously "walled round": in philosophical language, it is co-extensive with the cosmos. Every man his own universe. Ascetics taught self to feel its meanness; we teach self to feel its greatness. The ideal here set forth is fulness of life, gained from conscious unity and solidarity with the lives of others.†

It is true in one sense that no man can cross the frontier of his neighbour's personality. But in another sense it is equally true that such immigration is continually taking place.

All with whom we live, all with whom we hold intercourse, all of whom we read, hear, or think, are received into the mind through the portals of the senses, and become actual parts of the Ego. We understand them only so far as we are able to identify them with ourselves. Our own thoughts give us a key to their thoughts, and enable us to translate their words and gestures. Two interlocutors are like opposite mirrors. Each, among other objects, reflects its *vis-à-vis*, and therefore reflects its own reflexion. The mirrors may be cracked or clouded, convex or concave, or there may be other peculiarities which prevent the image in one from perfectly corresponding to the image in the other. Still, in however distorted a form, each may be said to *contain* its opposite neighbour, and, were mirrors sentient beings, the mutual inclusion would be psychical as well as physical.

Short of friendship, or even acquaintance, we receive as

\* Selfism, not selfishness, is the proper term for this autosism.—R. L.

† In the 4th book of the "Dunciad," which is an apostacy from the creed of his "Essay on Man," Pope anathematizes so-called Deists and others, who "see all in Self, and but for Self are born," and who "make God man's image." But that is the position advocated by this Neophrenology, the presumption of which is converted into real humility by the denial to man of faculties for reaching the Absolute or Unconditioned, confined, as he is by the laws of his nature, to relative Egoism, the transcendence of which is a *Reductio ad impossibile*. See Bacon's "Prometheus," in his *Wisdom of the Ancients*.—R. L.

tenants of the mind all those members of the human race concerning whose character we can form even the vaguest symbolic idea. This is sympathy in its most elementary form; yet it is the germ of all altruistic morality, which is thus unified with egoism.

It may be said that since the fact of asselfment does not necessarily produce benevolence towards those whom we asself, the theory which emphasises the fact will be similarly fruitless. I shall not be induced to feel charitably towards a man by prying into his mind while he is living, any more than by dissecting his body when he is dead.

The answer is that an action accompanied by complete self-consciousness has a widely different psychological effect from an action not so accompanied. The component parts of human life are always the same; but the emphasis laid now on one, now on another component, is a pressure which changes the centre of gravity of the whole. Patience, long-suffering, self-sacrifice, existed long before Buddha or Christ, but not until attention was especially directed to them could they assume the position of cardinal virtues. What is done every day may be like a word of entreaty or command repeated in a foreign tongue. We are aware that by pronouncing the word we shall gain satisfaction of our wants, but its precise interpretation is unknown. By-and-bye we learn exactly what it signifies, and then it takes quite a different place in our thoughts, and is seen to be related to other phrases in a way hitherto unimagined.

In the same way, we may be constantly mentalising our fellow-creatures, without being in any way impressed with the solidarity of mankind. But when the act is philosophically interpreted, we learn for the first time that it is not only an organic necessity, but that it also possesses supreme intellectual and moral significance. It is not isolated, but representative; it gives the clue to great problems, and is thus brought within the sphere of emotion, as well as of reason. All facts owe their importance to their relationships; and a truth which is seen to dominate and marshal in order a host of minor truths, and to be at the same time a

corollary of the primary conditions of conscious perception, seems well fitted to operate as a powerful motive.

It seems, on this occasion, superfluous to pursue the subject further, and to consider all the bearings of Hylo-Idealism upon theoretical and practical ethics; *its complete reversal of the theologic standpoint*; and its restoration to mankind of their ancient, pre-scientific, imperial dignity and freedom. When the theory of Copernicus extended the universe by immeasurable spaces and illimitable æons, the human race seemed to dwindle from monarchs of the world into contemptible animalculæ, crawling over this insignificant sandgrain of a planet.\* Yet the ephemeron man may reinstate himself in far more than his former glory; for not only does the earth which he inhabits owe all its forms and colours to his creative eye, but the very spaces and æons before which he cowered borrow their sublimity from his imagination. Eternity and Immensity have no awfulness which he has not conferred. He alone is the "fountain of honour."

We receive but what we give,  
And in our life alone does Nature live;  
Ours is her wedding garment, ours her shroud.—Coleridge.

\* The magnitude of the Universe in no degree diminishes, but on the contrary exalts, the supremacy of Sensation and Thought. No comparison is possible between a sentient and non-sentient phenomenon; and the smaller the scale of the former, the greater its marvel and glory. The "*ridiculus mus*" of the fable "*Parturiunt montes nascitur ridiculus mus*" immeasurably transcends in importance and dignity, all the "parturient mountains" on earth or elsewhere—the sphere of sentient surpassing incommensurably that of non-sentient existence. Our astonishment at the sagacity of the ant is intensified, not lessened, by the infinitesimal scale of its *sensorium*. The revelations of the microscope exceed *relatively* those of the telescope. Astronomy can no longer claim to be "Queen of the Sciences," except in so far that it is from its lesser complication, as compared with the biological series, the least uncertain. It deals with problems in an altogether lower plane than Anatomy (Somatology). Practically self-knowledge does not enter into its scope. No thinker, now-a-days, can doubt that the mind of Locke was more complete and sounder than that of the great Jeome, his biographer, and visionary Newton. Lord King ascribes much of Locke's mental sobriety and method to his *medical* training. He knew little, or nothing, of mathematics.—R. L.

## THE PRINCIPLES OF SOCIOLOGY.\*

From *The Birmingham Midland Naturalist*, February and March, 1890.

SOCIOLOGY is a branch of science which has yet to establish in the public mind its right to exist. It is perhaps natural that people should resent being treated as social units, and that they should not like to see their most cherished ideas accounted for on evolutionary principles—those ideas which surely represent eternal truths, and which *ought* to be accepted by all sorts and conditions of men, quite irrespective of race, habitat, or stage of civilisation. The definition, "Sociology is the science of the growth and development of human societies," does indeed sound sufficiently inoffensive; but it is when we descend to details that human dignity feels itself assailed. "What!" we may imagine a Red Indian demanding of some new and heterodox medicine man—"what! do you actually mean to tell me that my great-great-grandfather was only a man like myself, when I know that he was a dog, and for this reason never harness a dog to my sledge? Do you mean to tell me that my father's ghost did not come to me last night in my sleep, when I saw him, and heard him—yes, and he beat me and gave me a bad pain in my side? Who should know that better than I? Why, I have the pain still! Worse than all, do you actually say that the sacred legends of our tribe arose in the first place from mere misunderstanding of facts or of words? That our laws, our customs, our religion, our very tribal existence grew up like a plant, and so may perish? When we know that these things were the work of the Gods and of our fathers? All this may doubtless be

\* An address delivered before the Sociological Section of the Birmingham Natural History and Microscopical Society, on the occasion of the opening of the session, Tuesday, 22nd October, 1889.



very true of the Iroquois, let us say, or of the Dacotahs—but it is sheer blasphemy to apply it to us Chippeways.” I do not imagine that there are any among this audience who will sympathise with the poor Chippeway—yet, after all, his indignation is neither unnatural nor unreasonable. For it is a Sociological axiom that no mind can, by an effort of will, transport itself from one evolutionary stage to another stage more advanced and more complex. The principles of a science can never be intelligently accepted until its data are understood, fitted together, viewed from every side, and known in all their mutual bearings. If, without such knowledge, the principles are taken on trust, they change their character, and are transformed into dogmas, of no more avail for intellectual nutriment than the driest books of theology. Teach a savage—or a schoolboy—the whole contents of a chemical text book without giving him a glimpse of the facts summarised in its formulæ, and you might as well have taught him the Athanasian Creed or the magician’s Abracadabra. I do not mean that he must necessarily see every process in the laboratory, but that he must have sufficient practical knowledge to form a clear conception of the phenomena from which the principles are inferred. Ill-gotten *truth* never prospers, but ceases to be truth in the mind which acquires it otherwise than by the legitimate method of rational inference. It is like the lightly earned fairy gold that changes to dead leaves at the dawn of day.

The bare idea of Sociological law could not possibly have arisen at an early period in the history of knowledge. Sociology demands the concurrence of all the sciences to furnish its raw materials, and to work out the lines on which it must proceed. All must combine in the bestowal of its birthright—as the Olympian gods were fabled to shower gifts upon some fortunate infant: endowed by Juno with power, by Venus with beauty, with wisdom by Pallas, with genius by Apollo. No conception of the formation and growth of societies can ever spring up until we have learnt to view the physical universe as a network of cause and effect, of action and reaction. Nor can the conception become fruitful until

we can trace, with at least a partial comprehension of the processes involved, the evolution of organic life, thus honestly earning truths which can afterwards be applied to the interpretation of social phenomena. Further a knowledge of the laws and workings of the human mind is absolutely essential, that we may analyse aright the strange customs, the wild traditions, the apparently senseless prohibitions and commands, which we find among barbarous peoples—or which our own forefathers inherited from ancestors still more remote.

Even with these equipments, the result of our Sociological, investigations must be, and perhaps must always remain, extremely imperfect. To a certain extent it must be granted that the public distrust is justifiable. The science has indeed advanced beyond the stage of mere theoretical possibility; it does exist, but only in the embryonic condition, with all its details and even its general outlines as yet indistinct. There is a preliminary difficulty in the selection of its data, which of course renders its inferences questionable in geometrical ratio with the doubtfulness of their foundation. All this is fully admitted by Mr. Spencer in his chapter entitled "Primitive Ideas." \*

"What ideas *are* primitive?" we ask—and the answer is, "We do not know." It must be remembered that our savage contemporaries are, in one sense, no more primitive than we are. They have an equally long ancestry, and there is no reason for assuming that the lowest of them have neither advanced nor retrograded since the dawn of humanity. "Probably," says Mr. Spencer, "most of them had ancestors in higher states; and among their beliefs remain some which were evolved during those higher states. . . It is possible, and I believe probable, that retrogression has been as frequent as progression." What is said of ideas may, of course, be said of customs, manners, and laws; so that our study of the evolution of mankind from primitive conditions is hindered by the difficulty—nay the impossibility—of determining by direct evidence what those primitive conditions were.

Another and less obvious hindrance comes from our in-

\* *Principles of Sociology*, vol. I, p. 93.

complete knowledge of our own times. What are we ourselves, viewed as social units? Whither are we moving, and what is the curve of our line of progress? What is the goal towards which we are really working?—for it may be, and probably is, far other than that which we set before our imagination. Not possessing the solution of these enigmas, we cannot know the full sociological significance of our own day or of any previous day, since part of that significance lies in the unseen future. That future is without doubt as rigorously predetermined by past and present as the nature of the harvest is predetermined by the nature of the seed that is sown. If we really knew the crop, we could both predict the harvest and could trace its past history from the formation of the ovule to the liberation of the seed when mature. No child of the century can truly understand himself or his age, or can solve the problems in which he himself is a factor. If he could, he would be a child not of this century, but of all centuries. As our knowledge advances, and as our apprehension of principles becomes more definite and coherent, we may learn to distinguish many of the “streams of tendency” which flow around us or bear us onward; but the inter-actions, even of those which are seen, are far too complex to be worked out by the clearest intellect. And we can never be certain that the most important currents have not remained unobserved, just because we are moving with their motion.

“Enough,” cried Rasselas, when Imlac had explained to him the necessary qualifications of a poet—“enough! Thou hast convinced me that no human being can ever be a poet.” In like manner, I have possibly suggested to some present that the existence of this Section and the delivery of this Address must be mere vanity, since no human being can ever hope to become a Sociologist, the earliest and the latest conditions of society being, for different reasons, wrapped in obscurity. Yet I would fain hope that my audience will be more indulgent than the Prince of Abyssinia, who, wearied out by his friend’s rhapsody, refused to hear further particulars of the poet’s vocation.

There is one consideration which should make every man a Sociologist. There is a key fitted to unlock many of the dark places into which direct inductive research can never penetrate. *Without* inductive research, the key is indeed useless—for we must take the trouble first to find the lock that it fits, and then to examine diligently the stores to which it gives access. And this key is that knowledge of the laws of human reason, and the workings of the human mind, of which I have already spoken, as absolutely essential to the sociological student. But I might, in one word, have called it self-knowledge. Though we cannot completely estimate the modifiable elements in ourselves and in society, because these elements are exactly the ones which unconsciously bear our conclusions; yet we can, if we will, learn to discover in our own personality the foundations of human thought and feeling, which do not change, and which are the same for the whole world. I do not mean that we are to evolve the condition of primitive society out of our own inner consciousness, but that we are to use that inner consciousness as an instrument of selection and interpretation. And with good right, for your reason and my reason are, fundamentally, one with the reason of the race;—of the most evolved sage and the most undeveloped savage. That is, natural logic is in all men the same; and this truth will often give us a clue to the origin of the most apparently irrational beliefs and practices. In Mr. Spencer's words—"Our postulate must be that primitive ideas are natural, and, under the circumstances in which they occur, rational. In early life we have been taught that human nature is everywhere the same. Led thus to contemplate the beliefs of savages as beliefs entertained by minds like our own, we marvel at their strangeness, and ascribe perversity to those who hold them. This error we must replace by the truth that the laws of thought are everywhere the same, and that, given the data as known to him, the primitive man's inference is the reasonable inference."\* If the savage had not been a reasoning being, he would have rested content with the apparent chaos around him. He would not have

\* *Principles of Sociology*, vol. I, p. 98

felt the necessity of inventing an invisible entity, a mysterious second self, a soul or spirit, to account for dream images, for waking visions, for shadows and reflections, for the phenomena of syncope, catalepsy, and death ; nor would he have proceeded to explain by similar spiritual agencies the alternations of rain and sunshine, the fierce winds, the drought, the flood, the famine. Unconsciously he was seeking for a principle of order in the midst of confusion. The light that led him astray was yet the light of reason.

It is, of course, difficult to conceive the world as it must appear to one who is wholly ignorant of those physical truths, which have become incorporated with our very perceptions. But the feat can in part be achieved by the analysis of our ideas to their simplest elements, and the laying aside of all that has been contributed by science and by philosophy. Then we may try to reconstruct the world from the simple data of sense-perception, rigorously putting aside all suggestions which are incompatible with the most childish ignorance.

In this way we may select, from among the mental and social characteristics presented to us by the barbarous tribes of to-day, those which are likely to have belonged to the primitive man, and those which represent secondary and tertiary stages ; and may be able to sketch out provisionally the mode of development from the former to the latter. This is not, it will be said, a very sure mode of interpretation—for, hard as it is to acquire knowledge, it is still more hard to divest one's self of it at will, and the second nature of civilisation and education, even if expelled with a pitchfork, will steal back again surreptitiously and vitiate all our conclusions. The house may be swept and garnished, but the old demon of Philosophy will find his way back again, bringing with him seven companions worse than himself, in the shape of Sociology, Comparative Mythology, and other nameless phantoms.

In this objection there is some force—but its force is almost wholly neutralised by the consideration that we are allowed to use our organ only as throwing light upon modes of thought and life which actually exist, or which can be

proved to have existed. If we proceeded farther, and took our own reconstruction of the world (in thought) as representing an actual construction by primitive man, we should grossly err, and put ourselves at once outside the boundaries of science. It is by the *comparison* of our ideal primitive man with the real savage that we may hope to arrive at sound conclusions. From the savage we may learn that many things that we thought primitive are really acquired; by our inner touchstone we may distinguish the real nucleus of his character and his ideas from the growths which have overlaid and almost hidden it. His sophistications are unlike our sophistications, and the two brought into contact will neutralise each other, and will thus rectify the two sets of errors which threatened to destroy our science at its very birth.

We have, then, to study (1) humanity in its barest elements, (2) its varying environments, and (3) to trace, by inductive research and deductive reasoning, the gradual development of humanity by its own inner forces, and by stimulus from without.

The bare elements of humanity prove not only man's capacity for the social state, but, so to speak, his innate sociality. For when we look at these elements we find that they are distinctively social just so far as they are distinctively human. Every individual man *implies* or *presupposes* society by the very foundations of his being. It is a truism to say that there could be no society were there no individuals, and that, as the individuals are, the society must be. But it is equally true, if not yet a truism, to say that there could be no really *human* individuals were there no society, and that man is literally unthinkable except as a social creature. Just consider what we should have to strip away from our conception of the human character if we tried to imagine a man perfectly isolated from his kind, both in retrospect and prospect—not only living apart from human society, like Alexander Selkirk, but never having known it at all—utterly alone, and made for solitude.

In the first place we must strip away every emotion except

brute fear, brute rage, and brute pleasure in food and warmth. All the higher emotions—all the emotions distinctively human—refer directly or indirectly to the fellow-creatures with whom we have intercourse. Affection, sympathy, pride, love of approbation—all the higher forms of hope and of joy, of sorrow, and of despair—all these cannot exist apart from human relationships. Growing by exercise, they crave the establishment and extension of such relationships as a vital necessity.

In the second place, we must strip away all the better part of the intellectual life. The germs of perception and memory may perhaps remain; but none of those defined concepts, those more or less coherent trains of reasoning, which grow from the necessity of making thought intelligible to self, that it may be intelligible to others. To a being unique of his kind, the world could be only a limited storehouse for individual wants—not an illimitable cosmos interpreted by racial experience.

It hardly needs to be said that in the third place we must strip away the entire moral character. Morality consists of duty to others and duty to self, which two are in the last analysis one. But, without a certain amount of intellectual development, no idea of duty or principle of any kind could arise, so that even the self-regarding virtues could never originate. And the golden rule, "Do unto others as you would that they should do unto you," which is found in various forms in all religions, and which lies at the root of justice and mercy alike, would of course be meaningless. The ground of morality is on the intellectual side, the knowledge that we are surrounded by beings like ourselves; and on its practical side the intuitive sense that equals should be treated equally.

The emotions, then, the intellect, and the moral nature of man, all *pre-suppose* society, and apart from some form of society cannot be thought of even as existing, any more than society would be possible without their existence. It may very well be urged that the family would yield a certain scope for their exercise, and that we might all have remained in the

condition of the "solitary families of the Wood-Veddahs," mentioned by Mr. Spencer, which do not aggregate into communities; or even of the wild men in the interior of Borneo, who form transitory connections lasting only till the children are old enough to shift for themselves, and otherwise live in savage independence. But these are obviously cases of arrested racial development, or more probably of retrogression, in which the mind and character are permanently fixed at a low level; and they can no more be taken as typifying the normal tendencies of humanity than the microcephalous idiot can be taken as typifying the normal structure of the human mind. As the thinking faculties of the primitive man develop, the desire for intercourse with his fellow-creatures, as well as the need of mutual aid, must be increasingly felt, and his practical reason must take shape in a rudimentary morality. The emotions are brought into play, and act and re-act with the social environment, so that character on the one hand, and society on the other, are progressively modified.

We must not forget that, although the primitive man is a rational, emotional, and social being, still he has not attained a very high degree either of reasoning capacity or of fitness for peaceful co-operation. He cannot generalise, or rather he does generalise to a certain extent, but his power of sustained thought does not suffice to disengage his generalisations from their concrete embodiments, to place them side by side, and thus to discover a still higher unity. That is, he is incapable of what we call abstract thought. The Damaras, we are told by Mr. Galton, "puzzle very much after five (in counting) because no spare hand remains to grasp and secure the fingers that are required for units. . . . When bartering is going on, each sheep must be paid for separately. Thus, suppose two sticks of tobacco to be the rate of exchange for one sheep, it would sorely puzzle a Damara to take two sheep and give him four sticks."\* Evidently the Damara has the idea of unity, but he cannot disengage or *abstract* it from its visible and tangible representation. In the same

\* *Principles of Sociology*, vol. I, p. 84.



way the morality of the savage is guided by no determinate principle. He feels that certain modes of conduct towards others are right, and that the opposite modes are wrong ; but the feeling is wavering, inconsistent, not understood even when most strongly manifested. What is enfolded in his nature requires to be elicited by stimuli from without, just as the seedling requires nutritive soil, air, and sunshine, before it can put forth leaves and flowers.

Climate, the structure of the earth's crust and the conformation of its surface, the flora and fauna of the inhabited region, are so many factors in the physical and mental—hence in the social—life of the inhabitants. A warm and kindly climate favours the growth of an infant society, because it does not unduly strain the bodily strength, and so gives opportunity for the growth of the inventive and artistic faculties. But at a later stage a temperate, or even a cold climate, conduces to sturdier development by making demands on ingenuity and on industry, and bracing up mind and body to increased effort. The influence of useful or noxious plants and animals, of geological structure, and of the natural features of the country, must be taken into account. One tribe finding a rich soil and a fine climate will settle to agriculture, while its neighbours lead the life of nomad shepherds, or continue to subsist by the chase. Imbued with the love of property—manifesting itself, alas ! as the love of plunder—a tribe which has outgrown its boundaries or exhausted its resources makes war upon neighbouring tribes, and throws all its intellectual and physical force into a rude military organisation. It comes out of its petty struggles strengthened and disciplined, headed by a strong chief with a group of picked warriors by his side. Law and custom grow up as they are needed ; language expands for the expression of new ideas ; increase in numbers and greater social cohesion necessitate division of labour and some kind of traffic, which again direct the inventive faculties of man to the improvement of his tools and the utilisation of the minerals which he digs from the earth. Knowledge acquired from sheer necessity grows into embryonic science ; interpretations and mis-

interpretations of nature generate an infantile theology, and the "play-impulse" causes the superfluous energies to well over in rude works of art and primitive epics. The process is in its nature progressive. For a community living under law, speaking and even writing an enriched language, trading, beginning to understand, or rather to *misunderstand*, its surroundings with some degree of intelligence—a community which can build, can paint, can sing, can work in metals—has not only modified its pristine condition, but has introduced new and active factors into its internal economy. The next generation is moulded by these new factors, which it in turn remodels, and hence a "perpetual motion" is set up which cannot cease but with the extinction of the race. The growth and development of a society, as thus sketched out, bears an obvious analogy to the growth and development of an organism. Upon this analogy Mr. Spencer dwells in the second part of the "Principles of Sociology," but he takes care to note that it must be cautiously applied. The comparison is something more than a metaphor, something less than a definition. Any material or ideal whole which grows by assimilation and not by accretion, and which has interdependent parts, co-ordinated for some general purpose, may be said to resemble an organism, and to obey the laws of organic evolution. Language grows in this way, so does science, so does art. In the case of society, however, the analogy is more tempting, because the social units are themselves organisms, and the faculties which are evolved in them must necessarily be manifested in the community. We must, however, be careful to remember that the conception fails us utterly in the ethical sphere. Mr. Spencer himself observes that, while in the animal body some of the cells "become specially sentient and others entirely insentient," in the body politic all the units are sentient; so that, while in the animal the units exist for the benefit of the aggregate, in the society the aggregate exists for the benefit of the units. It might also be added that the units are intelligent as well as sentient, and that the society—not of course the material aggregate, but the ideal synthesis, without which not even

the simplest community could exist for a moment—is present, though in varying degrees, in the mind and character of each of its members. Between the individual and the community there is no real antithesis, for the society lives in its units, just as truly as the units live in the society.

I have not time even to summarise the problems discussed in the important work which this Section is about to study, and indeed I do not feel it either necessary or desirable that I should attempt the task. The Section will read and comment for itself, and a running commentary is much better than a preliminary lecture. So I will only make a few suggestions as to the modes of study.

When reading on any great subject it is always well to make our text book a central point, from which lines of thought, and possibly of action, may radiate. But to find points of attachment for these lines we must go outside the text book, and seek in various quarters for facts, ideas, and arguments which bear upon its teachings. Confirmatory or contradictory, all must be taken into account, and we must never shrink from submitting to this test our most favourite theories, or the opinions of those masters of thought whom we respect most highly. This necessity has been duly recognised in the list of books appended to the circular announcing this meeting. In addition I may venture to suggest Professor Max Müller's Gifford Lectures published under the title of "Natural Religion," which contains his latest statement of that hypothesis which Mr. Spencer so powerfully combats. Then the "Asiatic Studies" of Sir Alfred Lyall, who is or has been a correspondent of Mr. Spencer, and has furnished him with not a few of his data, is worthy of careful perusal.

It is well also to note the curious sociological facts, which we may often cull from newspapers and magazines, or meet with in the course of our general reading. For instance, I cut from the *Times* the other day a paragraph which might very well form a note to Mr. Spencer's chapter on the "Status of Women."

"THE STATUS OF WOMAN ACCORDING TO THE CHINESE CLASSICS.—In a missionary periodical published in Shanghai, Dr. Faber, a well-

known scholar, publishes a paper on the *status* of women in China. He refers especially to the theoretical position assigned to women by the classics. These lay down the following dogmas on the subject :—(1) Women are as different in nature from man as earth is from heaven. (2) Dualism, not only in body form, but in the very essence of nature, is indicated and proclaimed by Chinese moralists of all times and creeds. The male belongs to *yang*, the female to *yin*. (3) Death and all other evils have their origin in the *yin*, or female principle ; life and prosperity come from its subjection to the *yang*, or male principle, and it is therefore regarded as a law of nature that women should be kept under the control of men and not allowed any will of their own. (4) Women, indeed, are human beings, but they are of a lower state than men, and can never attain to full equality with them. (5) The aim of female education, therefore, is perfect submission, not cultivation and development of mind. (6) Women cannot have any happiness of their own ; they have to live and work for men. (7) Only as the mother of a son, as the continuator of the direct line of a family, can a woman escape from her degradation and become to a certain degree her husband's equal, but then only in household affairs, especially the female department, and in the ancestral hall. (8) In the other world woman's condition is exactly the same, for the same laws of existence apply. She is not the equal of her husband ; she belongs to him, and is dependent for her happiness on the sacrifices offered by her descendants. These are the doctrines taught by Confucius, Mencius, and the ancient sages, whose memory has been revered in China for thousands of years."

I am not quite sure that similar ideas do not linger even to the present day in remote parts of our own island—and, indeed, in parts not so very remote, if we may judge by Mr. Grant Allen's extraordinary diatribe in the "Fortnightly" for October. If a Museum of Evolutional Psychology should ever be established—in the 21st century, let us say—that article will have a distinct value as a curious instance of reversion.

But the most practical part of the student's work is to examine his own prejudices, and to recognise them as survivals of beliefs which were once rational, but which now, undermined by maturer knowledge, are evidently destitute of foundation. This task would be one of the most important that the Section could possibly undertake ; though, perhaps, it will be best accomplished by each member acting as his own

private inquisitor. When we have traced out the mixture of truth and error which constitutes our own beliefs, we shall be more ready and more able to perceive the rational element in the sociological conceptions of contemporary races. When I was in India last year, I was talking once to a very enlightened Brahmin, a university professor of Sanskrit, who had cast aside many religious and social prejudices, and was anxious to keep his little daughter of nine unmarried till the comparatively ripe age of twelve, if only his family and caste could be brought to consent to so great an innovation. I said something about the bondage of caste being the root of all evil, and asked whether he did not think that its fetters would soon be relaxed. But he gravely replied "No! I will speak to you quite frankly. My ancestors for ages back have come of a stock devoted to intellectual pursuits, and the love of these has become hereditary. I should not like to sully the purity of our blood by intermixing it with that of another caste engaged in meaner occupations. Does not Darwin show us that ancestral characteristics are reproduced in the offspring, and are preserved by natural or artificial selection?" I felt rather crushed by having Darwin brought down upon me in this unexpected manner, and although the Pundit's argument was without doubt open to cavil, yet I could not help recognising that it was an argument just as good as many which are used for the support of some of our most cherished institutions.\*

Another field for sociological investigation is suggested by the history of our own town—its rise and progress, and the social and political tendencies which are still in course of development. The fertile soil of the Triassic and Permian plains, and the mineral riches of the Black Country will have to be taken into consideration as the essential elements of our industrial prosperity. The manner in which this prosperity has stimulated the growth of the village into a small town, the small town into a great city, must be traced out, and the

\* While speaking of India, I may take the opportunity of saying that Mr. Spencer's works are known and appreciated among the more highly educated of the native gentlemen.

social revolution—for it is nothing less—caused by the invention and general use of machinery, by the factory system, by the present rapid communication between all parts of the kingdom, and indeed all parts of the civilised world, must be sketched in its general outline, and more minutely delineated in its local features. Last, not least, we must study that great democratic movement which began at the end of the eighteenth century, and which, changing its form again and again, and gaining force with every change, is ready at the end of the nineteenth century for still further transformations. With these data and inductions we may reach an intelligent comprehension of the strange metamorphosis which Birmingham has undergone within the last 140 years. In Dr. Langford's admirable "Century of Birmingham Life," we read the following curious account of Birmingham society in 1751, as gleaned from the local journals of that date:—He says that apparently "there were scarcely any events of a public nature worth recording. . . . All, or almost all, the public demonstrations are made on the celebration of some Royal birthday, or the arrival of the King from Hanover. . . . The allusions to anything like local public life as we understand it now are of the rarest occurrence. No police reports, no public meetings, no charitable appeals, no literature, no popular educational institutions, no popular lectures, no libraries, no newsrooms, no penny readings, no board of guardians, no town councils, no debates of local senates, no orations of local senators to read, no leading articles, for there were no local events about which to write" (and I may add no Mason College, no Natural History and Microscopical Society, no Sociological Section with its genial and able President). "All seems to have been a dull, dead level of monotonous existence, varied by occasional cock fights and other brutal sports." The contrast with present conditions is almost ludicrous, yet the change has been brought about by natural and discoverable means. A philosophical history of Birmingham has yet to be written, a fitting work for some member or members of the Sociological Section. It must be undertaken in no vain-glorious temper, but in the true evolu-

tional spirit, which does full justice to the past and the present and yet looks steadily onward to the future, never permitting its aspirations to crystallise into stolid self-satisfaction. A society like ours ought to find its ideal in that "possible future social type" which, in Mr. Spencer's words, "will use the products of industry neither for maintaining a militant organisation nor exclusively for material aggrandisement, but will devote them to the carrying on of higher activities"—a type which, instead of believing that "life is for work," will hold the inverse belief that "work is for life."\*

\* *Principles of Sociology*, vol. I, p. 563.

## ANIMAL AUTOMATISM. \*

From *The Journal of Science*, April, 1882.

THIS volume consists of a series of addresses, lectures, and essays, which, as we learn from the short preface, "have appeared at intervals during the past seven years." It is needless to say that we have here many examples of that profound scientific knowledge, set forth in accurate and pellucid language, which is associated with the name of its author. The welcome task of commendation is indeed so superfluous that, were no flaws discoverable, the book need hardly be reviewed at all, but might be left to make itself appreciated, like the sun, by its own inherent lustre. Happily a few faults afford us an excuse for referring to its many merits; and since the latter will be speedily discovered by all who read it, and taken for granted by all who do not, we may feel ourselves justified in dilating chiefly upon the former.

The two articles which call for special remark are respectively entitled, "On the Hypothesis that Animals are Automata, and its History," and "On Sensation, and the Unity of Structure of Sensiferous Organs." In both we find exact statement and luminous exposition, which can scarcely be misunderstood save by the most obtuse or careless reader; yet in both the negative conclusions drawn from positive premises appear illogical and unsatisfactory. Professor Huxley reminds us of the allegorist who, after relating his story with the utmost verisimilitude, disenchants us at the end by his, "Then I awoke, and behold, it was a dream." In

\* *Science and Culture, and other Essays.* By Thomas Henry Huxley, LL.D., F.R.S. London, Macmillan & Co.



the one essay, he traces the progress of an excitation from the peripheral end of the afferent nerve to its termination in the "sensifacient" sensorium; and in the other, shows how the stimulus is reflected through the grey matter of the brain or spinal cord to the efferent nerve. These processes he describes throughout "in terms of matter and motion," leaving no room for the intervention of any spiritual Archæus. Yet at last we are left in doubt whether this creative cerebrum may not after all be a mere phantom, evoked by the Archæus itself.

The whole discussion of Descartes' theory of "Animal Automatism" tends to prove that the human organism is a self-acting machine, differing from the lowest forms of life only in its greater complexity. It is simply a watch, supplied with a mechanical contrivance by which it can wind itself up and manufacture other watches. We are told that "modern physiology, aided by pathology . . . proves, directly, that those states of consciousness which we call sensations, are the immediate consequents of a change in the brain excited by the sensory nerves, and, on the well-known effects of injuries, of stimulants, and of narcotics, it bases the conclusion that thought and emotion are, in like manner, the consequents of physical antecedents." Undoubted examples of complicated and seemingly rational reflex action, in man and other animals, are dwelt upon at some length; and in order to examine the train of reasoning which runs through the greater part of this essay, it will here be necessary briefly to recapitulate certain well-worn physiological facts.

If the spinal cord of a human being be divided at any point, those parts of the body supplied with sensory nerves having their origin below the division are absolutely deprived of sensation, but remain capable of apparently purposive motions in response to stimuli. The same holds good of a frog similarly mutilated, but in this case we are able to carry the experiment a step further. If, without injuring the spinal cord, we remove "the foremost two-thirds of the brain," the animal will jump or walk when irritated, and

swim if thrown into the water, but it is absolutely devoid of any spontaneity. The inference is, "that the impression made upon the sensory nerves of the skin of the frog, by the contact with the water into which it is thrown, causes the transmission to the central nervous apparatus of an impulse, which sets going a certain machinery by which all the muscles of swimming are brought into play in due co-ordination." If we remove only the anterior division of the brain lying in front of the optic lobes, the frog is still blind, deaf, and destitute of volition. Yet if the plane on which he is seated be inclined, he will change his position so as to save himself from falling, and, though he cannot see, will yet avoid any object placed between his head and the light, by passing to the right or left of it. "Although the frog, therefore, appears to have no sensation of light, visible objects act through its brain upon the motor mechanism of its body." Consciousness, then, cannot be regarded as the cause of "voluntary" motion, but only as its frequent concomitant. This inference is further supported by the remarkable case of a French sergeant, who, in consequence of a serious injury to the brain, became subject to periodical trances, during which he pursued his usual avocations, but was apparently destitute of spontaneity and sentience. Though he ate, drank, smoked, and even wrote letters, he was totally insensible to pain, or to any physical impressions, with the doubtful exception of impressions of touch. We come naturally to the conclusion that "the argumentation which applies to brutes holds equally good of men; and, therefore, that all states of consciousness in us, as in them, are immediately caused by molecular changes of the brain-substance. . . . The feeling we call volition is not the cause of a voluntary act, but the symbol of that state of the brain which is the immediate cause of that act." It is surely clear that "we have as much reason for regarding the modes of motion of the nervous system as the cause of the state of consciousness, as we have for regarding any event as the cause of another."

In the essay on "Sensation and the Sensiferous Organs,"

we find facts not less decisive and utterances not less unequivocal. The creative power of our material organization is fully recognised in a sentence like the following: "The epithelium may be said to be receptive, the nerve-fibres transmissive, and the sensorium sensifacient," the last word being, as we shall see later, of especial importance. "The sensiferous apparatuses are, as it were, factories, all of which, at the one end, receive raw materials of a similar kind—namely, modes of motion—while, at the other, each turns out a special product—the feeling which constitutes the kind of sensation characteristic of it."

But if we here take breath, and hope to be allowed to repose in a logical and consistent Monism, we shall be greatly mistaken. Though the brain is sense-creating, and therefore world-creating; though, "so far as we know, the change in the sensorium is the cause of the sensation," we are now gravely called upon to doubt the existence of matter, and consequently that of the material encephalon, thus admitting all our previous conclusions to be null, void and absolutely meaningless. We are presented with three hypotheses, corresponding to Animism, Materialism, and Pre-established Harmony, and are told that all stand on the same footing, and that the superiority of the second consists solely in its simplicity and convenience. It has been previously hinted\* that no adherents of the third doctrine now exist, and in a former work the first is thus contemptuously dismissed, as unworthy of serious attention, and inferior to the most shallow Materialism. "Cabanis may have made use of crude and misleading phraseology when he said that the brain secretes thought as the liver secretes bile; but the conception which that much-abused phrase embodies is, nevertheless, far more consistent with fact than the popular notion that the mind is a metaphysical entity seated in the head, but as independent of the brain as the telegraph operator is of his instrument."† In the concluding article of the present volume, on "The Connection of the Biological Sciences with Medicine," we also find that "the

\* Page 234.

† *Life of Hume*, p. 80.

essence of modern, as contrasted with ancient, physiological science, appears . . . to lie in its antagonism to animistic hypotheses and animistic phraseology."

Obviously we have not to join issue with Pre-established Harmony, or with orthodox Dualism, but with what may be denominated Absolute Agnosticism, and which, if logically carried out, would be as fatal to science as it is to philosophy. There can be no doubt that matter, as we know it, "is the hypothetical substance of physical phenomena—the assumption of the existence of which is as pure a piece of metaphysical speculation as is that of the existence of the substance of mind." Yet it may be possible to show that the existence of both is a necessary postulate of valid thought, which can only attain consistency when it reaches the further proposition, that these apparent two are in reality one. In truth, the whole question may be settled by an appeal to Descartes' primary axiom, "*Cogito ergo sum*," which is no mere *petitio principii*, as its critics have erroneously assumed. This will be clear from the following considerations.

A perception, or mental phenomenon, cannot be supposed to possess any energy or power of action. As a mere *appearance* it can obviously only *appear* to act, or to produce any effect. What we regard as a mind in action will—according to Absolute Agnosticism—be only a succession of separate and distinct mental phenomena, not even casually related, since causality is only an inference from observed connection. But if so, there can be no such thing as the development of a conclusion from premises, and consequently a logical chain of reasoning will be impossible. Now, when a "heap or collection of different perceptions" \* examines itself, and finds its supposed substance in all probability non-existent, its arguments are either valid or fallacious. If valid, the "heap" has a more than phenomenal existence, and the arguments again fall to the ground. Universal scepticism thus places itself in the same dilemma as Epimenides the Cretan, when he asserted that all the Cretans were liars. This applies not to Hume's philosophy, but to popular misconceptions of his

\* Hume's *Treatise of Human Nature*, bk. I, part iv, § 2.

true meaning, which is clearly stated in the following passage: "Thus the sceptic still continues to reason and believe, even though he asserts that he cannot defend his reason by reason; and by the same rule he must assent to the principle concerning the existence of body,\* though he cannot pretend, by any arguments of philosophy, to maintain its veracity. . . . We may well ask, *What causes us to believe in the existence of body?* but it is in vain to ask *Whether there be body or not?* That is a point which we must take for granted in all our reasonings."† Hume's real aim was the demonstration that the basis of reason cannot be derived from reason itself. Certain primary assumptions, not philosophically proved, but justified by intuition and experience, are necessities alike of abstract thought and practical conduct. This does not, of course, apply to hypotheses such as Animism, which can be contested by non-suicidal arguments.

The existence of a material proplasm of mind is implied by Professor Huxley, when he describes the sensorium as "sensifacient," and consequently prior to the sensations which it creates. Yet, though we are forced to believe in "mind-stuff," does this in any way prove the reality of matter? "Since our sensations, our pleasures, our pains, and the relation of these, make up the sum total of the elements of positive, unquestionable knowledge," may not the seemingly creative brain be itself a creation of the mind? No man can examine and experiment upon his own cerebral organ; and the mass of grey and white matter, which the brain of another presents to him, is, like the rest of the "external world," a mere subjective phenomenon. But each individual is justified by analogy in assuming the existence of other individuals, who manifest their thoughts and sensations in the same way in which he manifests his own. The physiologist or physician is therefore practically an observer of two sets of phenomena,—those which belong to

\* The word "body" is here used as synonymous with *substance*, either of mind or matter.

† Hume's *Treatise of Human Nature*.

the physical frame of the patient, and those which belong to his mental constitution. The latter kind of observation is, of course, only mediately possible; but the facts of which it takes note may be sufficiently interpreted by the experience and self-knowledge of the investigator. He will discover that all changes in the latter class are preceded by certain definite changes in the former, and will at length arrive at the conclusion that the mind "is really a system of effects, the causes of which are to be sought in antecedent changes of the matter of the brain." \* He will next remember that, as shown above, every thinker is forced to postulate the reality of "mind-stuff,"—that is, of a matrix which generates the phenomena of sensation and thought. If not misled by genius, he will see the necessity of ascribing the invariably preceding phenomena of matter and motion to the same creative protoplasm, since he is not entitled to assume the existence of any other. Since these latter phenomena are by common consent called material, he is justified in assigning to the proplasm of mind the familiar name of matter. Thus we may say of the brain, "*Cogitat, ergo est.*"

This monistic view is preferable, not merely from its convenience as a "working hypothesis," but because it contents itself with asserting the being of that matrix whose non-being is unthinkable, and declines to take any note of an "immaterial substance," for the existence of which, as Prof. Huxley admits, not a particle of demonstrative evidence can be offered. The attitude of a Materialist towards the "*anima*" is that of every modern astronomer towards those planetary genii, or "ruling spirits," which were finally disestablished by Kepler from their crystal spheres. The existence of such beings "cannot possibly be disproved," and no reason can be given for disbelief in them, save their total superfluity.

Let us, then, assume our material proplasm as the *vera causa* of mental and physical phenomena, and see how this theory agrees with recognised facts. In the first place, we find that it is the very basis of medical science, and that

\* *Life of Hume*, p. 78.

every ordinary practitioner who has ever attended a dyspeptic or hypochondriacal patient knows that he can only minister to the mind by ministering to the body. If he were treating simply a phantasmal apparition, there could be no result save in his own inner consciousness; but since his remedies do produce a result in the inner consciousness of his patient, it is clear that the physical frame upon which they have acted, so far from being unreal, is the only reality with which he is practically concerned.

The effects of the food which is daily transubstantiated by the incarnating digestive organs,\* and the atrophy of mind and body which follows prolonged abstinence, prove alike the real existence of the material universe and its complete homogeneity with our own being.

Professor Huxley states that he is "utterly incapable of conceiving the existence of matter, if there is no mind in which to picture that existence." Here, as elsewhere, he confounds material phenomena, which cannot exist without a percipient mind, with matter itself. Unless his views have recently undergone a marvellous change, he holds that the earth was in being very long before the appearance of any sentient organism. Will he now maintain that this æonial existence depended upon a picture formed in some mind, supreme or otherwise? In his work on "Man's Place in Nature," he expressly asserts his conviction that mind is developed from matter, and that "even the highest faculties of feeling and of intellect begin to germinate in lower forms of life." According to his present theory, nothing whatever could have existed previously to this germination—not mind, since it was as yet unborn; not matter, since there was no mind in which it could be pictured. In fact, there could have been no "lower forms of life," and therefore no germination.

\* Digestion (concoction), a pre-scientific—indeed anti-scientific—term, is, in correct phraseology, now superseded by the term assimilation, *i.e.*, the process of *asselfing*, or incorporating with Self objects of "Not Self," thus indicating the essential consubstantiality of subject and object.—R. L.

The existence of matter may now be regarded as a theoretical and practical necessity, and the only question which remains is this—Can a separable spiritual essence be considered absolutely superfluous, or must the “dead matter” of the universe be inspired with energy from some external source before it can fashion itself into living and sentient organisms? Let us turn for information to Professor Huxley himself. “If,” he says, “there is any truth in the received doctrines of physics, that contrast between living and inert matter, on which Bichat lays so much stress, does not exist. In Nature nothing is at rest, nothing is amorphous; the simplest particle of that which men in their blindness are pleased to call ‘brute matter’ is a vast aggregate of molecular mechanisms performing complicated movements of immense rapidity, and sensitively adjusting themselves to every change in the surrounding world. Living matter differs from other matter in degree, and not in kind: the microcosm repeats the macrocosm; and one chain of causation connects the nebulous original of suns and planetary systems with the protoplasmic foundations of life and organization.”\* We have, then, a substance to which all known manifestations of cosmic and vital energy can be traced, and beyond which we can never penetrate. No independent principle of life is needed to vivify what is already vital; no basis of mind is necessary save that cerebral tissue which originates and conditions the facts of consciousness. We may say, in the pregnant words quoted by our author from Descartes: “So far as these [functions of mind and body] are concerned, it is no necessary to conceive any other vegetative or sensitive soul, nor any other principle of motion or of life, than the blood and the spirits agitated by the fire which burns continually in the heart, and which is nowise essentially different from all the fires which exist in inanimate bodies.” The minor physiological inaccuracies of this sentence in no way detract from its fundamental truth.

In taking leave of this very instructive volume, we may.

\* *Science and Culture*, p. 347.



in the same breath, justify its author and the "common-sense philosopher" whom he so sternly rebukes. Far from cavilling at Reid's maxim, that "it is genius, and not the want of it, that adulterates philosophy, and fills it with error and false theory," we gladly welcome it, as accounting, in a pleasing and rational manner, for certain deviations from sound sense and logical reasoning, which we discover even in the writings of so distinguished a *savant* as Professor Huxley.