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## MAGNETISM.

### SLEEP-WAKING.

The facts given under this head in a preceding number, (it should be remembered) were not creations of the fancy, fabricated to serve an unworthy purpose. They were sober realities, as much so as that you now see with your eyes, or that you are conscious of what you are now doing.

We give these accounts to show, that man has a peculiar *sense* which, in certain states of the nervous system, enables him to see without the use of the eye, and to hear without the natural use of the ear. We continue our quotations from Dr. Elliotson:

When persons use their muscles, there must be that internal feeling which accompanies all muscular exertion,—there must be the feeling of weight and resistance. I saw the sleep-waking condition strikingly exhibited lately in a patient of mine in University College Hospital,—a girl, sixteen years of age, destitute of the sense of smell as long as she could remember, subject to pain of her vertex, and, like her sister, epileptic, though very intelligent, very facetious, and of excellent behaviour. After the Baron Dupotet, passing the ends of his fingers up and down before her, had sent her to sleep, on many occasions, for a few minutes at a time, she was observed one day suddenly to talk unconnectedly and move her arms and hands about, though incapable of hearing, seeing, or feeling. She lay in bed or sat, with her eyes open, saying a great number of things, such as she might say when awake, told stories, and with great expression of voice, features, and manner, mimicked the voices and conversation of many fellow-patients accurately, and mimicked the manipulations of Baron Dupotet; yet she saw nobody, could not be roused by hallooing in her ear, and bore the sharpest pinches with indifference. She was cross, expressed displeasure at having before been magnetized, said she would not be made a fool of, complained of different things, shook her head, moving it forwards and frowning, and saying, "You dirty beast." Her hands were very cold in such attacks, and her whole surface pale. She would suddenly come out of this state, stare about like a person waking, rub her eyes, become still, smile, and be completely herself without the least knowledge of what she had been doing, and feel quite ashamed and beg pardon, when informed that she had said we made a fool of her. After some hours or days, the attack would return. But, before she remained permanently awake, she sometimes fell back repeatedly into the sleep-waking: and nothing could be more striking than to see her eyes suddenly fixed unconsciously, and then all the phenomena of perfect

external insensibility and talking begin again in less than a minute: and, in a few minutes, to observe her become suddenly still, look wild or fall fast asleep for an instant, rub her eyes, be sentient of every thing around her, smile, and in short in less than a minute be wide awake, without any knowledge of the state in which she had just been. As she could not be awakened by the strongest agency applied to her external senses, I resolved to try the effect of producing an internal sensation, and heightening her volition over her voluntary muscles. I took her off the bed, and found she could not stand. Two of us supported her erect, and lessened the support now and then, so that she might feel she was falling. Her knees bent, and she would have fallen, had we not held her up. This was repeated a few times, till at last she seemed to feel the ground a little with her feet, and, when we lessened our support, her knees bent less: at length she stood pretty well. Then I forced her on, and, though her legs at first dragged, she at last feebly attempted stepping, soon she walked, and, when she walked firmly, being led on quickly by one of us on each side, she suddenly awoke. This was all the work of not five minutes. I presently laid her down on the bed, and she in a minute relapsed into her old condition: I raised and walked her again, and she was instantly restored; and remained without any return for a week. I did not afterwards succeed in this way. When the affection returned it was not so marked. She had some power of perceiving persons, and hearing and feeling, so that she gave a certain amount of answer and expressed some uneasiness on being pinched. After a few days such attacks ceased, but she fell into the delirium only of the state,—ecstatic delirium: having the full use of her external senses, her volition over her muscles, knowing where she was, and active in all her intellectual faculties and feelings; saying she felt as if her brain was coming out and was too big for her head, and begging me to cut her head off; in short, being wide awake, but wandering unconnectedly from one subject to another, dejected, saying innocent, but absurd, rude, though often witty and droll, things, which showed her feelings to be disturbed, incoherent, and mimicking admirably, whistling and singing well; and picking paper or linen to pieces: at length in her attacks she occasionally swore and was amorous. After remaining in this condition for a few days, she suddenly by mesmeric manipulations one evening became herself completely; still complaining of pain at the top of her head, which she had suffered from for many months and for which I had bled her repeatedly. She afterwards suddenly fell into this delirium again several times, and, after continuing in it some hours or days, would by

mesmeric manipulations in two or three seconds become completely herself and remain so for some hours or days. To observe her picking paper or linen to pieces, talking incoherently, now whistling aloud, now singing in the ward, cross, miserable, rude, dancing about, unable to look steadily for many seconds, her eyes converging from parallelism, her countenance pale, and expressive now of insanity, now of fatuity; and then in two or three seconds to see her completely herself, smiling, perfectly rational, amiable, well behaved, with an expression of great intelligence, was one of the most extraordinary changes I ever witnessed;—to see the functions of the brain in many points nearly suspended, in many over excited, and in many wrong,—the organ altogether oppressed and deranged, and then righting itself and performing all its functions properly in an instant, made an impression upon me never to be effaced. When not in an attack, she forgot every thing that had occurred in her attacks: but, when in them, she recollected the occurrences of preceding attacks. In the delirium her hands were not always cold as in the sleep-waking. The pulse appeared hardly affected.

I will relate a number of examples of sleep-waking to show the various amount and extent of activity in this condition.

This first is very similar to that of my own patient, but *sleep-waking* was added in one stage of the paroxysm.

“At Berlin,” says Gall, “a young man, sixteen years old, had extraordinary attacks from time to time. He was agitated in his bed without consciousness; his movements and gestures showed a great activity of many internal organs; whatever was done to him, he did not perceive it; at length he jumped out of bed, and walked hastily in the apartment: his eyes were then fixed and open. I placed different obstacles in his way, which he removed with his hand, or carefully avoided; then he threw himself suddenly on his bed, was agitated there some time, and at length awoke and sat up, very much astonished at the number of curious persons who were about him.”

Here was a certain amount of *sight* and *touch*, and *sense of resistance and weight*; all was *forgotten*; the changes were *sudden*.

“M. Joseph de Roggenbach, at Friburg in Brisgau,” continues Gall, “told me, in the presence of many witnesses, that he had been a somnambulist from his infancy. In this state his tutor had frequently made him read; made him look for places on the map, and he found them more readily than when awake; his eyes were always open and fixed; he did not move them, but turned his whole head. Many times they held him, but he felt the restraint, endeavoured to liberate himself, but did not wake. Sometimes he said he should wake if they led him into the garden, and *this always happened*.”

Here was a certain amount of *sight*, *touch*, and feeling of *resistance and weight*; an *increase of mental power*; and a certain *power of prediction*; he moved, not his eyes, but his *whole head*.

“I knew also the history of a miller, who, dreaming and with his open, would go into his mill, enter upon his usual daily occupation, return to bed by the side of his wife, without remembering in the morning any thing he had done in the night.”

Here was a certain degree of *sight*, and feeling of *resistance and weight*; and all was *forgotten*.

M. Martinet speaks of a saddler accustomed to rise in his sleep and work at his trade: and Professor Upham of an American farmer who rose in his sleep, went to his barn, and threshed out five bush-

els of rye in the dark, separating the grain from the straw with great exactness.

These are examples of sleep-walking.

The following are examples of sleep-talking, or sleep-talking and sleep-walking:—

“Dr. Blacklock, the blind poet, on one occasion rose from his bed, to which he had retired at an early hour, came into the room where his family were assembled, conversed with them, and afterwards entertained them with a pleasant song, without any of them suspecting he was asleep, and without his retaining after he awoke, the least recollection of what he had done.”

“Dr. Haycock, Professor of Medicine at Oxford, would deliver a good sermon in his sleep: nor could all the pinching and pulling of his friends prevent him.”

Horstius mentions a young nobleman who was observed by his brother to rise in his sleep, put on his cloak, open the casement, mount by a pulley to the roof of the citadel of Brenstein where he was, tear a magpie's nest to pieces, wrap the young ones up in his cloak, return to his room, place the cloak with the birds in it near him, and go to bed. In the morning he told the adventure as a dream, and was astonished when shown the magpies in his cloak, and led to the roof and shown the remains of the nest.

Dr. Franklin says, “I went out to bathe in Martin's water hot bath, in Southampton, and, floating on my back, fell asleep, and slept nearly an hour, by my watch, without sinking or turning,—a thing I never did before, and should hardly have thought possible.” This showed only the completeness of his repose: but Dr. Macnish quotes a case of actual swimming in sleep on the coast of Ireland. “About two o'clock in the morning, the watchmen on the revenue quay were much surprised at desecrating a man disporting himself in the water, about 100 yards from the shore. Information having been given to the revenue boat's crew, they pushed off, and succeeded in picking him up, but strange to say, he had no idea of his perilous situation, and it was with the utmost difficulty they could persuade him he was not still in bed. But the most singular part of this novel adventure, and which was afterwards ascertained, was that the man had left his house at twelve o'clock that night, and walked through a difficult and, to him, dangerous road, a distance of two miles, and had actually swum one mile and a half, when he was fortunately discovered and picked up.” He then adds a case of fishing. “Not very long ago a boy was seen fishing off Brest up to the middle in water. On coming up to him, he was found to be fast asleep.”

The information given us with respect to these cases extends no further, and we cannot tell the state of the eyes.

Dr. Pritchard mentions an individual who, having “been in the habit of frequenting a public promenade where he used to meet his acquaintances, was seen to rise from his bed at night and walk in his shirt along the same path, which extended a mile on the brow of a hill, stopping very frequently and greeting different individuals whom he had been accustomed to see in the same place.”

Vision might here have existed sufficiently to show him his way, though the state of his brain suggested to him imaginary forms; or he might have made his greetings by habit, without fancying he saw individuals.

According to the newspapers, a year or two ago, John Green, a plasterer, accused Mary Spencer at the Town Hall, Southwark, before Alderman Thorp, of stealing from him a pair of trowsers which he

was carrying home at ten o'clock at night, through High Street, in the Borough, fast asleep.

"He deposed that, after finishing his work, he went to see some friends at Pimlico, and was accosted by a female; he had at that time a bundle under his arm. He knew no more of what transpired until between one and two o'clock on Sunday morning.

*Alderman Thorp.* What! were you so drunk that you cannot tell what happened?

"*John Green* (with great simplicity). I was not drunk, your worship; I was fast asleep. (Laughter.)

"*Alderman Thorp*" (with greater simplicity, though officially one of those who are presumed competent to determine who are the fittest persons to be physicians and surgeons and teachers in St. Thomas's and other hospitals, and who generally allow themselves to be led by one whom they have made treasurer and consider fit to guide them in their judgment, having himself in most instances already retired from business). "You cannot be serious. I never heard such a thing, as a man walking through a crowded thoroughfare, like High Street, without being disturbed.

"*John Green.* What I have stated, your worship, is true; I am unfortunately too frequently afflicted with fits of somnambulism; and, for greater security from robbers, I always make what articles I carry fast to my arm, so that if any one attempt to snatch it from me it would awaken me.

"*Alderman Thorp.* But how do you know the prisoner is the party who accosted you in the Borough? If you were asleep, you could not see her.

"*John Green.* Strange as it may appear, although I have not the power to arouse myself when in such a state of excessive lethargy, yet I can retain the sound of persons' voices in my mind, and, from the voice of the prisoner, I have not the least doubt she is the party.

"*Alderman Thorp.* How do you account for the lapse of time, from being accosted by the prisoner up to the time you discovered your loss?

"*John Green.* I am in the habit of walking for hours in my sleep, and if an attempt had been made to forcibly take the bundle from my arm, it would have aroused me; my handkerchief was cut, and thus the bundle was easily taken away.

"*Alderman Thorp.* I never heard such a case before; was the bundle found?

"Acting Inspector M'Crow, division M., answered in the affirmative, and added, that what the complainant had stated about walking the streets and roads was true: he had made inquiries, and found it to be the fact: it was well known to the police.

"Watt, Police constable 163., division M., deposed, that the complainant came to the station-house between one and two o'clock on Sunday morning, and made precisely the same statement he had made before the Alderman. The Inspector thought the tale savoured of the marvellous, and told witness to accompany him (complainant) in search of the property; and on arriving at a house in Kent Street, Borough, he said he thought the bundle was there. He knocked at the door, which was opened, and by the door of a room wherein the prisoner was sleeping, the property was found. The moment she spoke, he said the prisoner was the person who stopped him in the Borough. Witness took the prisoner to the station-house.

"The prosecutor here pointed out the way in which the bundle must have been taken away, and showed the Alderman the rent handkerchief.

"Mr. Edwards for the prisoner contended that no jury would convict upon the evidence of a sleep-walker, in prosecution against a street-walker. The

prisoner laid no claim to the bundle; and as the complainant had sworn it was his property, the police would give it up to him.

"*Alderman Thorp* said it was so strange a case that he hardly knew how to act; he should, however, under the doubtful circumstance as to identity, give the prisoner the benefit of it, and discharge her. The bundle was given up to the complainant.

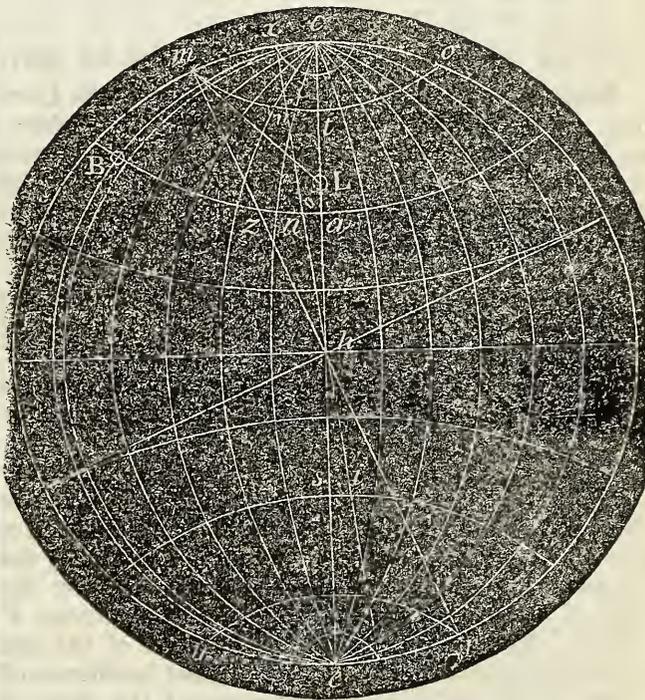
"A gentleman, who was in attendance, said he had known the complainant many years, and it was not an uncommon thing for him to be seized with that unhappy affliction while at work on the scaffold, and yet he never met with an accident, and while in that state, would answer questions put to him as though he was awake."

*Hearing* was retained, as well as the sense of *weight* and *resistance*, and possibly *sight* to a certain degree; the attack came on suddenly, in the waking state; so that the case, like that of my patient, was one of partial sleep in the waking state,—ecstasy as it is termed, and not of partial excitement during sleep.

For the Magnet.

#### THE MAGNETIC FORCES.

When the declination has arrived at its maximum at any place *without* the arctic and antarctic circles, the poles move on in a straight line, or nearly so, a certain distance from any such place, as seen by the line extending from London, *L*, to the arctic circle, *m*, (fig. 8 below,) and this distance, as ascertained by geometric formula, is  $1^{\circ} 53' 31''$ .



The line of no variation *n r*, crosses the earth's axis *a s*, at an angle of  $6^{\circ} 28'$ , and it does so because the verse sine of the planes of the arctic and antarctic circles *m o* and *u r*, around which the poles move, is each  $6^{\circ} 28'$ . This line moves from east to west at the same angle with the axis, at the annual rate of  $32' 26''$ , and crossed the meridian of Greenwich on the 9th of July, 1657, and is now in this country, or the western hemisphere. In its revolution around the earth it describes the small circles of no variation around the terrestrial poles *c e*, the diameter of each of which is  $12^{\circ} 56'$ .

I may now proceed to show that the earth is magnetized in the manner I have described; and in doing so it will be necessary to determine first, the longitude of the magnetic pole in the arctic circle,

and then proceed to show the rate of motion of the magnetic poles. To determine these important points, after I had magnetized the ring and disc, R. W. Haskins, A. M., of Buffalo, N. Y., was soon after induced to take three solar observations, on three successive days—the 14th, 15th and 16th of September, 1837; and these were reduced by Dr. Scott, of that city, and the declination found to be  $1^{\circ} 25' 03'' 04'''$  W., in latitude  $42^{\circ} 53' N.$ , and longitude  $78^{\circ} 55' W.$  I then proceeded to find the longitude of the pole in the following manner:— $98^{\circ} 00' : 23^{\circ} 28' :: 42^{\circ} 53' = 11^{\circ} 10' 53'' 09'''$ . The obliquity of the ecliptic being  $23^{\circ} 28'$ , I found in this way the relative amount of the obliquity, in latitude  $42^{\circ} 53'$ , the latitude of the place of observation, or the distance from the meridian  $a$ , to the great circle of maximum declination  $z$ , in the latitude of Buffalo, B. The amount thus obtained was subtracted from the obliquity of the ecliptic. The relative amount of the angle of the line of no variation in the arctic circle was then found in the same manner. Thus,  $90^{\circ} 00' : 6^{\circ} 28' :: 66^{\circ} 32' = 4^{\circ} 46' 50''$ , the  $90^{\circ}$  being the distance from the equator  $h$ , (fig. \*11,) to the terrestrial pole  $c$ , and the  $6^{\circ} 28'$  being the distance from the pole  $c$ , to the circle  $x$ . The  $66^{\circ} 32'$  is the latitude of the arctic circle, and the  $4^{\circ} 46' 50''$ , the numbers obtained, is the distance from  $t$  to  $v$  on the arctic circle.

The numbers thus found, with the declination of the needle, and longitude of the place of observation, were then added together. Thus:—

$78^{\circ} 55' 00'' 00'''$  long. of place of observation.  
 $12 17 06 51 = 23^{\circ} 28' - 11^{\circ} 10' 53'' 09'''$ .  
 $4 46 50 00 = 6 28 - 1 41 10$ .  
 $1 25 03 04$  W. declination.

$97 23 59 55$  W. long. mag. pole, Sept. 15, 1837.

Bond, the astronomer, found no declination in London, in 1657; and the observation of Mr. Haskins, at Buffalo, shows that the line of no variation crossed the meridian of Greenwich, on the 9th of July of that year; for the difference in time from 1657 to 1837, is 180 years; and  $32' 26''$ , the rate of motion of the magnetic poles, multiplied by 180, gives  $97^{\circ} 18'$ , and the 68 days from the 9th of July to the 18th of September, at the same rate, amounts to exactly  $5' 59'' 55'''$ , which, added to  $97^{\circ} 18'$ , makes  $97^{\circ} 23' 59'' 55'''$ , the west longitude of the magnetic pole on the 15th of September, 1837, as calculated above from the observation at Buffalo.

This is deemed a perfect demonstration of the rate of motion of the magnetic pole; but as it may not be clearly understood by the reader, I will proceed to find the longitude of several places in Europe, by the latitude and declination of the needle, to show the rate of motion of the pole; and for this purpose  $4^{\circ} 46' 50''$ , the relative amount of the angle of the line of no variation in the arctic circle, must be subtracted from  $97^{\circ} 23' 59'' 55'''$ , the longitude of the pole, to make the declination of the needle correspond with the rate of motion of the pole, which will leave  $92^{\circ} 37' 09'' 55'''$ , the apparent longitude of the pole on the 15th of September, 1837.

In 1576, Norman found the declination in London, lat.  $51^{\circ} 31'$ , to be  $11^{\circ} 20'$ , and from that time to 1837, the time of the observation at Buffalo, is 261 years, and the longitude of the place of his observation is thus found:

$141^{\circ} 05' 06'' 00''' = 32' 26'' + 261$  years.  
 $-92 37 09 55$  W. lon. mag. pole, Sept. 15, 1837  
 $48 27 56 05$   
 $-23 28 00 00$  obliquity of ecliptic.  
 $24 59 56 05$

\*First No. Magnet.

$24 59 56 05$   
 $- 3 42 05 38$  relative amount of angle of line of  
 $21 17 50 27$  [no variation, in lat.  $51^{\circ} 31'$ .  
 $-20 57 57 54 = 11^{\circ} 20'$  declination.  
 $19 52 33$   
 $- 15 46 20$  difference in time of year.

$4 06 13$  W. long. of place of observation.

The difference in the time of year, carries the time of the observation back to 20th March, 1576, at the time of the vernal equinox.

The time of year in which the observation was made is not known, and I have consequently assumed the difference in time of year, between this observation and that at Buffalo. It is said to have been taken at the old Lime House, three or four miles west of the Observatory at Greenwich

The declination is converted into degrees of longitude in the following manner:—

$90^{\circ} 00' : 166^{\circ} 30' :: 11^{\circ} 20' = 20^{\circ} 57' 57'' 54'''$

LONDON.—Lat.  $51^{\circ} 31'$ . Declination  $5^{\circ} 36' E.$ , by Gunter, 1612.

$121^{\circ} 37' 30'' 00''' = 32' 26'' \times 225$  years.

$-92 37 09 55$   
 $29 00 20 05$   
 $-23 28 00 00$  obliquity of ecliptic.  
 $5 32 20 05$   
 $+ 7 00 00$  dif. in time of year.

$4 06 42 40$   
 $-4 04 00 00$  declination.

$2 42 40$  W. long. of place of observation.

The obliquity of the ecliptic could not, it will be seen, be used in this, like the other examples, nor any other example where the remainder is less than the declination. The use of the relative amount of the obliquity of the ecliptic must also be dispensed with when the remainder is less than the declination, and the amount of the angle of the line of no variation substituted in its place, and then the relative amount of this angle in the same order as that commencing with the obliquity of the ecliptic in the former examples: because the angle of the obliquity, the relative amount of the obliquity in the latitude, the angle of the line of no variation, and the relative amount of this angle in the latitudes, correspond with the angles of the needle with the terrestrial meridians.

LEYDEN.—Lat.  $52^{\circ} 08'$ . Declination  $5^{\circ} 00' E.$ , by Peter Adsiger, 1269.

$307^{\circ} 00' 28'' 00''' = 32' 26'' \times 568$  years.  
 $- 92 37 09 55$  W. long. mag. pole, Sept. 15, 1837  
 $214 23 18 05$  E. “ “ “ “ 1269.  
 $+145 36 41 55$  W. “ “ “ “  
 $360 00 00 00$  the circle in which the pole moves.  
 $145 36 41 55$  W. long. magnetic pole, 1269.  
 $27 12 34 48$  double the relative amount of obliquity in lat.  $52^{\circ} 08'$ .  
 $6 28 00 00$  angle of line of no variation.  
 $10 56 59$  diff. between the angles of the magnetic meridians of Lyden and London.

$+ 5 00 00 00$  declination.

$184 28 13 42$   
 $-180 00 00 00$  half of the arctic circle divided by the great circle of the meridian  
 $4 28 13 42$  E. long. of Leyden. [of Greenwich.

Peter Adsiger says, “The exact quantity of this declination I have found, after numerous experiments, to be  $5^{\circ} 00'$ ,” and the result of this calculation, which is legitimately accurate in all its details, shows it to have been obtained by an observation on

the sun, at the time of the equinox, in September, 1269.

The rate of motion of the magnetic pole in the arctic circle, is thus clearly demonstrated, as well as the perfection of the magnetic instruments of the eastern nations, with which these declinations were found.

The great circle of maximum declination before noticed, which passed over London in 1820, L. (\*fig. 11) crossed the equator *h w* at *w*,  $15^{\circ} 39' 42'' 34'''$  east of the node of the magnetic equator *z*, making the distance from the node of the great circle of maximum declination *u*, to the magnetic equator *d g*,  $6^{\circ} 28'$ , corresponding with the depression of the magnetic pole *m*, below the terrestrial pole P, or the verse sine of the plane of the arctic circle. So if we subtract from  $66^{\circ} 32'$ , the latitude of the arctic circle  $6^{\circ} 28'$ , the remainder will be lat.  $60^{\circ} 04'$ , the relative obliquity of which will be  $15^{\circ} 39' 42'' 34'''$ , corresponding with the distance between these nodes. On the opposite side of the earth this order is reversed, when this distance is south instead of north of the terrestrial equator, as in this case.

These explanations, with those before made, on the relative obliquity of the ecliptic in the different latitudes, will enable the reader to understand the elements of the calculations to find the maximum declinations of the needle in the different latitudes, and of the legitimacy of the manner in which I now proceed to find the longitude of places in Europe, east of the meridian of Greenwich, where the declination is west and is decreasing.

FREDERICKSBURGH, (Denmark.)—Lat.  $58^{\circ} 06' = 15^{\circ} 08' 56'' 32'''$ . Dec.  $18^{\circ} 50' W.$ , by Prof. Hansteen, 1810.

$$\begin{array}{r} \text{Lat. } 66^{\circ} 32' - 6^{\circ} 28' = 15^{\circ} 39' 42'' 34''' \\ 15 \quad 08 \quad 56 \quad 32 \\ \hline 00 \quad 30 \quad 46 \quad 02 \end{array}$$

$$\begin{array}{r} 15^{\circ} 08' 56'' 32''' \\ +15 \quad 08 \quad 56 \quad 32 \\ \hline 30 \quad 17 \quad 53 \quad 04 \\ -00 \quad 30 \quad 46 \quad 02 \\ \hline 29 \quad 47 \quad 07 \quad 02 \text{ maximum declination.} \\ -18 \quad 50 \quad 00 \quad 00 \text{ declination in } 1810 = 34^{\circ} 50' 26'' \\ \hline 10 \quad 57 \quad 07 \quad 02 \end{array}$$

$$\begin{array}{r} 34^{\circ} 50' 26'' 30''' \\ 10 \quad 57 \quad 07 \quad 02 \\ +15 \quad 08 \quad 56 \quad 32 - 23^{\circ} 28' \\ \hline 95 \quad 46 \quad 56 \quad 34 \end{array}$$

$$\begin{array}{r} 92^{\circ} 37' 09'' 55''' \text{ long. pole } 1837. \\ -3 \quad 37 \quad 36 \quad 18 = 8^{\circ} 03' 34''' \times 27 \text{ years.} \\ \hline -88 \quad 59 \quad 33 \quad 37 \\ 95 \quad 46 \quad 56 \quad 34 \\ \hline 6 \quad 47 \quad 22 \quad 57 \\ -00 \quad 9 \quad 37 \quad 03 \text{ diff. in time of year equal to } 4' 45''. \\ \hline 6 \quad 57 \quad 00 \quad 00 \text{ longitude of place of observation.} \end{array}$$

The yearly rate of decrease of variation in lat.  $58^{\circ} 06'$  is about  $11'$ .

The  $8^{\circ} 03' 34'''$  used above is the mean ratio of increase of the declination on the earth where it is decreasing. This rate gradually increases from the equator to the magnetic poles, where it amounts to  $32^{\circ} 26''$ .

CHRISTIANA, (Norway.)—Lat.  $59^{\circ} 45' = 15^{\circ} 34' 45'' 20'''$ . Declination  $20^{\circ} 03' W.$ , by Prof. Hansteen, 1817.

$$\begin{array}{r} \text{Lat. } 66^{\circ} 32' - 6^{\circ} 28' = 15^{\circ} 39' 42'' 34''' \\ -15 \quad 34 \quad 45 \quad 20 \\ \hline 00 \quad 4 \quad 57 \quad 14 \end{array}$$

$$\begin{array}{r} 15^{\circ} 34' 45'' 20''' \\ +15 \quad 34 \quad 45 \quad 20 \\ \hline 31 \quad 09 \quad 30 \quad 40 \\ -20 \quad 4 \quad 57 \quad 14 \\ \hline 31 \quad 04 \quad 33 \quad 26 \text{ maximum declination.} \\ -20 \quad 03 \quad 00 \quad 00 \text{ declination } 1817. \\ \hline 11 \quad 01 \quad 33 \quad 26 \end{array}$$

$$\begin{array}{r} 20^{\circ} 03' = 37^{\circ} 05' 29'' 17''' \\ 37 \quad 05 \quad 29 \quad 17 \\ 11 \quad 01 \quad 33 \quad 26 \\ +15 \quad 34 \quad 45 \quad 20 - 32^{\circ} 28' \\ \hline 100 \quad 47 \quad 17 \quad 20 \end{array}$$

$92^{\circ} 67' 09'' 55''' W.$  long. mag. po. Sep. 15, 1837.  
 $-2 \quad 41 \quad 09 \quad 20 = 8^{\circ} 03' 34''' \times 20 \text{ years.}$

$$\begin{array}{r} -89 \quad 56 \quad 00 \quad 35 \\ 100 \quad 47 \quad 17 \quad 20 \\ \hline 10 \quad 51 \quad 16 \quad 45 \\ -00 \quad 9 \quad 16 \quad 45 \text{ difference in time of year, equal to} \\ \hline 10 \quad 42 \quad 00 \quad 00 \text{ longitude of Christiana. } [4' 20''. \end{array}$$

The following are examples for finding the longitude of a place where the declination is at its maximum:—

ROME.—Lat.  $41^{\circ} 54' = 10^{\circ} 55' 30'' 08''' = 3^{\circ} 00' 38'' 08'''$ . Declination  $17^{\circ} 12' W.$ , by Cassini, 1788.

$92^{\circ} 37' 09'' 55''' W.$  lon. mag. pole, Sept. 15, 1837.  
 $-26 \quad 29 \quad 14 \quad 00 = 32^{\circ} 26'' \times 49 \text{ years.}$

$66^{\circ} 07' 55'' 55''' W.$  long. mag. pole, Sept. 15, 1788.  
 $-23 \quad 28 \quad 00 \quad 00$  obliquity of ecliptic.

$$\begin{array}{r} 42 \quad 39 \quad 55 \quad 55 \\ -10 \quad 55 \quad 30 \quad 08 - 23^{\circ} 28' \end{array}$$

$$\begin{array}{r} 31 \quad 44 \quad 25 \quad 47 \\ -3 \quad 00 \quad 38 \quad 08 - 6^{\circ} 28' \end{array}$$

$$\begin{array}{r} 28 \quad 43 \quad 47 \quad 39 \\ -17 \quad 12 \quad 00 \quad 00 \text{ declination.} \end{array}$$

$$\begin{array}{r} 11 \quad 31 \quad 47 \quad 39 \\ -00 \quad 41 \quad 20 \quad 27 \text{ difference between the angles of the} \\ \hline \text{mag. meridians of Rome and} \\ \hline \text{[Greenwich.} \end{array}$$

$$\begin{array}{r} 12 \quad 13 \quad 08 \quad 06 \\ -00 \quad 14 \quad 51 \quad 54 \text{ difference in time of year.} \end{array}$$

$$12 \quad 28 \quad 00 \quad 00 E. \text{ long. of Rome.}$$

Cassini made the declination a few minutes too much, as will be seen by the following example:—

Lat.  $41^{\circ} 54' = 10^{\circ} 55' 30'' 08'''$  relative obliquity in  $10^{\circ} 55' 30'' 08'''$  [latitude.

$$\begin{array}{r} 21 \quad 51 \quad 00 \quad 16 \\ -4 \quad 44 \quad 12 \quad 26 \\ \hline 17 \quad 06 \quad 47 \quad 50 \text{ maximum declination} \\ \hline \text{in latitude.} \end{array}$$

$$\begin{array}{r} 66^{\circ} 32' - 6^{\circ} 28' = 15^{\circ} 39' 42'' 34''' \\ -10 \quad 55 \quad 30 \quad 08 \\ \hline 4 \quad 44 \quad 12 \quad 26 \end{array}$$

The exact east longitude of Paris has not been known to this time, notwithstanding the boasted perfection of the instruments for that purpose: the difference between the calculations of different persons being about  $30''$ . There is however little doubt but the following example, calculated from the maximum declination, gives the exact longitude of that city.

PARIS.—Lat.  $48^{\circ} 50' 15'' = 12^{\circ} 43' 50'' 11'''$ . Declination  $22^{\circ} 04'$ , by M. Arago,\* July 1, 1835.

\*First No. Magnet.

\*The declination given by M. Arago is greater than it really was at the time by about 4 min.

66° 32'—6° 18' = 15° 39' 42" 34'''	—12 43 50 11
12° 43' 50" 11'''	2 55 52 23
+12 43 50 11	
25 27 40 22	
— 2 55 52 23	
22 31 47 59 maximum declination = 41° 40' 45''	
[24''' of logitude.	
92 37 09 55 W. long. of magnetic pole, Sept.	
[15, 1837.	
—00 58 06 35 difference in time—rate 32' 26''.	
91 39 03 20 W. long. of mag. pole, July 1, 1835	
—46 56 00 00 double the obliquity of the ecliptic.	
44 43 03 20	
—00 41 41 14 = 13° 25' 31" 25'''—12° 43' 50" 11''' †	
44 01 22 06	
—41 40 45 24	
2 20 36 42 E. log. of Paris (Observatory.)	

The line of no variation did not pass over Paris until nine years after it passed over London, or until 1666, notwithstanding it is east of London, in consequence of the angle of the line of no variation with the terrestrial meridians, as seen in fig. 8. If we add 163 years to 1666, the number will be 1829, the time of the maximum declination at Paris.

OBSERVATORY, GREENWICH.—Lat. 51° 29' 22'' = 13° 25' 20" 25''' Declination 23° 01' 19" 48''' W. by calculation, Sept. 15, 1837. ‡

Lat. 66° 32'—6° 28' = 15° 39' 42" 34'''	—13 25 20 25
13° 25' 20" 25'''	2 13 22 09
+13 25 20 25	
26 50 40 40	
— 2 14 22 09	
24 36 18 31 maximum dec. at Observatory.	
—23 01 19 48 declination.	
1 34 58 43 decrease of the declination since the time of the maximum.	
24° 36' 18" 31''' = 45° 31' 05" 36'''	
+45 31 05 36	
91 02 11 12	
+1 34 58 43	
92 37 09 55	
92° 37' 09" 55''' W. long. mag. pole, Sept. 15, 1837	
—92 37 09 55	
00 00 00 00 long. of Observatory.	
HENRY HALL SHEARWOOD, M. D.	
New York, July, 1842.	

For the Magnet.

#### INTERESTING EXPERIMENTS.

Mr. Editor.—Having made Human Magnetism matter of experiment during three years, not in order to pecuniary interest, but simply to know its nature and effects, it may perhaps be conducive to the cause as well as interesting to your readers, for me, briefly, to state the result of my observations with a plain demonstration of its truth. This result has been a full conviction that *what is called Animal Magnetism is simply animal electricity, and as subject to certain fixed and determinable laws as natural electricity itself.* My own reasons for believing that it is merely the electric fluid, put in action by determinate volition, are many, and founded on a series of facts, careful experiments and inductions.

1st. *Experiment and solution.*—A man of 160 lbs.

†The difference between the angles of the magnetic meridians of the observatories of London and Paris.

‡It is easy to determine the declination at any place, its latitude and longitude being known.

weight is raised on the points of the fore fingers of two men, in a horizontal position; he stiffens his muscles and all three forcibly respire a long breath with the effort of the two willing to lift him. The result is, that he is raised with no more effort than to lift ten pounds a piece—without breathing, four vigorous men cannot lift him, at arms length, with the whole hand placed under him.

The philosophical solution is, that the free electricity in the air inhaled is received into the lungs and causes the blood to circulate, &c., and on being thrown forth forms an electric vacuum over the man—into this he ascends, and were there no electricity in the air respired, and did it cover his whole person, he would require no effort to lift him, as it is the effort in proportion to the imperfection of an electric vacuum. The current sent through the fingers into his person, favors his specific levity. Now here is an effect and there is nothing of magnetism in its causality. Instead of attraction it is appulsion. He is driven by the electric current into the vacuum, and it now being destroyed, he, by the downward, is immediately drawn towards the earth. This is a legitimate conclusion. The experiment may be made at any time, and by any individuals. It is as complete a demonstration, that the agency is the electric fluid, as can possibly be given.

2nd. *Experiment and solution.*—I threw the electric fluid of my own body into a tumbler of water and gave it to a boy of fifteen. In five minutes he became non-volant and specifically light. With his back towards me, as he was walking from me, at the distance of five, ten, and fifteen feet, I threw him fifty times, on two successive evenings, in experimenting, in every possible direction, except upward. He fell as light as the man lifted is felt to be, receiving no contusion, although he made no effort at self-preservation till just as he struck the floor. The Schalers, of Courtland street, were present when it took place, 1838, at Crowfordville, Geo., and can testify to the truth of this statement.

The philosophical solution is this. The fluid received into the system of the boy presented a permanent pleonasm to the current of the electric fluid ever entering the earth, constituting gravity and an almost perfect obstacle to that sent from the brain along the nerves of volition; the consequence was, he became involuntarily and specifically light. He was evidently thrown, by the electric spark proceeding from my hand, in determinate volition. Here was no magnetic effect. It was altogether appulsive. The inevitable conclusion is, that the cause was animal electricity.

3d. *Experiment and solution.*—With an electric subject, alternately, with the same energy and determination of will and extent of manipulation, as many passes upward as downward, and no effect followed, except a slight electric feeling of alternate vibratory agitation. Solution—as it is the same when forming a natural magnet with the load stone, or with the violet rays, or by a galvanic current, if we alternately or rapidly change, as the case may be, that no effect follows, we may, with the highest certainty, ascribe the effect to the same cause. In forming the magnet it is well known to be an electric effect; so in making a clairvoyant. In clairvoyancy the brain becomes an electric vacuum, and the individual feels, that is, sees, as much more clearly than with the eye, as it is a larger and more perfect organ.

4th. *Experiment and solution.*—In Chamber st., at a small select party, who met to amuse themselves in animal electric experiments, I threw the blind girl, experimented on by Mr. Hill, into the moon, venus, the sun, and a grand centre of systems, (not of the mind, for there is no centre, it being infi-

nite!) and found that her electric agitation was in exact proportion to the magnitude of the object—at the moon she was disgusted with the inhabitants—at venus, she fainted—at the sun filled with reverential fear, and in this centre awfully alarmed and overwhelmed. The conclusion was inevitable that it was an electric contact with these objects, the brain being the electric centre. This was further confirmed from the fact, that the time required to pass was the same, the atmosphere of the earth presenting the only obstacle.

5th. *Experiment and solution.*—I commenced operating on a subject standing, and who was highly electric. He refused and turned away. A strong impulse seized me. With a violent determination of will and action of the hands, he was smitten *en masse* to the floor, and ell over on his side. He was raised up instantly, his language was of extreme fear. “Take him away!—let him not touch me!—let him not put it on me again!” He was as pale as death and as weak as infancy. I can give the certification of this by substantial witnesses. Now, here is no magnetic effect, no sympathy, but all is appulsive. What is the solution? Why, that it is an electric materia conveyed. The conclusion is, that what has been called animal magnetism, is animal electricity, a natural causality and not essentially different from electricity itself. This being the case, it is subject to fixed and determinate laws, to be discovered and determined by experiment and fact. This is confirmed from the consideration that what is called *nervo-magnetic* in all the variety of physical and intellectual phenomena seen in experiment, may be thus easily and successfully explained, and from the fact that natural magnetism is now becoming evanescent in the conviction that it is purely an electric effect in its action and re-action. I have thus briefly thrown before you what I deem to be fact, and calculated, on a bare inspection, to do much good by stripping the subject of its mystery\* and that aspect of legerd main and humbuggerly which it must have, so long as the grand principles of action, and especially the *medium and cause of efficiency*, remain unknown. The subject is vast, and volumes might be written upon it. Your periodical requires brevity and a statement of such facts as are calculated to present matter of tangible existence to the truth in the apprehension of universal mind. You will occasionally hear from me.

I am, respectfully,

Your ob't serv't,

Plainfield, N. J., Aug. 1, 1842.

JAS. S. OLCOTT.

\* I have since operated in Plainfield, N. Jersey, by throwing the electric fluid of my own body in a tumbler of water containing a gill—on administering to a youth of fifteen he fell as if struck by lightning. Dr. Craig was present, and examined the patient. Hands cold, muscles relaxed or stiff at my volition. pulse one hundred and twenty per minute. About one hundred were present. This subject will defy all mutual exertion to rouse him from his electric concentration. A pin forced into his flesh, &c., is unfelt. The electricity thrown into his system produces an inward rush through the absorbants, as is evident from the fallen chest, and the muscles of his countenance, coldness of the extremities &c. A key held before a gentleman, behind a lady beautifully clairvoyant, who was, at a few passes thrown into it, extinguished her perception of all but his head, as it was raised to his face the head disappeared. The conclusion was, as other objects were, in her then slightly electric state distinctly seen, that the key contracted the electric materia radiated from his body and prevented electric perception. In sustaining a boy of fifteen, made electric by drinking the electrified water, I was drawn, as he fell, into an electric vacuum, and received a severe shock and a proportionate momentum, which was observed by all present. J. S. O.

The experiments referred to by our correspondent, have often been performed by ordinary magnetisers. Before he assumed that, what he did had nothing to do with magnetism, he should have pointed out the *difference* between magnetism and electricity—Ed.

## THE MAGNET.

NEW YORK, AUGUST, 1842.

### PHRENO-MAGNETISM.

Phrenology and Magnetism are inseparable. They are as much united as the soul and the body. For, what are the developments of the brain, or the physical organs, without *life*?

That animal life is nothing more nor less than Magnetism in an organized form, so to speak, cannot admit of a doubt in the mind of any one at all familiar with the phenomena described in the preceding numbers of this work. The experiments by which we have satisfied ourself of this fact are too numerous to be described here; nor, indeed, would they be sufficient to convince all, if we were to detail the whole of them. They must be *seen*, they must meet all the senses of the sceptic before he would yield to the inferences we draw from them. We have stated enough, however, already, to convince any candid mind, that admitting *we* have not been deceived in what we have seen, we have sufficient reasons for many of the conclusions at which we have arrived. Instance the following:—

A. knows nothing of Human Magnetism; nor is he at all familiar with the laws of Terrestrial Magnetism. On putting him to sleep, and applying a pointed steel instrument to the centre of the organ of causality over the left eye, his head is attracted. We asked him the cause, and he answered, “it pulls me.” On applying the instrument to the same organ over the right eye, he drew his head back, and said it “pushed” him. And the same results followed on applying the steel to the opposite portions of the brain in the back part of the head. We applied it to the end of one of the thumbs, and the hand was immediately stretched out; when applied to the other, the hand was drawn back. So also, when we have applied it to one organ in the brain, the patient said it gave a sensation of “drawing,” and when we touched its opposite organ, it was said to *attract* the head. These tests, repeated on different persons, long ago, brought us to the conclusion, that there is a most remarkable *correspondence* between the natural functions of the different organs, and the *positive* and *negative* magnetic forces. That the functions of the different organs are most curiously balanced in *opposition* to each other, is a matter of fact, of which any Phrenologist may satisfy himself in a very short time. Take for instance, the organs of Combativeness, and Pity or Suavity, or Self Esteem, and Submission, or Reverence; is there no *opposition* in the functions of these organs? And if one of the organs is balanced in this way, others may be, and, our experiments have rendered it quite certain, that the whole are thus balanced in opposition to each other. Indeed, so far as these experiments have proved any thing, they have demonstrated, beyond all doubt, not merely the existence of a large number of organs, of which Phrenologists have never, heretofore, assumed to have any knowledge or suspicion; but they have shown, that nearly, if not every organ in the head has its opposite, whose functions, if we may so speak, are *positive* or *negative*; as for instance, one organ for Retaliating injuries, another for the exercise of For-

giveness; one for Analysis, another for Generalizing; one for Joy, another for Grief; one for Cheerfulness, and another for Sadness, and so of the rest.

And we might well inquire, how a rational, *accountable* mind, could have been constituted in any other way? Suppose one had an organ of Destructiveness, without any antagonist organ of Conservativeness? or suppose a head were to be endowed with large Aversion and no Suavity at all? or large Physical Fear, and no Courage? Suppose a mind with all *Positive* organs, or one with the organs all *Negative*? Is it difficult to imagine what the results would be in that case?

The truth is, (as we think,) our experiments have demonstrated that the mind is made up of a congeries of *opposite* faculties, which balance and influence each other; and our virtue consists in governing these faculties according to the laws of the Great Creator.

If our Phrenological friends should feel disposed to deny the views here given, it would be well for them to attempt two things:—first, tell us what it is, that makes one of the cerebral organs manifest one disposition rather than another; or, rather, how it is that one organ prevents the exercise of another? If they are not in opposition, how can one control, or modify the action of another? And secondly, how is it that the mental manifestations are dependent upon the *state* of the brain, at all? If these organs are not *animated*, and exercised by *Magnetism*, what is the agency by which the WILL operates upon the muscles, and makes known the feelings within? If animal life be not Magnetism, in a modified or organized form, how do you account for the phenomena stated in our first number, where persons were put to sleep by a common magnet? And, how will you account for the phenomenon stated above, where a pointed steel *attracts* and *repels* different portions of the head? True, it may be, that this phenomenon may not appear in every case of *somniphathy*; and for obvious reasons. It may depend on the magnetic susceptibility of the patient. There are, undoubtedly, more or less magnetic qualities in different persons; qualities which are more or less susceptible to the magnetic influence; and other bodies may, and do, unquestionably, possess more or less power for communicating, the magnetic forces. Or, it may be, that one person is more *positive*, and another more *negative*, and the power of one person, or body, over another, may depend on the proportions of these two forces, when brought in contact with each other.

We shall, probably, be asked why the human body is not always as much affected by the approach of a common magnet as it seems to be sometimes, in what we call the Somniphathic state? We answer, it may be for the same, or similar reasons, that every piece of iron poised upon a pivot, does not point to the north and south poles. Or we might answer this question when you have told us why it is that a rod of iron has no polarity when held in one position, and why it instantly acquires that polarity, when turned in another. Why is it that the needle, sometimes, points directly to the north pole, and at other times, varies from it?

There is another fact, which Phrenologists should explain, who deny the reality of Human Magnetism. They should be able to tell how it is that the organs *act upon*

*each other*? How is it that one organ excites another? The excitement of Self Esteem for instance, often brings Combativeness into action; and the excitement of Mirthfulness, not unfrequently suffuses the eyes with tears. This phenomenon is explained by the laws of Magnetism. The organs of Sadness are contiguous to those of Mirthfulness. The poles of Sadness are located in the lachrymal ducts, as well as at the lower corners of the mouth; and when the organs of Sadness are directly or indirectly excited, the effects appear in the lachrymal discharges from their poles.

The sympathetic points connected with Mirthfulness are located at the upper corners of the mouth, and hence when these organs are excited we see the corners of the mouth drawn up, and apart, in the act of laughing. The poles of Self Esteem are located in the middle of the upper lip, with that of firmness. And when these organs are excited you will see what has been appropriately denominated, "a stiff upper lip." But why it is that one with large Firmness and Self Esteem carries a stiffer upper lip than others, Phrenology alone, could never tell.

The poles of modesty are located in the cheek, and when we excite the organs, the cheeks are immediately suffused with blushes. But why a person blushes when modesty is excited, no one could ever tell till the experiments above referred to, enabled us to explain the cause.

We must take more time for doing justice to this subject; the above are merely a few desultory remarks, to give our readers some idea of what we may hereafter have to offer upon it.

#### LIFE, HEALTH, DISEASE, AND DEATH.

We are much gratified to find that the article on the magnetic treatment of disease, in our last, has given so general satisfaction, and that it has contributed not a little towards directing the attention of the friends of Human Magnetism, to the only legitimate use of this wonderful agency. We have too long been taunted with the *cui bono?* of this subject, and have had to content ourselves with referring more to the good it is said to have done in other countries, than to what we were able to show of its therapeutical benefits among ourselves.

That Magnetism has been the means of some of the most astonishing cures, is a matter of fact, not to be disputed. Here are the persons who have been benefited by it. Nor do we see what is to be gained by attempting to deny this fact. Say, if you will, the cause is *imaginary*. How does it come to pass that one is relieved, by imagination, from a *real* disease? Take the case numbered 6 in the last Magnet. That lady had been unable to stand upon her feet for five months. This was well known to her friends, and to her physician. Her limbs were said by the attending physician to have been paralyzed. That she could not straighten them, is a matter of fact, susceptible of the clearest demonstration.

When we first saw her, we understood her to say, that only the left limb was paralyzed, and, accordingly, we did not operate on the other at all. Of course, nothing was said to the patient as to the nature of the operation, nor of any results to be anticipated from it. Immediately after the first sitting, she straightened the left limb, and declared that the knee joint had become relaxed, so that

she was able to place her foot upon the floor, a thing she had been utterly unable to do for five months before. But she could not stand upon the right foot, till she informed us that the right limb, also, was paralyzed, and it had been operated upon the same as the other. And, after the third operation, she actually walked across the room, and, from that time till the present, she has walked more or less, about every day! Now, we ask, was the relief, in this case, imaginary, *merely*? If so, then was the *disease* imaginary. And, if there has been imaginary paralysis, there has been, and there may be, again, *imaginary fever*, *imaginary consumption*, *imaginary rheumatism*, *imaginary bronchitis*; and in fact, one disease must be seated in the imagination as much as another.

We have ventured, before, to state the opinion to which we have long been inclined, that all diseases arise *from derangement of the Magnetic forces in the human system*. To our own mind, this fact has been demonstrated beyond the shadow of a doubt. And we now venture to announce another conclusion, equally important, to which we have been led by a long course of Magnetic experiments. It is this:

*That every disease, whether local or general, is controlled by portions of the brain, and they are dependent upon the state of the cerebral organs; and, through those organs, they may be excited, controlled, modified, and removed.*

We hinted such an assumption more than a year since; but our investigations have, since, left us no room for a doubt on this subject, though we are not aware that any similar opinion has ever been suggested or entertained by any other person, the world over. We know, indeed, that certain venders of patent nostrums have made great pretensions to having demonstrated that man can have but one disease, and this is said to be in the blood, a most preposterous idea! For, who should not know, that if the disease is always in the blood, the effects must always be extended over the entire system, and penetrate all its parts, wherever the blood circulates?

Of the above facts we have fully satisfied ourselves; nor have we any doubt but that time and investigation will satisfy every other person, that we had truth and facts for our basis when we came to the following conclusions:—

I. That *Animal Life* is nothing more nor less than *Magnetism* in an organized, or modified form. The magnetic forces produce the conception and growth of the human system; and their decay and separation from the body, results in death.

II. That this *life* is generated between the brain and the semilunar plexus, or, perhaps, the solar plexus.

III. That from the brain, vitality is distributed over the system; and different parts of that organ supply it for different portions of the body; so that every vital or physical organ and muscle is *animated* and *controlled* by a separate portion of the brain.

IV. The temperaments are fixed and determined by the predominance of the different magnetic forces. A predominance of the *negative* forces makes one temperament, and the *positive*, another; and the combination of the different forces in the same person, and proportions of the forces in certain parts of the system, make a combination of the different temperaments in the same person.

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V. Derangement of the magnetic forces, in the mental organs, produces monomania, insanity, and madness.

VI. Derangement of the cerebral organs, which control the physical organs, produces disease; and the derangement of the *sympathic points*, or poles in any other parts of the system, produces the same results, and effects the brain, more or less, in all cases.

VII. All diseases may be controlled, more or less, by magnetising the cerebral organs corresponding with the parts affected. Hence, as far as we have ascertained the location of the different cerebral organs, which control the vital organs, we have found magnetism to be a specific for recent diseases of every kind.

VIII. For nervous complaints, and diseases of the brain, such as monomania, insanity, and madness, magnetism is a perfect cure, in recent cases where we can ascertain, with certainty, the different parts which have been affected; and where there is no malformation, or destruction of the organs.

IX. Medicines have no effect in removing disease, except in so far as they produce the right kind of action upon the magnetic forces of the parts diseased.

X. Health, therefore, is that state of the system in which all its organs perform all their natural functions, unrestrained, by a due proportion of the magnetic forces.

We beg the attention of the medical faculty to these opinions. They need not attempt to remind us of the ten thousand *theories* which have, heretofore, been put forth by members of the profession and others, as to the nature of particular diseases, and the best methods for their cure; nor refer us to the vagaries of quacks and empirics which have, in their turn, drawn the multitudes from the claims of science and the dictates of common sense. We know, but too well, how exceedingly difficult it is for one to give up favorite opinions, and those, too, into the belief of which he has been educated by a life of patient study. Those who have been at much labor and expense in the acquisition of their opinions do not love to part with them, without what they may reasonably consider an equivalent. Nor does it alter the case at all, whether the opinions themselves be true or false; for, we shall find, that all are equally tenacious of their favorite theories when all must know, that each of them cannot be true.

Certainly, no candid mind will assume, that it is the better way to shut the eyes against the facts we have adduced, demonstrating, as it seems to us they do, man's magnetic nature, and the efficiency of this agency in the cure of disease. Let us have the facts. Let us follow where truth leads the way, whatever may become of theories, and preconceived opinions.

PUBLIC EXHIBITIONS.—We are much gratified to find that our remarks against the public exhibitions of the magnetic sleep, and its usual phenomena, have met with the general favor and approval of the intelligent friends of magnetism throughout the country. It argues well for the cause of truth, and we venture to assure those who are desirous of seeing this subject elevated to its proper level with the other branches of science, that the signs of the times are numerous, and full of promise.

A correspondent wishes to know if our objections, here, will not apply, with equal force, against practical

illustrations of Chemistry, Phrenology, or any other science, made before public and promiscuous assemblies.

We answer, not at all. In the first place, we all know, that Human Magnetism is, altogether, unlike any other subject which can be named. It has to do with the nervous system, not of the operator and his patient merely, but with the nervous system of every other person present. And, the success of the operator's efforts must depend, more or less, on the state of feeling with which he is surrounded. And, it is an admitted law of Human Magnetism, that no one should ever attempt to operate on another, merely to satisfy an idle, or a wicked curiosity. The motive should always be the relief of the patient; or if it be for the benefit of science, the attempt should be made agreeably to the rules which the subject itself prescribes for its own management.

It would be precisely parallel, if one who wished to make money and gratify the marvellousness of the multitude, should carry with him, for public exhibitions, a person laboring under mental derangement, or a raving maniac. But, though we should all wish to understand the philosophy of insanity, should we think it advisable to encourage public exhibitions of a specimen of insanity? Who would, for one moment, tolerate the thought? And so of numerous other departments of medical science. Is it necessary, in order to inform the public mind, that dissections of the human body should be made before promiscuous assemblies? And who would think of charging physicians with a desire to keep the multitude in ignorance, because they should decline traveling with their patients in order to deliver *clinical* lectures to the multitude?

It does not follow that the public should, or that they will, remain in ignorance on this subject, when we object to the manner in which patients have been exhibited through the country. We affirm, that most of the public exhibitions, which we have ever known, have done more hurt than good. True, they may have convinced some, but they have disgusted many more, and set the minds of intelligent people against this subject, and prevented them from giving it that investigation which it would otherwise have received.

What true and enlightened friend of Magnetism will allow himself to believe, that the great mass of mind, the intelligent portion of the community, will ever be convinced of the value of this science by attending these public exhibitions, got up for the purpose of making money? And who can doubt but that, if the real motive in these exhibitions were to convince the public of the truth of Magnetism, these operators would find abundant means for doing so, without resorting to an exposure of a human being in a state of sleep, or mental derangement for this purpose? Why do they not resort to our hospitals, and to the beds of the sick, for the purpose of giving those demonstrations of their magnetic power, which are so much to benefit the *public*? The sick may be found in every neighborhood, who stand in suffering need of the magnetic influence.

But let us not be misapprehended. We do not disapprove of all exhibitions of the magnetic sleep. There are occasions enough for all benevolent and scientific purposes, when the magnetic phenomena may be seen and tested, without exposing patients in the way they have

been by many public lecturers heretofore. Indeed, it is a subject which every one should investigate for himself, and this all may do without giving countenance to its abuse by public exhibitions, in the way they have, hitherto, been managed.

## M E D I C I N A L .

### CASES.

We had designed to favor our readers with a statement of a large number of cases in our present number; but the want of time prevents us from doing so. We can only give the following, and promise to continue our attention to this part of our work, as circumstances and our other labors will allow.

#### 8 CHOLERA MORBUS.

Mrs. W. was seized most violently with this complaint, July 31, 1842, about 9 o'clock P. M., and it continued, without intermission, till the next day at about twelve, when we were called to see her. She was, then, so much prostrated that she was not able to stand upon her feet, and scarcely to lift her hand to her head. Though she was much set, in her mind, against magnetism, she consented to have the trial made. The relief was *immediate and permanent*. She sunk into a sound magnetic sleep, which continued for six hours. During the sleep we were called away to see another patient; and in our absence she commenced a description of ourself and of various other persons, in different places; and their views and feelings towards us. She described the state of her system, minutely, and has since been perfectly well. What she said was written down by a lady present, and shown to us, on our return. That her descriptions were correct, in many respects, we know; and we should add, that they were made of those concerning whom she could have known nothing, in the waking state.

#### 9 Loss of VOICE.

The following may be considered, we think, quite an extraordinary case.

I hereby certify, that it is now more than two years since, from a severe affection in the throat, I lost my voice entirely, and during this time I have been quite indisposed as to my general health; but I have been wholly unable to speak above a *whisper*, until last Tuesday evening, the 26th inst., when the Rev. La Roy Sunderland, putting his hand on my head, enabled me to speak *aloud*. This he has enabled me to do repeatedly, in the presence of numbers of my friends, to their no small astonishment, as well as my own; and this morning I read in a loud voice the whole of the 40th Psalm. I can only say, it seems to be the Lord's doing, and marvelous in my eyes.

MARY ANN BOOM.  
Albany, N. Y., July 28, 1842.

We the subscribers, do hereby certify that we are well acquainted with Mary Ann Boom. Her age is about 25. She has been unable to speak above a *whisper* for some two years, until she was made to speak aloud in our presence by Mr. Sunderland; and this we have seen him do, both when she was asleep and awake.

NATHAN COLBON, JR.  
MRS. ANN SCOTT.  
E. W. GOODWIN.

The following account of this case is from the editor of the Albany Tocsin of Liberty:—

*Wonderful experiments by Rev. La Roy Sunderland—The voice restored to one who had lost it.*

We were privileged one day last week to witness for the first time some of the wonderful effects of Human Magnetism. Having been invited by the Rev. La Roy Sunderland,

editor of the Magnet, to attend and witness an operation upon a lady who, by disease, had lost the use of audible speech.

The lady stated, and so did her friends, that she had not spoken aloud for about two years, and during that time had been afflicted with a most troublesome and incessant hacking cough and tickling in the bronchial tubes, and a part of the time, had been brought very low, and appeared to be wasting away with disease. Since the effect of magnetism has been made upon her, (which was first made by another gentleman,) she has become much more healthy, and from a sick bed from which she was unable to raise herself, she is now able to be about the house cheerful and smart.

But to the incidents of the present occasion—Mr. Sunderland after a few moments' effort put the patient into a good mesmeric sleep: after which, the following are some of the experiments which were made. Mr. S. by touching one of the patient's fingers with the end of his, raised her hand and passed it back and forth, and up and down precisely as the magnetized steel would act upon a needle. By touching a particular part of the head the hands cramped and the muscles became rigid. A few passes of the operator's hand over the arms would instantly release them. I pinched the operator's hand: the patient instantly twinged one of hers, and began to rub it smartly with the other; this was repeated several times, always with the same results. On being asked by Mr. S. what was the matter, the reply was some one had pinched her hand! I then pinched her hand, but without producing the least apparent sensation. I spoke to her, but without appearing to be heard.

After these and other experiments, Mr. S. entered into conversation with her, and told her to speak aloud as she used to do. She instantly obeyed, in an audible voice!! Mr. S. requested me then to go out of the room into the hall as far as the front door. I did so. He then requested the patient to call my name aloud; she did so in so audible a tone as to be heard distinctly by me. The following conversation then took place between Mr. S. and the patient:

Mr. Sunderland seated himself at the farther side of the room, some distance from the patient, when the following conversation took place between them, she answering his questions in an AUDIBLE VOICE, so that she was heard distinctly all over the room:—

Q. How long is it since you were able to speak above a whisper.

A. About two years, sir.

Q. During this time, have you ever been able to make yourself heard by any one as far from you as I am now?

A. No, sir.

Q. Did you expect ever to be able to speak aloud again?

A. No, sir.

Q. How long is it since you lost the enjoyment of religion?

A. Six years.

Q. How long is it since you despaired of God's mercy, and thought you had committed the unpardonable sin?

A. About one year.

Q. Do you believe that magnetism may be the means of correcting this error of the mind, as well as the body?

A. Yes, sir.

Q. Has it thus benefitted you?

A. Yes, sir. I now love the Savior—I feel perfectly happy. I never in my life felt more perfectly HAPPY.

Q. Do you think you will regain your voice?

A. Yes, sir, if you would continue to magnetize me.

Q. Do you think I have the power of relieving human suffering in this way?

A. Yes sir. You may, thus do good, both to the souls and bodies of men.

Q. What have your physicians told you about your case?

A. Some of them have said I should never be able to speak aloud again.

Q. Do you think I understand your case?

A. Yes, better than any one else.

A letter from Albany, dated August 5, states, that this lady continued to talk, more or less, aloud, and we have no doubt, if the proper means should be used, but that she would be completely relieved.

#### 10 MONOMANIA.

*Despair*, is a physical disease, unquestionably. All we know of the mind, appears from the exercise of its different organs in the brain. Monomania, despair, and insanity, in all its forms, arise from the morbid action of different parts of the brain. We have, times without number, produced insanity and madness, and removed these states in a few seconds of time. We do not say, that

when these diseases have become chronic, they can be cured at once, or at all, in some cases. But we say what numerous physicians in this city and vicinity will vouch for, when we affirm, that we have frequently produced a state of insanity, and restored the patient again in a few minutes; and we have done this without any injury to the persons on whom we have operated. Since our last, we have found some very conclusive reasons for believing, that there are *particular portions* of the brain, which, when excited, always produce insanity and madness. And another, for instance, produces epilepsy; and so of other derangements of the nervous system. This much we can say, that in a number of instances we have found patients who became insane, or mad, or epileptic, in the excitement of particular portions of the brain, and, from the first, we have been able to control these diseases, or indeed, to bring them upon persons in the somniphatic state.

For the truth of the following account we refer to the persons whose names are attached to one of the certificates which will be found above.

A lady in A—, had been quite zealous in religion, a few years ago, and, during that time, she was known frequently to "lose her strength," as it is called, when she would appear to be exceedingly happy, and remain hours in a state of apparent catalepsy. But, sometime since, she sunk into a state of mental *despair*, and supposed herself abandoned of God and doomed to perdition.

On putting her to sleep, (she had been magnetised before) we not only removed her despair, but by exciting some of the organs, she declared herself perfectly happy, and what is remarkable, when we excited a particular organ she instantly lost her strength and her limbs became rigid, precisely as she was formerly affected, under religious excitement. Indeed, she declared the two states to be *precisely the same*.

We believe she has not since been in a state of what we should call *despair*; though she seems to be quite desponding at times.

We have stated the facts in this case as they actually occurred; and leave all disposed to draw whatever inferences they please.

## CORRESPONDENCE.

### FROM PROF. SUNDERLAND.

McKENEREAN COLLEGE,  
Lebanon, Ill., June 27, 1842. }

*Dear Brother.*—The subscribers I send you are my pupils, and very intelligent young men. Notwithstanding all the ridicule upon Mesmerism they had seen in the Christian Advocate, and the Western Advocate, they have had the good sense to examine it for themselves. It was a subject that had never been heard of here, until I announced it to my class, about the time I first wrote you to send me something on the subject. But, at this time, every student in college is a firm believer in it, notwithstanding our worthy President denounces it as a humbug, and many of the preachers, who have heard of its wonders (for, of late, there has sprung up considerable on the subject) pronounce it the worst species of infidelity. I have never attempted any experiments, my object has been simply to keep up with the discoveries of others, and in explaining it to my pupils.

I have only endeavoured to make them acquainted with its pretensions and general principles so far as to enable them to judge, for themselves, whether it is worthy of their attention or not.

For myself, I have no doubt but Human Magnetism will, ere long, be ranked among the exact sciences, and a general knowledge of its laws will be considered indispensable to a liberal education. I have, myself, resolved to make it a part of my course of instruction while I remain in my present profession, for I think it quite as important part of physics as terrestreal or electro-magnetism.

Yours, as ever,  
JAMES W. SUNDERLAND.

FROM CHAS. D. KASSON, ESQ.

Burlington, Vt., April 20, 1242.

*My Dear Sir.*—Being one of the readers of the "New York Evening Post," an article in that paper of the 19th March, entitled "Mesmerism," and a communion on the same subject from you, have attracted my attention.

Though an entire stranger, I trust the interest I feel in the subject of those articles, and their tendencies, if the Phenomena be once established, will be a sufficient apology for this obtrusion upon your notice. And my only purpose in addressing you is to throw out some suggestions, the result of my own reflections, (for I have never witnessed the experiments) with a view to the exposition of the principles and causes operating to produce such astounding Phenomena.

Science has done much, within a few years, in the departments of Magnetism and Electro-Magnetism; and by its rapid discoveries promises much more; and it may well be worth the speculation to enquire whether its discoveries, in this respect, are not approximating to the discovery of the *principle of vegetable and animal life*, so long hidden in the profoundest mystery. But must it not stop here in its claims as a *cause* of the Phreno-Magnetic Phenomena? That somnolency can be produced by *merely* physical causes, I have no doubt. That paralysis of a member may be, also, produced by physical cause alone, does not admit of doubt, provided the cause be applied to and through the medium of the part affected, as by destroying a nerve by *force*; but, beyond this, I apprehend we must cease tracing any of the phenomena of Animal Magnetism to purely physical causes.

I will, now, say nothing of "*Prevision*;"—but there is "*vision without the eye*"—clairvoyance—somnolency and paralysis *without contact*, or aught but mental effort—these are spiritual or mental causes, or effects, as the case may be; and I do not conceive it possible to account for them, on material or physical principles, inasmuch as the first two, at least, are manifestly purely mental or spiritual phenomena: and I view them as the same, though we commonly attach a shade of difference to their respective imports.

The *fact* of either is, simply, a state or condition of the mind; and the mere *perception* or *idea* of something *without*, which we ordinarily behold through the medium of the senses, but which, in this case, we behold without the aid of our "senses;" and if such be the *fact*, though the object be very near, it proves as much as though it were an hundred miles off.

It proves the capacity of our spiritual sense, in and of itself, for a realization of everything it is subject to, through our physical part; that all perceptions are but *mere conditions of the mind and spirit*, and that could it only be disencumbered of this "mortal coil," it would be equally and, doubtless, far more ca-

pable of *all knowledge*; that pleasure and pain are not physical and do not exist, except in the spiritual idea, and are equally capable of infliction without the aid of the body; (hence the paralysis, which is but another name for the severing of the physical and spiritual connexion;) a disarrangement of a part of the physical man is painless if the mind be absent or diverted from the operation; in short, it proves a capacity in the spirit for an individual existence, independent of the body; and hence a capacity for immortality.

Such appear to be the results of an analysis of the phenomena. Where shall the *cause* be found? They are the effect of *spiritual effort*—of the *controlling* operation of *one mind on another*. By an effort of the "*will*" of one, the arm of the other is paralysed—*i. e.* the *mind* of the other is forced to take no cognizance of that part of the body; at other times to be in "*communication*" with some particular person, or sent roaming its freedom through unwonted haunts. Mind, then, must act on mind unaided by the senses; there must be a capacity for *spiritual communion*:—more than this—*mind* or *spirit* is capable of acting on *matter*—there is a *spiritual power*, and it is this that propels the machine called man.

"God is a spirit;" and His *power* (*spiritual power*) infused animation into the world, which He, by the same power created—a phenomenon similar in *kind* and operation with some of those I am considering.

He created man (meaning the *me*, the *conscious self*, the *spiritual man*) in his own "*image*" and "*likeness*," and breathed into him a *life*, or *soul*. You have alluded to "*swoons*" in cases of religious excitement. I see no physical *cause* here, though there be physical *effect*. The *spirit*, in its struggle for communion with its native source, in a measure, departed from the body; mingled in the great mass of mind or spirit—it ceased, in a degree, to animate the body—it communed with its great original. Is not prayer, after this wise, made efficacious; and, by the *necessary law* of spiritual operations, does it not possess a *re-productive power*; and when *answered* is it aught but the necessary operation of this imperative law, established by the great *spiritual power* that fills all space? Is it not thus, that mere *thoughts*, when they attain to the "*higher reason*," become "*absolute*," a part of the *self*—a species of a new *creation*, and, mingling with the mass, have, in and of themselves, an *influence* on mankind, are *infectious*, so to speak? Many, doubtless, as well as myself, have experienced that mental phenomenon, from which some of the ancient philosophers drew an argument in favor of the transmigration of souls. It is this. I have often had a *present scene*, which I *knew* was altogether novel, and I had never witnessed before, at once rise up before me like a thing of *remembrance* and of *former experience*; and though the scene be constantly changing and developing itself, each successive step was but the *repetition of my former experience*. So, too, of localities, which I had never before witnessed. Here is "*Prevision*" and "*vision without the eye*;"—whence came it, and was it any thing but the mind unconsciously *going out*, previously, and observing the locality, in the one case, and, thus, receiving the *latest knowledge*, which is awakened by a corresponding exhibition through the senses, into *consciousness*? Is not all *power*—*i. e.*—the genuine *idea of power*—spiritual? And is not the Phreno-Magnetic phenomena purely *spiritual*? From the connexion between the spiritual and physical man, the mind of the operator may be *aided* in getting the *control* of the patient's mind, by the *strictly magnetic influence* imparted from his body to that of the patient, so as, measurably, to allay that physical excitement, which

would naturally attract the subjects mind to itself or its person ; but, I apprehend, the *control of the mind*, or the *mental condition*, is the real important *fact*, and that the other is only *auxiliary* to the operator in the *exercise of his mental power*.

I am aware of the difficulty of giving you hardly a notion of my meaning in the space allotted by one sheet, and that in passing over a large field, so rapidly, many steps in the reasoning are necessarily left to be filled by your own reflections. The subject, I consider, is of great importance as it respects its philosophical tendencies, and, in my view, the phenomena afford strong proof of the truth, if need be, of revelation. But if it be limited in its causes to a mere *electric* or *magnetic* influence, while these are considered, by many, as *matter*, is there not danger of falling into the schools of materialism, or sensualism, the foster-mothers of infidelity ?

What I have written I rather intend as mere *suggestions* than *convictions* of my own mind, and as the outline of a *theory* in the absence of *experimental knowledge*, for I am not ready to adopt it fully until I shall have had more time to investigate it than the arduous duties of a laborious profession (the law) will at present allow me. I trust, therefore, you will deem what I have written as intended for *your own private use*, as my object is nothing more than to suggest to your own consideration, a train of thought (in which, very likely, I am already anticipated by you) which may lead to the development of truth, and for truth's sake.

I am sir, with the highest respect,  
Your obedient servant,

CHAS. D. KASSON.

### LITERARY NOTICES.

FACTS IN MESMERISM; and Thoughts on its Causes and Uses. By Charles Caldwell, M. D. Louisville, Ky. Prentice & Messinger, 1842, 8vo. pp. 132.

Probably no man in the South or West enjoys a higher reputation as a physician, than Dr. Caldwell. And, when we consider his age, and the relation he has so long held to the medical profession at the West, it would seem somewhat remarkable that one of his years should have embraced, so ardently, as he seems to have done, the views set forth in this work. Indeed, we have not seen a more enthusiastic believer, scarcely, than the doctor; and we cannot doubt, but his frank avowal of the convictions which have been forced upon his own mind, in favor of Human Magnetism, will do much toward commending this subject to the attention of the profession, generally.

LOUIS CORNARO: The Discourses and Letters of Louis Cornaro, on a Sober and Temperate Life; with a Biography of the Author, by Piero Maroncelli, and Notes and an Appendix by John Burdell. New York: Collins, Keese & Co., 254 Pearl-street. 1842. 18mo., pp. 228.

Although the discourses of this far-famed apostle of temperance have been read with great interest in different languages, for more than two hundred and fifty years, yet we believe this is the first edition that has ever appeared in English, which could be said to be free from important errors. The former editions printed in this country were mere republications of an English translation which appeared in 1768, and which contained only four of his "Discourses," and its account of the author was deficient in every thing but errors.

In order to have the present edition correct, and to make it as acceptable as possible, the editor procured a biography of Cornaro, from the pen of an Italian gentleman of high literary merit, who was every way qualified for this work.

The publication of these Discourses is an acceptable service at the present time to the cause of Temperance and Science. Here we have a most interesting account of one who brought himself well nigh to the grave by the indulgence of his appetite; but who, on seeing the danger to which he was exposed, at once set himself upon a course of temperance, even after he had crossed the meridian of life. For thirty years, it is said, Cornaro lived on only fourteen ounces of food per day, and his last Essay was actually written at the advanced age of ninety-six!

### ELECTRICITY.

#### ELECTRICITY.

In the articles we have written on the subject of human magnetism, we have observed that Electricity, Galvanism, add Magnetism, are the same substance, (if substance they may be called,) in different, or modified forms. Of this we have had many clear and convincing demonstrations. Hence, whatever tends to explain the laws of one will shed light upon the others; and as our work is designed for those who are not supposed to have access to the larger scientific works, we give the following familiar account of some of the common electrical phenomena, with which all should be familiar. It is from Wesley's Philosophy, and was written some fifty years since. It is worthy of notice, that he so long ago stated it as highly probable, that Electricity was the "general instrument of *all motion in the universe*;" an assumption which will, doubtless, soon be admitted and believed by the students of nature every where.

From a thousand experiments it appears, that there is a fluid far more subtle than air, which is every where diffused through all space, which surrounds the earth, and pervades every part of it; and such is the extreme fineness, velocity, and expansiveness of this active principle, that all other matter seems to be only the body, and this the soul of the universe. This we might term *elementary fire*; but that it is hard for us to separate the ideas of fire and burning, although the latter is in reality but a preternatural and violent effect of the former. It is *highly probable that this is the general instrument of all the motion in the universe*; from this pure fire (which is properly so called) the vulgar culinary fire is kindled; for in truth there is but one kind of fire in nature, which exists in all places and in all bodies; and this is subtle and active enough, not only to be under the great cause, the secondary cause of motion, but to produce and sustain life throughout all nature as well in animals as in vegetables. To this effect the learned bishop of Cloyne observes: 'The vital flame is supposed to be the cause of all the motions in the body of man, whether natural or voluntary; and has not fire the same force to animate throughout, and actuate the whole system of the world? Cherishing, heating, fermenting, dissolving, shining, and operating in various manners, as various subjects offer to employ, or to determine its force. It is present in all parts of the earth and firmament, though latent and unobserved till some accident produces it into action, and renders it visible in its effects.'

This great machine of the world, requires some such constant, active, and powerful principle constituted by its Creator, to keep the heavenly bodies in their several courses, and at the same time give support, life, and increase, to the various inhabitants of the earth. Now as the heart of every animal is the engine which circulates the blood through the whole body, so the sun, as the heart of the world, circulates this fire through the whole universe; and this element is not capable of any essential alteration, in-

crease, or diminution. It is a species of itself, and is of a nature totally distinct from that of all other bodies: that this is absolutely necessary both to fixed common fire, and to sustain the life of animals, it seems may be learned from an easy experiment. Place a cat, together with a lighted candle, in a cold oven, then shut the door close, having fixed a glass in the middle of it; and if you look through this you may observe at one and the same instant, the candle goes out, and the animal dies: a plain proof that the same fire is needful to sustain both culinary fire and animal life, and a large quantity of it. Some doubtless pervades the oven-door; but not enough to sustain either flame or life. Indeed, every animal is a kind of fire-engine. As soon as the lungs inspire the air, the fire mingled with it is instantly dispersed through the pulmonary vessels into the blood: thence it is diffused through every part of the body, even the most minute arteries, veins, and nerves. In the meantime, the lungs inspire more air and fire, and so provide a constant supply. The air seems to be universally impregnated with this fire, but so diluted, as not to hurt the animal in respiration. So a small quantity of liquor dropped in water, may be friendly to human nature, though a few drops of the same liquor, given by themselves, would have occasioned certain death: and yet you cannot conceive one particle of the water, without a particle of the medicine. It is not impossible, this may be one great use of air, by adhering so closely to the elementary fire, to temper and render salutary to the body what would otherwise be fatal to it. To put it beyond dispute, that this fire is largely mixed with the air, you may make the following experiment: Take a round lump of iron, and heat it to a degree called welding heat; take it out of the fire, and with a pair of bellows blow cold air upon it. The iron will then as effectually melt, as if it were in the hottest fire. Now when taken out of the forge, it had not fire enough in it to conquer the cohesion of its parts: but when this fire is joined with that which was mixed with the air, it is sufficient to do it. On the same principle we account for the increase of a coal or wood fire by blowing it. And let none wonder that fire should be so connected with air, as hardly to be separated. As subtle as fire is, we may even by art attach it to other bodies; yea, and keep it prisoner for many years, and that either in a solid or a fluid form.—An instance of the first we have in steel; which is made such, only by impacting a large quantity of fire into bars of iron. In like manner we impact a great quantity of fire into stone, to make lime. An instance of the second kind we have in spirits, wherein fire is imprisoned in a fluid form. Hence common spirits will burn all away. And if you throw into the air spirits rectified to the highest degree, not one drop will come down again, but the universal fire will take hold of and absorb it all. That this fire subsists both in air, earth, and water; that is diffused through all and every part of the universe, was suspected by many of the ancient naturalists, and believed by the great Sir Isaac Newton. But of late years it has been fully demonstrated; particularly by Mr. Stephen Gray, a pensioner at the Charter-house, who some years since presented to the Royal Society an account of many experiments he had made, whereby this subtle fluid became clearly perceptible both to the sight and feeling.—Because the glass tube, by means of which those experiments were made, was observed, when rubbed, to attract straw and other light bodies, (a known property of amber, called in Latin *electrum*;) these experiments were termed electrical; a word which was soon affixed to that subtle fluid itself, and every thing pertaining to it; but improperly enough, seeing

the attracting (or seeming to attract) straws and feathers, is one of the most inconsiderable of all the effects wrought by this powerful and universal cause. It was afterward found, that a glass globe was on some accounts preferable to a glass tube; particularly as it was less labour to turn the one for some hours together, by means of a small wheel, in the meantime rubbing it with a dry hand, or a little cushion, than to rub the tube for a long time. It was likewise observed, that a greater quantity of ethereal fire might be collected by this means than the other. I say collected; so that fire is no more created by rubbing, than water is by pumping. The grand reservoir thereof is the earth, from which it is diffused through all the other parts of common matter. Accordingly, in these experiments, the globe rubbing against the cushion, collects fire from it; the cushion receives it from the frame of the machine from the floor, but if you cut off the communication with the floor, no fire can be produced, because none can be collected. In the year 1746, M. de Muschenbroek, professor of natural philosophy at Leyden, was led by casual experiment into many new discoveries. These were chiefly made by means of a large but thin glass vial; the best way to prepare which, is to coat it with thin lead; to line it on the inside with gold-lead, to within two inches of the top, and to fasten some tinsel fringe to the bottom, or to the end of the wire within the vial, so as to touch the gold lining. By this wire going through the cork, the vial is hung on any metallic body, which communicates by a wire with the globe or tube. This metallic body has been termed, the prime conductor, as it conducts or conveys the fire collected by the tube or globe, either into the vial, or into any other body communicating therewith. But all bodies are not capable of receiving it. There is, in this respect, an amazing difference between them.—The excrements of nature, as wax, silk, air, will not receive the ethereal fire, neither convey it into other bodies; so that whenever in circulating, it comes to any of these, it is at a full stop. Air itself is a body of this kind, with great difficulty either receiving or conveying this fire to other bodies; so are pitch and rosin, excrements, as it were, of trees. To these we may add glass, amber, brimstone, dry earth, and a few other bodies. Those have frequently been styled, *electric per se*, as if they alone contained the electric fire; an eminently improbable title, founded on a palpable mistake. From the same mistake, all other bodies which easily receive and readily convey it, were termed non-electrics, on a supposition, that they contained no electric fire, the contrary of which is now allowed by all. That this fire is inconceivably subtle, appears from its penetrating even the densest metals, and that with such ease, as to receive no perceptible resistance. If any one doubt whether it pass through the substance, or only along the surface of bodies, a strong shock taken through his own body, will prevent his doubting any longer. It differs from all other matter in this, that the particles of it repel, not attract each other; and hence is the manifest divergency in a stream of electrical effluvia. But though the particles of it repel each other, yet are they attracted by all other matter. And from these three, the extreme subtilty of this fire, the mutual repulsion of its parts, and the strong attraction of them by other matter, arises this effect, that if a quantity of electric fire be applied to a mass of common matter of any bigness or length, which has not already got its quantity, it is immediately diffused through the whole. It seems, this globe of earth and water, with its plants, animals, and buildings, have diffused through their whole substance, just as much of this fire as they will contain; and

this we may term their natural quantity. But this is not the same in all kinds of matter; neither in the same kind of matter in all circumstances. A solid foot of one kind of matter, as glass, contains more of it than a solid foot of another kind; and a pound weight of the same kind of matter, when rarefied, contains more than it did before.

We know that this fire is in common matter, because we can pump it out by the globe or tube; we know that common matter has near as much of it as it can contain; because if we add a little more to any portion of it, the additional quantity does not enter, but forms a kind of atmosphere round it. On the other hand, we know that common matter has not more of it than it can contain; otherwise all loose portions of it would repel each other; as they constantly do, when they have such atmospheres. Had the earth, for instance, as much electric fire, in proportion, as we can give to a globe of iron or wood, the particles of dust, and other light matter, would not only repel each other, but be continually repelled from the earth: hence the air being constantly loaded therewith, would be unfit for respiration. Here we see another occasion to adore that wisdom, which has made all things by weight and measure. The form of every electric atmosphere is that of the body which it surrounds; because it is attracted by every part of the surface, though it cannot enter the substance already replete. Without this attraction, it would not remain round the body, but dissipate into the air. The atmosphere of an electrified sphere is not more easily drawn off from any one part of it than from the other, because it is equally attracted by every part: but it is not so with bodies of other figures. From a cube it is more easily drawn off at the corners than the sides; and so from the corners of any bodies of any other form, and most easily from the sharpest corners: for the force with which an electrified body retains its atmosphere, is proportioned to the surface on which that atmosphere rests. So a surface four inches square retains its atmosphere with sixteen times the force than one of an inch square does. As in pulling the hair from a horse's tail, a force insufficient to pull off a handful at once, could easily pull it off hair by hair: so though a blunt body cannot draw off all the atmosphere at once, a pointed one can easily draw it off, particle by particle. If you would have a sensible proof, how wonderfully pointed bodies draw off the electric fire, place an iron sheet of four inches diameter, on the mouth of a dry bottle; suspend over it a small cork ball by a silken thread, just so as to rest against the side of the shot; electrify the shot, and the ball will be repelled four or five inches from it; then present to the shot, six or eight inches off, the point of a sharp bodkin; the fire is instantly drawn off, so the repulsion ceases, and the ball flies to the shot. But a blunt body will not produce this effect, till it is brought within an inch of the shot. If you present the point of the bodkin in the dark, you may see sometimes at a foot distance, a light gather upon it like a glow-worm, which is manifestly the fire it extracts from the shot. The less sharp the point is, the nearer it must be brought before you can see the light; and at whatever distance you see the light, you may draw off the electric fire.

To be convinced that pointed bodies throw off, as well as draw off the fire, you may lay a long sharp needle on the shot: it cannot then be electrified, so as to repel the ball, because the fire thrown upon it continually runs off at the point of the needle; from which in the dark you may see such a stream of light, as in the preceding instance. While the electric fire, which is in all bodies, is left to itself, undisturbed by any external violence, it is more or less

dense, according to the nature of the body which it is in. In dense bodies it is more rare; in rare bodies it is more dense: accordingly every body contains such a quantity of it, rare or dense, as is suitable to its nature. And there is some resistance to every endeavour of altering its density, in the whole of any body, or in any part of it; for all bodies resist either the increase or diminution of their natural quantity; and on the other hand, when it has been either increased or diminished, there is a resistance to its return to its natural state. With regard to the different resistance made by different bodies, in either of these cases, it is an invariable rule, that glass, wax, rosin, brimstone, silk, hair, and such bodies, resist the most; and next to these, the air, provided it be dry, and in a sufficient quantity; that this resistance is least in metals, minerals, water, quicksilver, animals, and vegetables, which we may rank together, because the difference in their resistance is very inconsiderable; and that in these bodies the resistance is greater, when their surfaces polished, and extended in length, than when their surfaces are rough and short, or end in sharp points. When a body has more electric fire forced into it than it has naturally, it is said to be electrified positively. When part of the natural quantity is taken away, it is said to be electrified negatively. Now when an iron bar is negatively electrified, the fire drawn out does not go in again as soon as the experiment is over, but forms an atmosphere round it, because of the resistance it finds in its endeavour to dilate itself, either into the air or into the bar: and when it is electrified positively, the same kind of atmosphere is formed, by the fire accumulated upon it. Whether, therefore, bodies are electrified negatively or positively, and remain so when the experiment is over, there are similar atmospheres surrounding them, which will produce similar effects. But we can electrify no body beyond a certain degree; because when any one is electrified to that point, it has no atmosphere round it sufficiently strong to balance any power that endeavours to electrify it farther; nor is the electric fire, either from the tube or globe, able to force its way through this. And in the ordinary course of nature, this subtle, active fluid, which not only surrounds every gross body, but every component particle of each, where it is not in absolute contact with its neighbouring particle, can never be idle, but is ever in action, though that action be imperceptible to our senses; it is ever varying its condition, though imperceptibly, in all parts of all bodies whatever, and electrifying them more or less, though not so forcibly as to give sensible signs of it. All bodies then, and all their component particles, when in their natural situation, have round their surfaces, where they are not in absolute contact with other surfaces, an imperceptible atmosphere, sufficient to balance the smaller force with which they are attacked, every way similar to the perceptible atmosphere of bodies forcibly electrified. In these imperceptible atmospheres is placed the power which resists their being electrified to a higher degree than they are naturally: and this power lies in the elasticity of the subtle fluid, every where dispersed both round all bodies and in them. Glass is very difficultly electrified, which proves it to have a very dense electric atmosphere. Metals are easily electrified; consequently they are rare, and therefore weakly resisting atmospheres. But as heat rarefies all bodies, so if glass be heated to a certain degree, even below melting, it will give as free a passage to the electric fire as brass or iron does, the atmosphere round it being then rendered as rare as that of metals; nay, when melted, it makes no more resistance than water: but its resistance increases as

it cools; and when it is quite cold, it resists as forcibly as ever. Smoothly-polished wax resists as much as glass: but even the smaller heat raised by rubbing, will render its atmosphere as rare as that of metals, and so entirely destroys its resistance. The same is true of rosin and brimstone. Even the heat arising from friction, destroys the resistance which they naturally make to being electrified; a strong proof, that the resistance of all bodies thereto is exerted at their surfaces, and caused by an electric atmosphere of different densities, according to different circumstances. Most experiments will succeed as well with a globe of brimstone, as with one of glass; yet there is a considerable difference in their nature. What glass repels, brimstone as also rosin attracts. Rubbed glass emits the electric fire; rubbed brimstone, rosin and wax, receive it.—Hence if a glass globe be turned at one end of a prime conductor, and a brimstone one at the other, not a spark of fire can be obtained; one receiving it in, as fast as it is given out by the other. Hence also, if a vial be suspended on the prime conductor, with a chain from its coating to the table, and only one globe turned, it will be electrified (or *charged*, as they term it) by twenty turns of the wheel: after which it may be discharged, that is, unelectrified, by twenty turns of the other wheel. The difference between *non-electrics*, vulgarly speaking, and *electrics per se*, is chiefly this: a *non-electric* easily suffers a change, in the quantity of fire it contains. Its whole quantity may be lessened by drawing out a part, which it will afterward resume: but you can only lessen the quantity contained in one of the surfaces of an *electric*; and not that, but by adding at the same time an equal quantity to the other surface: so that the whole glass will always have the same quantity in its two surfaces; and even this can only be done in glass that is thin; beyond a certain thickness, we know no power that can make this change. The ethereal fire freely moves from place, in and through the substance of a *non-electric*; but through the substance of an *electric* it will by no means pass. It freely enters an iron rod, and freely moves from one, and to another, where the overplus is discharged; but it will not enter or move through a glass rod; neither will the thinnest glass which can be made, suffer any particle of it entering one of its surfaces to pass through the other. Indeed, it is only metals and liquids that perfectly *conduct*, or transmit this fire. Other bodies seem to conduct it, only so far as they contain a mixture of these; accordingly, moist air will conduct it, in proportion to its moistness; but dry air will not conduct it at all; on the contrary, it is the main instrument in confining any electric atmosphere to the body which it surrounds. Dry air prevents its dissipating (which it presently does when *in vacuo*) or passing from body to body. A clear bottle, full of air instead of water, cannot be electrified; but exhausted of air, it is electrified as effectually as if it was full of water: yet an electrical atmosphere and air do not exclude one another; for we breathe in it freely, and dry air will blow through it, without altering it at all. When a glass vial is electrified, whatever quantity of fire is accumulated on the inner surface, an equal quantity is taken from the outer. Suppose, before the operation begins, the quantity of fire contained in each surface is equal to twenty grains; suppose at every turn of the globe one grain thrown in; then after the first stroke there are twenty-one within, nineteen only without, after the second, the inner surface will have twenty-two, the outer but eighteen: and so on, till after twenty strokes, the inner will have forty, the outer none: and the operation ends; for no power or art of man can throw more on the inner surface, when no

more can be taken from the outer. If you attempt to throw more, it is thrown back through the wire, or flies out in cracks through the vial. The equilibrium cannot be restored in this vial, but by a communication formed between the inner and outer surface. If you touch these by turns, it is restored by degrees; if both at once, it is restored instantly; but then there is a shock occasioned by the sudden passing of the fire through the body, in its way from the inner to the outer surface; for it moves from the wire to the finger, (not from the finger to the wire, as is commonly supposed,) thence it passes through the body to the other hand, and so to the other surface. The force with which this check may be given, is far greater than one would imagine: it will kill rats, hens, or even turkeys, in a moment; others, that are not killed, it strikes blind. It will invert the polarity of a compass, and make the north point turn to the south: at the same time the ends of needles are finely blued like the spring of a watch. It will melt off the heads and points of pins and needles; and sometimes the whole surface of the needle is run, and appears as it were blistered, when examined by a magnifying glass. It will melt thin gold or silver, when held tight between two panes of glass, together with the surface of the glass itself, and incorporate them in a fine enamel. Yea, a strong spark from an electric vial makes a fair hole through a quire of paper doubled; which is thought good armour against the push of a sword, or even a pistol-bullet. And it is amazing to observe, in how small a portion of glass a great electrical force may be. A thin glass bubble, about an inch diameter, being half filled with water, partly gilt on the outside, when electrified gives as strong a shock as a man can well bear: allowing then, that it contains no more fire after charging than before, how much fire must there be in this small glass! It seems to be a part of its very substance. Perhaps, if that fire could be separated from it, it would be no longer glass. It, in losing this, loses its most essential properties, its transparency, brittleness, and elasticity.

#### THE NERVOUS INFLUENCE.

In our first number we alluded to an interesting work, published in Paris, some years ago, intitled:—

“Inquiry into the Motive and Effects of the Nervous Influence; and its connexion with the Vital Moral, and Intellectual Operations.”

It perports to have been written by a lady, the name is not given. In its approaches to truth, on the subject of Human Magnetism, it bears a striking resemblance to a pamphlet published by Dr. Rush, some years ago, the title of which we have forgotten, but which went far towards the discovery of what is now known to be true, by all who are familiar with the assumptions of Dr. Gall.

As there are many valuable remarks on the functions of the nervous system, we conclude our readers will be gratified in seeing a few extracts from it, in the Magnet.

#### INTEREST AND IMPORTANCE OF THE SUBJECT.

The functions of the brain and nerves form the most interesting part of the animal economy—as obscure and wonderful as they are important, the mystery in which they are enveloped stimulates our curiosity; and the power of their influence over our nature both moral and physical, gives a value to every fact, connected with their operations. The movements of the animal frame; the execution of the functions indispensable to life; the capability of thinking, of acting, and of feeling are all dependent upon the activity of the unknown principle that holds its mysterious empire in the brain and nerves. Here, it should

seem, lies the internal spring which sets the whole animal machine in motion: the effects of its derangement are general, and the suspension of its action arrests not only the bodily but the mental functions. It is in the nervous system that we must seek the point of contact between the soul and the body, and it is probably to this source that the morbid affections of both must ultimately be traced. That it is always affected, either primarily or secondarily, when any of our functions are deranged, is very apparent; therefore, whatever can throw any new light upon this important class of operations, is likely to be of service in diminishing the moral and physical evils to which we are liable. I do not of course imagine that I can cast even a feeble ray across this mass of obscurity; but as the subject, in whatever manner it may be treated, can never be wholly devoid of interest, I shall present the observations which I have noted down, during some years' attentive examination of my own internal phenomena, together with the various hypotheses which they have suggested. I shall begin by offering some conjectures upon the nature of the agent that is the immediate cause of motion and sensation, and I shall afterwards endeavor to trace the extent of its influence on the feelings and powers of the mind. The latter part of the subject will be independent of the former, therefore the prejudice that exists against the one need not operate against the other. I am aware of the ridicule that is attached to every voyage of discovery into the metaphysical world, particularly in search of a nervous agent, but the progress of knowledge has so long been favorable to my views, that I will at last venture to anticipate, by argument, what I hope may hereafter be effected by experiment.

#### GENERAL DISTRIBUTION AND FUNCTION OF THE NERVES.

The various functions of the nervous system, which show themselves more numerous and important, as they are more closely investigated, will appear more distinctly from a general view of the distribution of the nerves, wherein I have adopted the arrangement of an eminent *French* anatomist, because it is the most clear and systematic, and therefore the best suited to my purpose.

#### DIVISION OF THE NERVOUS SYSTEM.

The nervous system may, generally speaking, be divided into two parts: the one placed in a certain degree under the control of the mind, is its immediate agent, while it has at the same time some share in the performance of the vital functions. The other is appropriated exclusively to the purposes of life. The first, Bichat calls the nervous system of the *animal life*—it has the brain and spinal marrow for its centre, and its nerves pursue a direct course of the organs of sense, of locomotion, and of the voice. The other, which he calls the nervous system of the *organic life*, is distributed to the organs of digestion, circulation, secretion, respiration etc. Its nerves are irregular in their course, and do not, like those of the former, correspond in two halves of the body. They have their centres in the *ganglia*, which are small bodies, perhaps convolutions of nerves, whose office is unknown. The *organic* is derived from the *animal* system, and perhaps the *ganglia*, placed along the spine and forming with their communicating nervous branches, the great sympathetic nerve, mark the respective boundary of each.

The nerves of the *organic life* are not under the influence of the will, neither do they transmit sensation, except when the sensibility of a part is highly

exalted by irritation, and then we become sensible of their action.\* One part of the *animal* nervous system is bestowed upon the internal organs, for what reason is unknown, as they are not under the influence of the will: this has suggested to me an hypothesis which will be explained in the chapter on the mental operations. The natural stimulus of the nerves and muscles of the *animal life*, is the will; the natural stimulus of the nerves and muscles of the *organic life* consists of the fluids adapted to each organ, as the blood in the heart, the aliment in the stomach, etc.; but they are susceptible of excitation from other causes in both systems.

#### FUNCTIONS OF THE ANIMAL NERVOUS SYSTEM.

The office of the nervous system of the *animal life* is to minister to the mind, and to carry on certain of the functions indispensable to the continuance of life.

#### VOLITION AND SENSATION:

The connection of this part of the nervous system with the mind brings us to the very verge of the material world, and exhibits the most mysterious, as well as the most wonderful operations of our nature. Between the determination of the *will* and its visible effects on the *voluntary muscles*, an intermediate action takes place, and the operation of an intermediate agent is required. Between the percussion received by the *organs of sense* from external matter and the effects produced thereby on the mind, an intermediate action is also required. It appears that, in both cases, this immediate operation takes place in the brain and nerves, for, if the nerves of a voluntary muscle or of an organ of sense, be compressed or divided, the communication between the mind and the organ instantly ceases, and if the functions of the brain are interrupted, the communication between the mind and *all* these organs is immediately suspended; and it can no longer excite motion, nor become sensible of the action of external matter. We may therefore conclude that we *receive* and *produce* impressions, in short, that we hold communication with the external world, by means of some action that takes place in the nervous system.

#### INFLUENCE OF THE ANIMAL NERVES ON THE VITAL OPERATION.

The action of the brain, and of the animal nerves has also a large share of influence on the vital functions: the latter contributes both to the production of animal heat and of chemical changes, and the death of the brain causes a cessation of the phenomena of respiration, and also a total annihilation of animal heat, which can no longer be evolved, even if the action of the heart and lungs be artificially prolonged.

#### FUNCTIONS OF THE ORGANIC NERVES.

The functions of the nerves of the *organic life* are very mysterious, and their action differs in many respects from that of the animal nerves.

But the analogy that exists in their mode of operation is made evident from the painful sensations caused by internal irritation, being similar in their nature to those conveyed by the nerves of the *animal life*.

#### ON THE NATURE OF THE NERVOUS INFLUENCE.

Having given this brief sketch of the distribution of the nerves in general, I will proceed to explain my notions respecting the nature of the nervous influence. It appears that the action which takes

\*The muscular system can, like the nervous, be divided into the animal and organic.

place in the nervous system is indispensable to the performance of the mental operations on the one hand, and of the vital operations on the other. Upon considering the subject, I can find no reason for supposing that a material agent is incapable of producing the phenomena attributable to nervous causes, and I am inclined to think that the advances made in chemistry, anatomy and physiology will, in time, enable us to explain the Arcanum without having recourse to a mysterious and unknown principle. The late discoveries in Chemistry have confirmed me in an opinion which I had previously entertained respecting the nature of this agent, and have enabled me to develop the following hypothesis, in which it will be seen that I have ascribed the effects which it exhibits to a material cause.

The nerves are, in my opinion, the vehicles of the nervous power, and not the active agents in the nervous operations. It is acknowledged that the texture, the situation and the inelastic nature of the nerves does not afford any reasonable ground for attributing their effects to vibration or oscillation, and we can hardly ascribe such powers as they exhibit, to the soft and pulpy substance which composes their medulla. The substance of the brain is the same: in fact it is a continuation of the spinal marrow; yet if the brain be irritated directly it causes no pain, because the irritation has not been first transmitted through the nerves—which confirms me in the opinion that the power of producing sensation does not reside in the nervous substance. It is known that sensation is caused by some action continued along the course of a nerve, and transmitted through the brain to the mind, the co-operation of the brain being made evident by this circumstance, that if a nerve is divided, the part beyond the division has no sensibility, while the part next the brain still conveys the impression to the mind. The nature of this nervous action, and the existence of an agent foreign to the substance of the nerves, form the subject of this chapter. The nerves do not appear adapted to the reception or to the flux and reflux of fluids, as they are not hollow tubes: there is one fluid however, which requires no tube to contain it, which is subtle, powerful, and penetrating, and which produces effects on the dead muscle (as long as it retains its warmth) analogous to those which the nervous influence produces on the living muscle.

This is the electric fluid, and though the notion that the nervous power is of an electric nature, has often been ridiculed, the progress of chemical knowledge seems to have increased, instead of having diminished, the probability of such an hypothesis, and a further insight into the mechanism and operations of the animal frame may shew us, that the powers which electricity is found to possess, can operate within the living body as well as upon dead matter; and that it is by the most active, penetrating and powerful of all material agents, that the most wonderful and complicated work in the Creation is set in motion, while the direct action of the immaterial part is upon a substance so potent, subtle, and ethereal, that we may consider it, as it were, on the very confines of matter. We now find that electricity is not only capable of causing contraction in the muscles, but that it is indispensable to the production of heat and chemical changes; now all these operations necessarily take place in the animal body, and instantly cease in any organ in which the nervous action is interrupted. Heat cannot be produced without the aid of electricity, and the preservation of the vital principle depends upon the retention of some portion of heat in the animal body—its production is the last function that ceases, and if it be once totally extinct no means can restore suspended animation.

#### SOURCE OF THE NERVOUS INFLUENCE.

The recent discoveries in chemistry to which I have alluded above, have even shown us (in my apprehension) the very source whence we derive a constant supply of the nervous fluid. If it is a fluid, subject to exhaustion and renovation, it must necessarily be supplied from some source, which, to answer the desired purpose, must be constant, regular and inexhaustible. The discovery that electricity is naturally combined with vital air does, I think, give the clue to this arcanum: the conjecture that the subtle agent which carries on the animal and organic functions is contained in the pure, light, and elastic substance which we continually inspire, is not a mere supposition, but a conclusion which I have drawn from the phenomena exhibited in the act of respiration, from the effects resulting from the presence or absence of vital air in the blood, and from some other considerations which I shall mention.

#### VITAL AIR.

The importance of vital air is sufficiently ascertained by common experience, and its name implies that it is indispensable to the continuance of life. That internal mysterious property which we call the vital principle, does not of itself appear capable of carrying on the vital operations, for when the material agents are removed, where is its power? The action of a constant stimulus, supplied by external matter, is evidently required for this purpose. When deprived of it, the animal machine ceases to exercise its functions and the vital principle becomes extinct. This stimulus is contained in the air we breathe: if respiration be arrested beyond a certain time, even in the body, the most perfectly organized, in the prime of life, and in all the glow of health, loss of sense and motion ensues and death inevitably follows.

#### EFFECTS OF VITAL AIR.

We find that the effects of vital air are to impart certain properties to the blood, by which it is enabled to excite the muscles to contraction, to give sensibility to the nerves,\* activity to the brain, and due nourishment to the body, that it causes the production of animal heat, and that the blood which has not been subjected to its operation, carries debility and death to all the organs, and produces an instantaneous cessation of the function of the brain by its contact. These effects have been hitherto attributed to the oxygenation of the blood, in the act of respiration, because the air which is deprived of oxygen, cannot bring it into the state required for these purposes. I much doubt whether this principle alone would be capable of imparting such wonderful properties to the blood, even if it were carried into the system; but it is in fact expelled from the lungs, in the form of carbonic acid. Oxygen seems perfectly competent to the office of purifying the blood, by carrying off its superfluous carbon,\* and this is doubtless necessary to prepare it for the office of nourishing the body; but the mere abstraction of carbon does not appear sufficient to qualify it for the purposes above enumerated: suppose the black

\*Sensibility is greatly dependent upon a sufficient circulation of *arterial* blood to the extremities of the nerves, as well as to the brain. Those parts of the body through which red blood does not flow are possessed of little or no feeling, while, on the contrary, those that are extremely vascular are endowed with acute sensibility.

\*Carbon exists in a greater proportion in blood than in organized animal matter; the blood therefore, after supplying its secretions, becomes loaded with an excess of carbon, which is carried off by respiration.—(Conversations on Chemistry, by Mrs. Marcet.)

blood to be unfit for the office of nourishment, the want of support does not occasion instantaneous death, which is the consequence when the uncharged fluid comes in contact with the brain. A sudden cessation of the animal functions is more likely to be caused by the loss of excitation; now the known properties of oxygen do not warrant the conclusion that it is capable of throwing the whole living machine into action, and the contact of oxygen with a muscle does not even excite or accelerate its contractions. If the direct application of oxygen to a muscle does not cause it to contract, nor even produce much inconvenience to the animal in the experiment, I do not see how the mere addition of oxygen to the blood should enable it to excite the muscles and to give sensibility to the nerves: in the act of respiration however, it appears that the contractions of the muscles are affected, and Dr. Huygens ascertained, that the pulse might be lowered or accelerated according to the quantity of oxygen inspired. Hence I should conclude that the organs of circulation are affected by something which the oxygen conveys in the act of respiration, and which is disengaged by the action of the lungs in that operation. Let us consider what is chemically combined with oxygen.

#### PRINCIPLE COMBINED WITH OXYGEN.

Sir Humphrey Davy has found that the oxygen gas which we inspire, owes its elasticity to electricity, with which it is combined: and that air which has lost its elasticity, is unfit either to support life, or to produce combustion: I am therefore inclined to believe, that both life and animal heat, are, like combustion, dependent upon the same agent which gives elasticity to the air, and that oxygen is only the vehicle by which this powerful fluid, namely, electricity, is conveyed into the system.

#### ARGUMENTS.

About ten cubic inches of oxygen are taken into the lungs at every inspiration, of which only one eighth disappears, and is converted partly into carbonic acid and partly into water by its combination with the hydrogen of the blood: yet the whole of the air is respired in a state unfit for the support of life and combustion: the oxygen must therefore have lost in this inspiration the principle to which it owes the power of supporting life and heat. This is electricity; and I conclude that while the oxygen is expelled from the lungs, the electricity is retained. Then how are we to account for the various effects attending an increase or diminution of the proportion of oxygen inspired, in medical experiments, when only a determined quantity, viz. a little more than one inch is changed in the lungs?—effects displayed in the acceleration of the muscular action, the elevation of the spirits, and frequently the improvement of the health, when pure oxygen is administered medicinally—except by supposing that, although a certain portion only of oxygen is changed in the act of respiration, the electricity belonging to the whole quantity is disengaged, and that consequently the system receives different portions of electricity, though not of oxygen: and that it is electricity, and not the oxygen, which affects the health and spirits? Indeed the effects are such as might naturally be expected from the action of electricity; the powers of the principle with which oxygen is combined, appear to me the best calculated for effecting the various purposes that are attributed to oxygen, because they produce analogous phenomena in other cases.

Before I quit this part of the subject, I will observe, that atmospheric air is found to contain the same proportions of oxygen and azote in every climate and in all parts of the globe. It seems, there-

fore, that although these proportions may be altered by chemical means, in medical experiments, the air which we constantly respire contains the same quantity of oxygen, at all times: and yet nervous patients are more affected by the particular state of the atmosphere than by any other cause whatever. To what is this attributable? It is not to a variation in the quantity of oxygen, for there is not only a determinate portion of it changed in the lungs, but a determinate portion contained in the atmosphere: it must surely be to a cause known to be variable—viz. to the quantity of electricity present in the atmosphere.

#### CHANGE IN ELECTRICITY.

It might be objected that the action of so powerful an agent would be too violent for the animal frame—my notion is that like all the other elements thrown into the living body, it is there subjected to some change or modification that fits it for the human frame, and that it is changed into animal electricity or galvanism, which, as we know, acts upon both dead and living animal matter. The change may be effected in the brain for the purposes of the animal life, and in the ganglia for the purposes of the organic life; and these organs may be glands appropriated to the important office of secreting the nervous fluid and accommodating it to the performance of the animal and organic functions. The ganglia have been supposed to serve the purpose of brains, and this I should think has some appearance of probability, for the nerves of the organic system diverge from these bodies, as the nerves of the animal system diverge from the brain.

#### CONDUCTORS OF THE ELECTRIC FLUID.

To these conjectures I shall add, that as the blood contains the perfect conductors of electricity, viz. charcoal and iron, I think it not impossible, that it may in some manner be conducted by these to the different organs, or perhaps by the serum, which is, like the nerves, formed of albumen.

Oxygen is the only simple substance naturally combined with negative electricity; while all others are naturally combined with positive electricity. It is supposed that the union of the two electricities forms caloric, and it is in this phenomenon that I would seek an explanation of the production of animal heat. The union takes place when two substances form a chemical combination, and their opposite electricities are disengaged: in the act of respiration, may not the negative electricity contained in the oxygen which is inspired unite with the positive electricity contained in the venous blood, and produce the evolution of heat which takes place in the lungs! Indeed it is acknowledged that the operation of respiration is a kind of combustion. "Combustion is the rapid combination of a body with oxygen, attended by the disengagement of heat. The heat is produced by the union of the two electricities, which are set at liberty in consequence of the oxygen combining with the combustible body." (CONVERSATIONS ON CHEMISTRY.) "In respiration, a certain portion of oxygen combines with the carbon of the blood, and converts it into carbonic acid gas." Every chemical union produces an evolution of heat, owing to the union of opposite electricities; therefore heat must surely be evolved, when the oxygen of the atmosphere combines with the carbon of the blood.—If this heat were obtained merely from the caloric contained in the air, the temperature of the body could not be so equable, and the respiration must, I think, be sensibly affected during the night. This most important function is probably carried on by means less variable and uncertain; and it seems more likely that the animal heat is produced entirely by

a chemical process. Although we may *feel* chilled by the inspiration of the night air, the temperature of the blood remains nearly at the same point, and respiration is as free and as regular in the night as in the day, and in the winter as in the summer season, provided the lungs are in their natural healthy state. Not so if the air has lost its *elasticity*; which elasticity, it appears, is owing to the *electricity* which it contains; the breathing then becomes oppressed, and many unpleasant nervous sensations are the consequence of this state of the atmosphere; if it continues, disease and death may ensue. The union of the two electricities, causing an evolution of caloric, probably takes place in all the organs in which chemical changes are carried on, and indeed Bichat asserts that heat is produced in the general capillary system, as well as in the lungs.\* In this manner we might easily account for the general diffusion of heat over the whole body. The evolution of heat which takes place in the *stomach* during digestion, and which is so necessary to the execution of this function, is perhaps caused by the union of the nervous fluid, if it is of an electric nature, with the opposite electricity contained in the aliment; and we cannot doubt that the nervous influence is employed in this operation; for it cannot be performed if the eighth pair of nerves, which goes to this organ, is divided. It may also have a share in the chemical changes which take place in digestion as well as in all the organs of secretion, for the *chemical combination* of different substances is partly effected by the union of their opposite electricities. Thus we find that the properties of electricity are calculated for the performance of all the principal operations of the living body; viz. chemical change, muscular motion, and the production of *heat*, which is as indispensable to the maintenance of life as the nervous influence itself; for, without heat, the vital functions cannot commence; and when the power of producing it is entirely lost in the body, life is irrevocably gone.

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## ANIMAL MAGNETISM.

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### INSTINCT OF ANIMALS.

We could never very well tolerate the application of the term "*Animal Magnetism*," to human beings; and hence our readers will have noticed, that we have, from the first, made a distinction in what may be affirmed of the planets, as also of human beings, and mere animals. *Animal Magnetism* is a term appropriate to beasts, birds, reptiles, and fish; *Human Magnetism*, to *intellectual* beings; and *Terrestrial Magnetism*, to those forces which govern the solar system. But as our work is devoted to the investigation of the laws of Magnetism in all their varied applications to matter, both animate and inanimate, it properly comes within the sphere of our labors to notice their developments in the animal kingdom also; and we are sure our readers will be delighted in finding how beautifully these laws agree, throughout the universe of God.

It is certain, that the nerves of animals, in their sub-

stance and functions, very much resemble those of man. And we have before suggested, that the *intellectual powers* of all animate bodies, depend upon the number and strength of certain magnetic forces; so that when we find a certain part of the cerebrum developed more or less, other things being equal, we may calculate with certainty as to the intelligence or reasoning powers of that important organ.

It is certain that man differs from the lower orders of animals, not merely in respect to his intellectual powers, but also in his possessing organs which render him responsible to his Creator, and which also give him a consciousness of an unchanging identity of being through the whole course of his existence. This proves that the *thinking, reasoning, self determining principle* in man, is not matter, inasmuch as we know, that matter, in no one of its forms, can be said to be unchangeable. The human body does not remain the same more than seven years; that is, the matter of which it is composed does not remain the same longer than this space of time. But through all the changes in the animal body, the *mind* remains the same in its identity, and, as we believe, governs and controls the nerves, and through them the muscles, bones, &c., of the body, by the magnetic forces.

However, we must not enlarge here. We commenced with the design of laying before the reader some facts which go to show, that animals have the power of reason, in an inferior degree—at any rate, a power which seems to approach very much to this faculty. And comparative anatomy will show, that the strength of this faculty in animals will be found to correspond with the size of that portion of the brain where phrenologists have located the organs of causality, and in which we suppose two large consecutive poles of the brain are located. This is true, in some cases, at least. But we are inclined to the opinion that there is a species of *reason* which is peculiar to every cerebral organ. So that, when you find the organs of caution large, for instance, in the cat and fox, the exercise of those organs constitutes what has been denominated *instinct*, or the reason of those animals.

The subject is certainly curious, and we give the following articles a place in our columns for the purpose of interesting the scientific in its investigation.

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### DO BRUTES REASON?

The last number of the Northern Light, a valuable periodical published in Albany, has an essay on this question by Willis Gaylord, from which we take the following answer:—

It appears very evident that brutes perform various actions which can fairly be attributed to neither instinct nor imitation, but must be classed with the results of reflection. That animals remember, will be disputed by no one; yet the very fact of their having a memory and acting upon it, proves the power of combining and inferring. The horse that eats his oats from the half bushel to-day, remembers the fact to-morrow, and infers when the measure is brought to his view that another meal is in readiness, while his neigh of pleasure attests his satisfaction at the prospect. The sportsman's dog is as well aware as his master what is intended, when the shooting apparatus is brought out, and his conduct shows that he relishes the sport as keenly. This is not the result of instinct, as the taste is an acquired one, and

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\*The capillary system consists of the minute vessels which proceed from the extremities of the arteries; they form an essential component part of the several organs, and most of the important functions of organic life; as secretion, nutrition, exhalation, &c., take place in them. This system gives origin to the exhalants, the vessels which convey the materials of nutrition, &c.; and is a general reservoir, in which the red blood enters at one side, and the black blood, exhalations, secretions, &c., are sent out at the other.

it is a power not widely different from reason, and excited by memory, that combines and connects the sight of a gun with the sports of the field. There is no reason whatever to imagine that actions in a brute, implying the possession and exercise of reasoning powers, may not, and should not be attributed to such a cause in the brute, as well as in the man. A few years since we were passing by an orchard in which a yoke of cattle were pastured. The apples were ripe, the cattle were very fond of them, and those that fell were quickly eaten by them.— Gradually they had gathered from the branches all within their reach, and were now compelled to wait for such as fell of themselves. We observed one of the oxen to walk repeatedly around one of the trees, and make a number of ineffectual efforts to reach some of the fruit. Suddenly he stopped, took one of the branches in his teeth, and gave the tree several violent shakes. The apples rattled off merrily; he let go the branch, and had a hearty meal as the reward of his sagacity. The only question is, did he design to shake off the fruit? It can only be said if a man had wished to accomplish that effect, he could not have devised a more skilful method, or gone more directly to the end in view; why then refuse to the one what we grant to the other? By common consent the title of "half reasoning" has been awarded to the elephant, and a multitude of proofs might be cited to show that the appellation is not undeserved. He has been known after stepping upon a bridge to refuse to cross it, as unsafe, and prefer swimming the river with his attendant, to passing the bridge. A shilling was thrown to an elephant in a menagerie; it rolled to the side of the place in which he was confined, and lodged close to the foot of the upright boards that formed the partition. The prehensile part of the trunk, delicate as it is, could not grasp it, and the spectators who saw him repeat his trials concluded he would abandon the attempt. He, however, reasoned differently. Placing his trunk close to the plank, and immediately over the piece of money, he blew with all his force, and the shilling was immediately dislodged, and placed within his reach. In this case there was evident reflection, a reasoning from cause to effect, and a nice adaptation of means to the end; in other words, there was design.

We have noticed in a late number of the London Lancet, an interesting account of intellectual development in a couple of dogs belonging to a French gentleman of the name of Leonard, resident in London. The dogs are of the Spanish breed, and the writer says, when introduced to him by Mr. L., with true French politeness, both bowed very graciously, and then seated themselves on the hearth rug. A great variety of experiments were then made with the animals, such as going through the exercises of the *menage*, exchanging a variety of different colored cards with each other, bringing to their master meat, bread, or cards, as commanded, Mr. L. sitting with his back to the dogs, and giving his directions in such a manner, and at the suggestion of the writer, as to put their intelligence to a severe test. So rapid were his orders, that, without a perfect understanding of his words, obedience would have been impossible. The writer adds:—

"After many other performances, evincing the wonderful sagacity and perception of the dogs, M. Leonard invited me to play a game of dominos with one of them. The younger and slighter animal then seated himself on a chair at the table. M. L. and myself placed ourselves opposite. Six dominos were placed on their edges in the usual manner before the dog, and a like number before me. The dog having a double number took it up in his mouth,

and put it in the middle of the table; I placed a corresponding piece on one side; the dog immediately played another correctly, and so on until all the pieces were engaged. Other six dominos were given to each, and I intentionally placed a *wrong number*. *The dog looked surprised, stared very earnestly at me, and at length growled, and finally barked angrily.* Finding that no notice was taken of his remonstrances, he pushed away the wrong domino with his nose, and took up a suitable one from his own pieces, and placed it in its stead. I then played correctly; the dog followed, and won the game. His play must have been the result of his own observation and judgment, as not the slightest information was or could have been given by M. L. to his dog."

M. L. is a gentleman of fortune, and the instruction of his dogs has been taken up merely for his own amusement and diversion. He has found that by inducing the animal to repeat again and again what was required, not only would the dog become capable of performing that specific act, but that part of the brain which was brought into activity by the mental effort, would become more largely developed, and hence a permanent increase of mental power be obtained. The fact is in accordance with the known laws of the physiology of the nervous system.

Such instances of intelligence might be multiplied to any extent, but it is unnecessary. Every person who has observed the actions of horses, dogs, foxes, and indeed all other animals, must have noticed numerous cases involving the exercise of memory, design, and a perception of the relation between cause and effect; and thus proving that reason, or the power of combination and inferring, is possessed by brutes. The power, it is true, is less perfect than in man, a circumstance we should naturally infer from the greater proportionate volume of brain, and its more perfect arrangement in the latter than in the former; still it may reasonably be inferred that the difference is only in degree, and not in kind.

We come to the conclusion then, that the question with which this paper commences should be answered in the affirmative, that brutes do reason. A general belief of this fact would, it is believed, materially change the treatment which they, under the mistaken idea that they were destitute of intellect, have been accustomed to receive from man. Placed by the Creator at the head of "earth's countless myriads," man's station is sufficiently elevated and responsible, without assuming distinctions, or imputing inferiorities which do not exist.

It may not be amiss to remark here, that the question under discussion, has no connection with the duration of mind, or the glorious destinies of man hereafter. The immortality of the soul does not depend on its power of reason. He who brought "life and immortality to light" might, had it so pleased him, as easily conferred the gift of endless existence on the "spirit of the beast that goeth downwards," as upon the "spirit of the man that goeth upwards."

OTISCO, April, 1829.

#### TAMING HORSES.

BY A. J. ELLIS, E. A. WINDSOR, OXLEY.

Mr. Catlin, in his work on the manners and customs of North American Indians, gave the following account of their method of taming the wild buffalo calves, and wild horses:—

"I have often, in concurrence with a well-known custom of the country, held my hand over the eyes of the calf, and breathed a few strong breaths into its nostrils; after which I have, with my companions, rode several miles into our encampment, with the little prisoner busily following the heels of my horse the whole way as closely and affectionately as

its instinct would attach it to the company of its dam. This is one of the most extraordinary things that I have met with in the habits of this wild country; and although I had often heard of it, and felt unable exactly to believe it, I am now willing to bear testimony to the fact, from the numerous instances which I have witnessed since I came into the country. During the time that I resided at this post, in the spring of the year, on my way up the river, I assisted (in numerous hunts of the buffalo, with the Fur Company's men) in bringing in, in the above manner, several of these little prisoners, which sometimes follow for five or six miles close to our horses' heels, and even into the Fur Company's fort, and into the stable where our horses are led. In this way, before I left for the head waters of the Missouri, I think we had collected about a dozen."

In the same way the wild horses are tamed. When the Indian has got him well secured with the lasso, and a pair of hobbles on his feet, "he gradually advances until he is able to place his hand on the animal's nose, over his eyes, and at length to breathe in its nostrils, when it soon becomes docile and conquered; so that he has little more to do than to remove the hobbles from his feet, and lead or ride it into the camp."

Mr. Ellis chanced to read this account when on a visit in Yorkshire, and forsooth resolved to try the experiment. He and his friends were alike incredulous, and sought amusement by the failure rather than knowledge by the result—but two experiments, all he was able to try, were both successful. Here are the particulars of them:—

"Saturday, February 12, 1842.—While the last experiments were being tried on the yearling, W. espied B., a farmer and tenant, with several men, at the distance of some fields, trying, most ineffectually, on the old system, to break a horse. W. proposed to go down and show him what effect had been produced on the yearling. When the party arrived at the spot they found that B. and his men had tied their filly short up to a tree in the corner of a field, one side of which was walled, and the other hedged in. W. now proposed to B. to tame his horse after the new method. B., who was aware of the character of his horse, anxiously warned W. not to approach it, cautioning him especially against his fore feet, asserting that the horse would rear and strike him with the fore feet, as it had 'lamed' his own (B.'s) thigh just before they had come up. W. therefore proceeded very cautiously. He climbed the wall, and came at the horse through the tree, to the trunk of which he clung for some time, that he might secure a retreat in case of need. Immediately upon his touching the halter, the horse pranced about, and finally pulled away with a dogged and stubborn expression, which seemed to bid W. defiance. Taking advantage of this W. leaned over as far as he could, clinging all the time to the tree with his right hand, succeeded in breathing into one nostril, without, however, being able to blind the eyes. From that moment all became easy. W., who is very skillful in the management of a horse, coaxed it, and rubbed its face, and breathed from time to time into the nostrils, while the horse offered no resistance. In about ten minutes W. declared his conviction that the horse was subdued; and he then unfastened it, and, to the great and evident astonishment of B., who had been trying all the morning in vain to get over it, led it quietly away with a loose halter. Stopping in the middle of the field, with no one else near, W. quietly walked up to the horse, placed his arm over one eye, and his hand over the other, and breathed into the nostrils. It was pleasing to observe how agreeable this operation appeared to the horse, who put up his

nose to receive the puff. In this manner W. led the horse through all the fields to the stable yard, where he examined the fore feet of the horse, who offered no resistance, but while W. was examining the hind feet, bent its neck round, and kept nosing W.'s back. He next buckled on a surcingle, and then a saddle, and finally fitted the horse with a rope. During the whole of these operations the horse did not offer the slightest resistance, nor did it flinch in the least degree."

Two experiments are all Mr. Ellis had an opportunity of either witnessing, or hearing the results of. But, as he states, these have been to him perfectly satisfactory; and, as he has no opportunity of carrying them on, since he is unacquainted with the treatment of horses, and neither owns, nor is likely to be thrown in the way of unbroken colts, he has resolved to publish these particulars, that gentlemen, farmers, and others, may at least try so simple a plan, and thus test and determine its value. Mr. Ellis is of opinion that this is the secret of the celebrated Irish horse tamers; and we remember that in more than one recorded instance of their power, they pretended to whisper to the animal, and played with his head, and thus probably breathed into his nostrils.

#### EXTRAORDINARY INSTINCT.

The following remarkable fact, connected with the death, or at least the discovery of the body of a man named Leoch, at Bredfield, is related in the Suffolk Chronicle. The deceased, who resided at Ufford, left the Castle public house, at Bredfield, late at night, intoxicated, but in the company of two other persons, with whom he had been drinking, and who also lived at Ufford. After a short time, however, they passed one another the two latter having stopped, thinking the deceased was before, and their not overtaking him did not create any alarm, but that all was right with him. After an anxious night and part of next day, he not coming home, his daughter resolved to go in search of him. Accordingly she set off for Petistree Tuns, but gaining no tidings of him there, she determined upon going to Bredfield Castle, about two miles distant. She had not left the Tuns long, when she met a dog, a terrier, which displayed great delight, as if it had met a person whom it had long known; though it seemed perfectly good natured, she was afraid of it, and beat it from her, and kept it at a distance by stoning it, but to no purpose; it still followed till her arrival at the Castle, at Bredfield, where, after learning the time and situation her parent had left there the night before, full of wonder and fear as to what had become of him, she was about retracing her steps home the way she had come, but her companion was in waiting, and immediately ran on instead of following her as before, which attracted her attention, and induced her to follow it. When it ran down a drift leading to a footpath to Ufford by the side of which was a ditch, it suddenly stopped, making a dead point, and stood firm in that condition till the young woman came to the spot, when on looking into the ditch, she saw the body of her father extended at the bottom, partly covered with water. She immediately gave an alarm, and the body was removed to the public house to await the issue of the coroner's inquest. The young woman went home, attended by the faithful companion, where it has ever since remained, showing the greatest attachment to the place and the family of the deceased. A most mysterious feature in this case is, that no one knows the dog, to whom it belongs, or from whence it came, although it has been seen by many persons since, for the purpose of identifying it.

## A MONKEY'S MEMORY.

Authors generally seem to think that the monkey race are not capable of retaining lasting impressions—but their memory is remarkably tenacious when striking events call it into exercise. A monkey which was permitted to run free, had frequently seen the men servants in the great country kitchen, with its huge fire place, take down the powder horn that stood on the chimney piece, and throw a few grains upon the fire, to make Jemima and the rest of the maids jump and scream, which they always did on such occasions very prettily. Pug watched his opportunity, and when all was still, and he had the kitchen entirely to himself, he clambered up, got possession of the well filled powder horn, perched himself very gingerly on one side of the horizontal wheels placed for the support of sauce-pans, right over the waning ashes of an almost extinct wood fire, screwed off the top of the horn and reversed it over the grate. The explosion sent him half way up the chimney. Before he was blown up he was a snug, trim, well conditioned monkey as you would wish to see in a summer's day; he came down a black, carbonated nigger in miniature, in an avalanche of burning soot. The thump with which he pitched upon the hot ashes in the midst of the general flare up aroused him to a sense of his condition. He was missing for days. Hunger at last drove him forth and he sneaked into the house close by, singed, and looking scared. He recovered with care, but like some other personages, he never got over his sudden elevation and fall, but became a sadder if not a wiser monkey. If ever Pug forgot himself and was troublesome, you had only to take down the powder horn in his presence, and he was off to his hole like a shot, screaming and chattering his jaws like a pair of castanets.

## PHYSIOLOGY.

## ANIMALS AND INSECTS.

BY PROF. HITCHCOCK.

The sciences of Anatomy and Physiology abound in facts the most wonderful and interesting. Comparative Anatomy has of late been a subject of close attention; and so perfectly have its principles been established that from a single bone or tooth the character of the animal may be inferred, with its food, habits, haunts, and all the circumstances of its existence. Comparative Anatomists have, from a single tooth described and made drawings of the extinct creature to which it belonged; which has been found to agree exactly with a skeleton afterwards discovered. We cannot fail to be struck with the change as we go from the Anatomy of the human body to that of the lower animals, and with the perfect adaptation of the organs to the circumstances and character of the different animals. Looking at the eye, for instance; we cannot see in water, while on the other hand fishes are blind in air. By the use of very convex spectacles, however, our vision may be distinct in water; and there is little doubt that a skilful optician could furnish a Whale who might wish to travel 'on the continent' with glasses which should enable him to see as distinctly and observe to as much purpose as many of our own species have done. Some insects which live upon the surface of the water are furnished with two pair of eyes—one for seeing through the air and the other through the water. As the eyes of insects are usually fixed in the head, so that they cannot easily be directed to different objects, they are made polygonal—furnished with an almost infinite number of plane surfaces; and each

of these surfaces is in fact a distinct eye. The common house-fly has 7,000 of these surfaces in each eye, and the butterfly 17,000. The crystalline lens of the codfish which is never half an inch in diameter, is made up of above five millions of fibres held together by sixty-two thousand millions of teeth. We find it difficult to conceive how animals can exist without heads; but there is a class of animals, which live in shells, which, for the very reason that they are headless, are named *acephalous*. The skill these headless creatures evince in constructing the shells they inhabit, moreover, throws completely into the shade the skill of the biped that not only boasts of having a head, but of being absolutely *the* head of the whole creation. The construction of their nests by wasps—a single queen of whom frequently rules over 30,000 subjects all her own children, too—is worthy of our highest admiration. The character of the spider, too, as ascertained by the great naturalist HUBER who placed them under glass cases and examined them closely with highly powerful microscopes, is especially wonderful. This insect, so long as it remains in possession of the cocoon it has spun will defend it with desperate valor against all assailants; but when this is taken away it will so perfectly simulate death that all its limbs may be torn off and will evince no life; but if its web be again brought within its reach it grasps it with the fiercest energy. The trap-door spider, found in the West Indies, digs a hole in the ground some six inches deep, lines it with a thick coating of silk and closes its mouth with a lid which springs down so as to shut out all enemies.

The transformation or metamorphosis of animals which change their form is also curious and interesting. Thus serpents throw off their skins annually; frogs at first are tadpoles, and butterflies and other insects of the same kind are first hatched in the *larva* state, appearing as a caterpillar or grub, and only emerge into their final beauty through the *pupa* or *crysalis* state.

A singular species of animals is found inhabiting the gills of the fish, called the *diplozoon* species; having two bodies like the Siamese twins; and what is still more wonderful the two bodies seem to be influenced by different dispositions. The species of *Polypi* also present a subject of curious and instructive inquiry. The simplest form of these animals is a simple tube, which is in fact a stomach, the mouth being surrounded by a number of long arms which collect and force into the stomach the food on which the animal subsists. These creatures have the remarkable power that when turned inside out like a sack, as may easily be done, it makes no difference with them—digestion and all other functions going on just as well. The animal moreover may be cut up into a multitude of parts without destroying its vitality. Each piece immediately forms itself into a new tube, arms or *tentacula*, as they are called, shoot out, and the functions of life commence. A number of heads may also be cut off and thrown together, when they will soon combine to form a new animal with a great number of heads. Many plants of the fungous species are often found growing out of the bodies of living insects.

The number of species of different animals that have been discovered on our globe is a subject of no little interest. Of the mammalia there have been found 4,000 different species; of birds 6,000; of fishes 8,000; of insects 120,000; of shells 9,000, and of polypi 3,000, making in all 150,000 different species, which is probably not half the number that really exist. The number of individuals belonging to a single species is also most astonishing. Capt. Flinders once observed in Van Dieman's land a flock of

petrel, containing not less than 150,000,000 individuals; and AUDUBON saw near the Ohio river a single flock of pigeons which must have numbered at least 90,000,000,000, requiring at least 9,000,000 bushels of grain for a single day. The gelatinous animals on which the whale lives, called *medusae*, so abound in parts of the Arctic Ocean, as to color the water for miles around; and a cubic foot of water contains at least from 80,000 to 1,000,000 of them. Several shoals laid down on the charts of the South Seas have been found to be nothing more than these medusae, discolored the water so as to produce the deception.

The number of young produced by certain species of animals is most surprising. The queen of the *termites* in four months deposits 80,000 eggs; the queen of the *cyclops* 4,000,000,000; the *carp* deposits 200,000 eggs at once, and the *tench* and *flounder* likewise have most wonderful powers of reproduction.

Of the *infusoria* or animalculæ, which, except the vinegar eel, are all microscopic, seven hundred species have been described, the smallest of which comprises animals not more than one twenty-four thousandth part of an inch in diameter; and a single drop of water will contain 500,000,000 of them, and still allow each an abundance of sea-room. Yet every one of these is provided with all the organization of animal life; and naturalists by giving them colored food—as pure indigo—have been able to trace their nerves and circulating vessels. In high northern regions and upon the Alps the snow is often seen to be tinged with red; and it has been ascertained that this is caused by the presence of living animalcula, which can only exist in the temperature of snow and perish as soon as it melts. Many of the animalcula called *hydatina*, are covered with a shield of pure silex, which, when the animal dies, is deposited at the bottom of the water forming beds of feruginous matter many feet thick. Whole rocks have been found by geologists entirely made of these skeletons. In Germany these beds are often fourteen feet thick: forty-one thousand millions of these skeletons will only fill a cubic inch of space. Prof. BAILEY of West Point has found under great peat bogs in this country, a white substance which was long mistaken for magnesia; but which is found to be nothing but the skeletons of minute animals living in the water.—*N. Y. Tribune.*

#### PHYSICAL DEBILITY OF AMERICAN WOMEN.

But the second and still greater difficulty peculiar to American women, is delicacy of constitution; which renders them victims of decay.

The fact that the women of this country are usually subject to disease, and that their beauty and youthfulness are of shorter continuance than the women of other nations, is one which always attracts the attention of foreigners; while medical men and philanthropists are constantly giving fearful monitions as to the extent and alarming increase of this evil. Investigation makes it evident that a large proportion of young ladies from the wealthier classes have the incipient stages of curvature of the spine, one of the most sure and fruitful causes of future disease and decay. The writer has heard medical men, who have made extensive inquiries say, that one of every six of the young women at boarding-schools are affected in this way; while many other indications of disease and debility exist in cases where this particular evil cannot be detected.

In consequence of this enfeebled state of their constitution, induced by a neglect of their physical education, as soon as they are called to the responsibilities and trials of domestic life, their constitution fails,

and their whole life becomes a burden. For no person can enjoy existence when disease throws a dark cloud over the mind, and incapacitates her from the proper discharge of every duty.

It would seem as if the primeval curse that has written the doom of pain and sorrow on one period of a young mother's life in this country, has been extended over all; so the hour never arrives when "she forgetteth her sorrow for joy that a man is born into the world." Many a mother will testify with shuddering that the most exquisite sufferings she endured were not those appointed by nature, but those which, for week after week, have worn down health and spirits when nourishing her child. And medical men teach us that this, in most cases, results from debility of constitution consequent on the mismanagement of early life. And so frequent and so mournful are these and the other distresses that result from the failure of the female constitution, that the writer has repeatedly heard mothers say that they wept tears for the sufferings they were destined to undergo; while they cherished the decided wish that these daughters should never marry. At the same time, many a reflecting young woman is looking to her future prospects with very different feelings and hopes from those which providence designed.

American women are exposed to a far greater amount of intellectual and moral excitement than those of any other land. Of course, in order to escape the danger resulting from this, a greater amount of exercise in the fresh air, and all those methods which strengthen the constitution, are imperiously required.

But instead of this, it will be found that, owing to the climate and the customs of this nation, there are no women who secure so little of this healthful and protecting regimen. Walking, riding, and gardening, in the open air, are practised by women of other lands to a far greater extent than by American females. Most English women, in the wealthier classes, are able to walk six or eight miles on a stretch, without oppressive fatigue; and when they visit this country, always express their surprise at the inactive habits of the American ladies. In England, the regular daily exercise in the open air is very commonly required by the mother as a part of daily duty, and is sought by young women as employment.

In consequence of a different physical training, English women in those circles that enjoy competency present an appearance which always strikes American gentlemen as a contrast to what they see at home. An English mother, at thirty, or thirty-five, is in the full bloom of perfected womanhood—as fresh and as healthful as her daughters. But where are the American mothers who can reach this period unfaded and unworn? In America,—young ladies in the wealthier classes are sent to school from early childhood; and neither parents nor teachers make it a definite object to secure a proper amount of fresh air and exercise, to counterbalance their intellectual taxation.

As soon as they pass their school-days, dressing, visiting, evening parties, and stimulating amusements, take the place of study; while the most unhealthful modes of dress add to physical exposures. To make morning calls, or to do a little shopping, is all that can be called their exercise in the fresh air; and this, compared to what is needed, is absolutely nothing. In consequence of these and other evils that will be pointed out more at large in the following pages, the young women of America grow up with such a delicate constitution, that probably eight out of ten become subjects of disease either before or as soon as they are called to the responsibilities of domestic life.—*Miss Beecher.*