

amination of these cases can suppose that an *unseen lesion* in the hemisphere of the brain on the opposite side to that of the paralysis was the real cause of this loss of movement.

(To be continued.)

A Lecture ON

MAN IN HIS ANATOMICAL, PHYSICAL, AND PHYSIOLOGICAL ASPECTS.

*Introductory to a Course of Lectures on the Institutes of
Medicine (Physiology).*

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GENTLEMEN,—In entering on my duties as Professor of Medicine and Anatomy in your ancient and honourable University, it is incumbent on me to pay a passing tribute to the memory of my distinguished predecessor, the lamented Dr. Oswald Home Bell.

It was my misfortune to know Dr. Bell very slightly, but the little I did know was of the most favourable tenor. He appeared to me to be a man of rare judgment, tact, and industry. He was admittedly conscientious and honourable, but he was more; he was a typically kind and generous man—a man of broad, charitable views. Higher praise can be accorded to no one. As most of you are aware, Dr. Bell had a distinguished University career. He put forth flowers which promised abundant fruit. Had he lived, and had he chosen to devote himself to science instead of practice, for which he had a rare genius, there can be no doubt that he would have attained to high academical distinction. As it was, he worked indefatigably for the good of others, and suffering humanity, I am told, never appealed to him in vain. His career, though brief, was eminently useful, and it is distressing to think that one so universally beloved should have been removed so young. Of him it might truly be said, he was “active in business and fervent in spirit.” He has left innumerable friends, and, it would appear, no enemies. As his life so was his death, full of earnestness and truth. Those who knew him best mourn him the most, and there are, I feel, none present who will not join me when I repeat the few last mournful words, *Requiescat in pace*.

I could have wished to say more, but after the touching eulogium passed upon Dr. Bell by our distinguished Principal, in his opening address, further remarks from me must appear superfluous. I will therefore turn to my introductory lecture. The subject I am called upon to teach is so vast that I have had considerable difficulty in selecting a topic. This difficulty has been increased from a feeling that on the present occasion I would be addressing, not a body of medical men, but a body of philosophers, scholars, and literati. I have, on reflection, chosen a theme which I hope may possess a general interest even to the non-professional—viz., *Man in his Anatomical, Physical, and Physiological Aspects*.

It has been truly said that the study of mankind is man, and I am free to confess that I know of no nobler study, if it be pursued, as it ought to be, in a liberal and strictly scientific spirit.

Of all created beings man unquestionably occupies the first place. He is god-like as to form, divine as to intelligence. He may be said to constitute the last link in creation. In point of time he was the last to be created; but, being created, everything endowed with life was made subject to him. He forms, as it were, the last of an indefinite series, and in this respect is to be regarded as in some measure intermediate between the other members of the animal kingdom and his Maker. “And God said, Let us make man in our image, after our likeness; and let them have dominion over the fish of the sea, and over the fowl

of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.”* Not only was man the last to be created, but very considerable preparation was necessary before he could take his place in nature. This is evident alike from the sacred writings and from geological records. The geological argument has been stated with great force by Sir Humphry Davy as follows:—“In those strata which are deepest, and which must, consequently, be supposed to be the earliest deposited, forms even of vegetable life are rare; shells and vegetable remains are found in the next order; the bones of fishes and oviparous reptiles exist in the following class; the remains of birds, with those of the same genera mentioned before, in those of the next order; those of quadrupeds of extinct species in a still more recent class; and it is only in the loose and slightly consolidated strata of gravel and sand, and which are usually called Diluvial formations, that the remains of animals such as now people the globe are found, with others belonging to extinct species. But, in none of those formations, whether called secondary, tertiary, or diluvial, have the remains of man, or any of his works, been discovered; and whoever dwells on this subject must be convinced that the present order of things, and the comparatively recent existence of man as the master of the globe, is as certain as the destruction of a former and a different order, and the extinction of a number of living forms which have no types in being.”†

Sir Charles Lyell writes in a very similar strain. He observes:—“We have been fairly led by palæontological researches to the conclusion that the invertebrate animals flourished before the vertebrate, and that in the latter class fishes, reptiles, birds, and mammalia made their appearance in chronological order analogous to that in which they would be arranged zoologically according to an advancing scale of perfection in their organisation. . . . To crown the whole, the series ends with the *Arancephala*, of which man is the sole representative.”‡

It is customary to speak of man as the lord of the creation, nor can this lofty title be well denied him since revelation and science equally support it. He is mentally and physically fitted for command. It is not my intention, however, on the present occasion to speak of intellectual man. As your Professor of Medicine and Anatomy, I shall best occupy your time by regarding him from a corporeal or bodily point. While claiming for man the first place in creation, I am not one of those who seek to elevate man by depressing the lower animals. All are perfect after a fashion. To argue otherwise would be to attribute imperfection to the Deity. Man has very many points in common with the brutes that perish, not only physically but mentally; and so far from denying those points of analogy, affinity, and it may be of actual consanguinity, I am proud to think that God in his great goodness has surrounded us with so many beautiful creatures, not a few of them having even beautiful dispositions. Granting, however, that man is, as to his animality, not far removed from the highest of the lower animals, and that he possesses certain mental traits in common with them, I still maintain that he is *facile princeps*, and that there is a great gulf between him and his congeners which science has hitherto failed to bridge. The gulf is chiefly an intellectual gulf, for it cannot be doubted that there is a greater chasm between man and the higher apes, as regards intelligence, than there is between the several kinds of apes and the organic forms immediately below them. “When it is said that the human race is of far higher dignity than were any pre-existing beings on the earth, it is the intellectual and moral attributes of our race, rather than the physical, which are considered; and it is by no means clear that the organisation of man is such as would confer a decided pre-eminence upon him, if, in place of his reasoning powers, he was merely provided with such instincts as are possessed by the lower animals. . . . Linnæus declared that he could not distinguish man generically from the ape, and Professor Owen has spoken of the ‘all-pervading similitude of structure—every tooth, every bone, being strictly homologous,’—yet the same great anatomist considers man’s superior cerebral development as entitling him to be placed in a sub-class apart from all the other mammalia.”

* Genesis i. 26.

† Sir H. Davy: *Consolations in Travel*, Dialogue iii., “The Unknown.”

‡ *Principles of Zoology*, 10th ed., vol. i., p. 165. London, 1867.

It has been customary of late years to draw animals in all sorts of fanciful positions, and to give them interesting expressions. This has been especially the case with the anthropomorphous apes. Thus the orang-utan, chimpanzee, and gorilla have been ingeniously represented in semi-erect positions, and grinning as only apes can grin. The naturalists, however, have failed to convince the majority of mankind that man is the immediate descendant of the gorilla. Animals undoubtedly have expression, but the erect posture and the wonderful play of features indicative of an almost divine intelligence are, to a great extent, peculiar to man. He is the only creature who can be said habitually to maintain an erect attitude, and who can laugh, cry, and speak. Certainly there is no known animal which can use its hands to such purpose, and between whose head and hands there is such perfect co-ordination. If man, as Darwin and others try to make out, is actually descended from the lower animals by infinite transmutations in infinite time, the supporters of that view (and it is a great, grand, and original view) must admit, that they have hitherto failed to find the missing link. To prove this theory, an animal approaching man much more closely than the orang-utan, chimpanzee, and gorilla must be found living or dead. No such animal, however, can be discovered. The solitudes of tropical forests and the vast recesses of an expectant geology have hitherto been searched in vain. While, however, there is admittedly a missing link, it becomes us to bear with the evolutionists—those patient, earnest, indefatigable workers. They are engaged in a mighty undertaking, and until their labours are completed no verdict can be given. Let us, as scientific men, be liberal. Let us agree to differ. It is truth that is sought, not self-aggrandisement. There can be no science where there is dogmatism. Liberty of thought and action is the birthright of every original inquirer, and everyone who attempts to stifle this is a mere cumberer in the field he pretends to cultivate.

If the evolutionists accomplish no more, they have already accomplished much; they have shown us that from protoplasmic albuminous-looking masses rudimentary animals may be developed, and that, step by step, in endless succession and in infinite time, a graduated series of organic forms may be evolved; each member of the series dovetailing into that immediately above and immediately below it. They have thrown much light upon the complicated questions of natural affinity, the homologies of organs in various animals, and the recurrence in the embryos of the higher animals of structural peculiarities found in the lower ones. They have connected, as by a silver thread, the various palæontological forms in time, and the several faunas and floras in space. They have endeavoured to establish an actual genealogy and consanguinity of organisms.

The evolutionists begin with the lowest and end with the highest. This system may be fitly represented by a chain. They say, given the first link, living protoplasm, in the shape of an amœba or some degraded type, we may have a second link representing a higher living form, and so on until man himself is reached. You cannot, however, say they, have the highest type without the lowest, and the presence of the highest and lowest types indicates the existence, past or present, of intermediate types. There is, therefore, in evolution a similarity and a sequence. The evolutionists appear to me to err rather in their premises than their conclusions. They crave one or more living types developing into myriad living forms, and infinite time for their transformation. Their argument is virtually a *petitio principii*. If it takes a million years to form a man from a mollusc, then it is quite evident that no man or generation of men can hope to see the transformations as they occur. They can see and recognise species when created, but they cannot see the actual creations as they occur. In short, they can see the perfect chain, but not the process of link-making. If we take man as an example, we know from ancient sculptures and mummy pits that his form has not varied, even in the slightest, for several thousand years. The same may be said of many domesticated plants and animals, as, for instance, Egyptian wheat and the sacred animals of the Nile. The evolutionists, however, look upon a thousand years as a small matter in the transformation of living forms, and this element of time forms, it appears to me, at once the strength and weakness of their position. The evolutionists

represent the Creator not as a being whose work is finished, but whose work is progressing. They regard the world and all it contains as a vast panorama which moves continually.

"When first the doctrine of the origin of species by transmutation was proposed, it was objected that such a theory substituted a material self-adjusting machinery for a supreme Creative Intelligence. But the more the idea of a slow and insensible change from lower to higher organisms, brought about in the course of millions of generations, according to a preconceived plan, has become familiar to men's minds, the more conscious have they become that the amount of power, wisdom, design, or forethought, required for such a general evolution of life, is as great as that which is implied by a multitude of separate, special, and miraculous acts of creation."

The evolutionists are not to be confounded with the advocates of spontaneous generation. These latter deal with a still wider question, for they maintain that neither living protoplasm nor a living type is required to begin the animal series. They regard life as an accidental result, due to an accidental assemblage of dead particles under favourable circumstances. They say, given certain matters and certain conditions, such as heat, light, moisture, &c., and life will inevitably result. They require no parent or germ; theirs is life *de novo*.

Whatever man's descent, whether the offspring in a remote antiquity of stray particles deftly arranged by physical forces, or an evolution of living matter acted upon by vital and physical forces, or a separate creation in which he appeared perfect as he is when fresh from the hands of his Creator, matters little, if we regard him from a merely anatomical, physical, or physiological point. It is the duty of the anatomist, physicist, and physiologist to look upon man simply as an organism—i.e., an assemblage of organs or parts, each of which has a definite function to perform. Regarded as an organism he still stands at the head of the animated kingdom. In man we behold the highest degree of differentiation. In him there is a greater number of parts, and the parts are more divinely attuned. It may be as well at this stage briefly to explain what is meant by differentiation. In the lowest plants and animals the individual consists of a single cell—i.e., a globular, jelly-like, protoplasmic mass, invested with a more or less perfect envelope. This cell is endowed with wonderful vital properties, for it lives, grows, and reproduces itself. All its parts, however, are homogeneous; in other words, each part resembles every other part. The cell, or cell-plant, or cell-animal, as happens, is therefore said to be undifferentiated. As we rise in the scale of being, the cells in plants and animals break up, coalesce and interweave to form organs; each organ consisting of heterogeneous parts arranged according to a given plan, and performing a definite function. Thus, in plants and animals there are the respiratory and reproductive organs—i.e., portions of the plant or animal especially set apart for respiration and reproduction. The eye is regarded as the organ of sight, the ear of hearing, and so on. The parts or organs increase as we ascend from the lowest to the highest forms; and a plant or animal is said to be differentiated according to the number of organs composing it, and the complexity and variety of the functions performed by those organs. An organism is necessarily composed of parts, and the higher organisms are to be regarded as the aggregation of organs, all of which are more or less complex. Man, then, regarded as an organism—i.e., an assemblage of parts variously constituted and performing various functions,—is the most highly differentiated of all living beings.

As it is impossible to speak of an organism as apart from its organs, so it is impossible to speak of an organ as apart from the matter composing it. It is necessary therefore, even at the risk of being tedious, to say a few words regarding organic and inorganic matter, and vital and physical force. As anatomists, physicists, and physiologists, we cannot escape from matter; neither can we escape from the forces which actuate that matter as such. All living things proceed directly or indirectly from the material universe. There we find a store of matter and a store of force which are virtually inexhaustible; all the more inexhaustible because the matter and force of the universe are indestructible. We cannot annihilate matter, neither can we annihilate force. We can change the form of the matter and the direction of the force, but here our powers cease. If

matter and force are taken from the universe to build up a plant or an animal, they both return to it when the plant or animal dies. The universe is not only the great laboratory where everything living is fashioned; it is also the vast lumber-room where everything dead is stored. It is the huge magazine of extinct or geologic forms. The organic rises out of the inorganic, and returns to it. We cannot speak of even the lowest plant or animal, still less of man, without referring to the matter of the universe.

By organic matter is meant matter as it exists in living plants and animals, or in plants and animals that have once lived; by inorganic matter is to be understood matter as it exists outside plants and animals—i.e., in the mineral kingdom.* By vital force is meant force as manifested in living forms; by physical force, force as it exists in the universe as a whole. The vital forces prevail in life, the physical ones in death. The play of matter and force is seen to perfection in the formation, growth, and death of plants and animals. Mineral matters and physical forces, in the natural order of things, precede vegetable matters and vital forces, and vegetable matters and vital forces precede animal matters and mental forces. Thus to form and support a plant we must have mineral substances and vital and physical forces; and to form and support an animal we must have vital and physical forces and mineral substances *plus* plants. An animal can only exist through the plant; it cannot live upon inorganic substances. The plant alone possesses that vital or vito-chemical laboratory which can assimilate inorganic materials, and convert them into food for itself and for animals. Plants are the great producers in nature, animals the great consumers. The elements enter the bodies of animals by a somewhat circuitous route. Animals feed upon plants, and plants upon inorganic matter obtained from the soil and air. Animals for the most part obtain their elements indirectly from the plant or other animals. The plant precedes the animal in the same way that inorganic matter precedes the plant. The elements, as it were, circulate within plants and animals. Thus vegetables absorb from the earth and air carbonic acid, watery vapour, and nitrogen; they give off oxygen, and retain carbon and hydrogen. Vegetables build up organic matter under the influence of solar heat and form the food of animals; but the animals thus formed return to the soil and the atmosphere the materials supplied by plants, either during their lives or at their deaths. Animals give off what plants retain—viz., carbonic acid, hydrogen as a constituent of water, and free nitrogen in the form of ammonium oxide. The animal kingdom is to be regarded as an apparatus of combustion, the vegetable kingdom as one of reduction. The metamorphosis which certain of the elements undergo in plants and animals may be briefly stated:—"Rain water, loaded with the carbonic acid of the air, falls upon calcareous hills, and carbonate of lime in a state of solution enters rivers, and is by them carried to the ocean, where it is seized upon by millions of animals, and converted into their external skeletons or shells. The water of rivers and springs also is absorbed by plants, and drunk by animals, and so lime enters into their substance, and is converted into various salts of that base, such as oxalates, tartrates, phosphates, &c. Phosphate of lime is the principal element of the bones, besides entering more or less into the constitution of the other tissues of the superior animals, which are continually excreting as well as assimilating it. Lastly, on their death, the lime is dispersed in various ways; even the bones crumble to pieces, and so the mineral returns to the soil from whence it came. Sulphur passes from one region to another, in a similar manner—from the sea, which contains sulphur in large quantities, to the atmosphere, thence to the soil, and thence to plants and animals, from whence again it returns to the bosom of the ocean. These incessant changes between the soil or atmosphere, plants and animals, constitute the theory known as the chemical balance of organic nature."†

In all these beautiful transformations we have marked evidence of design. The mineral kingdom is necessary to the vegetable kingdom, and the vegetable kingdom to the animal kingdom. Some, indeed, even go the length of

saying that it is impossible to draw a line of demarcation between the mineral and vegetable kingdoms on the one hand, and between the vegetable and animal kingdoms on the other, and that in reality there is but one kingdom, which embraces all three. These philosophers look upon *all matter as one and all force as one*. Thus Tyndall remarks that "everywhere throughout our planet we notice a tendency of the ultimate particles of matter to run into symmetric forms. The very molecules appear inspired with a desire for union and growth, and the question of questions at the present day is, How far does this wondrous display of molecular force extend? Does it give us the movement of the sap of trees? I reply with confidence, Assuredly it does. Does it give us the beating of our own breasts, the warmth of our own bodies, the circulation of our own blood and all that thereon depends?.....You can pass on by almost imperceptible gradations from this wonderful display of force.....to the lowest forms of vegetable life. I pass from them to other forms higher, and so up to the highest.....One class of thinkers suppose that all the actions of crystals, that the passage from crystalline action to the lowest forms of vegetable life, and from them to the higher forms still, and so on to the highest,—I say, one class of thinkers regard this as the growth of a single natural process. They grasp, as it were, this act of life, this development of life, as an indissolubly connected whole—one great organic growth from the beginning. Others again say that it is not possible to pass from inorganic, as we are pleased to call it—for remember it is only human language we can use,—from the inorganic to the organic without a distinct creative act, and so with regard to the forms we observe."

It will no doubt appear to many, if not to all, far-fetched to speak of man as a direct evolution from inorganic matter by an elaborate and complicated series of transformations, but as this is the view adopted by many advanced thinkers of the present day, I feel it incumbent on me to state it.

(To be concluded.)

NOTES ON THE ADMINISTRATION OF ALCOHOL IN THE TREATMENT OF DISEASE.

BY BENJAMIN W. RICHARDSON, M.D., F.R.S.

I CANNOT, I think, begin the work of the new year more usefully than by recording a few observations on the employment of alcohol in the treatment of disease.

In the earliest part of my professional career—twenty-five to thirty years ago,—the lessons taught in the English and Scottish schools were very simple and, admitting the premises on which they were based, sound. They were the continuation of a wave of the Brunonian theory, though the name of the theory and much of its curious history had become entirely forgotten. The value of alcohol was thought to lie in its power of sustaining the animal body during "asthenic" states, and of saving the body from exhaustion of its "excitability." Alcohol, therefore, was administered, with moderate freedom, in cases of general dyspeptic debility; of hæmorrhages; of fever, when the pulse was failing in power; of syncope; of shock; of exhaustion from a discharge from the body, as from an abscess, or from free secretion of milk in the woman; of depression from severe inflammatory states, as in carbuncle or erysipelas; of melancholic, depressed, and nervous states of mind; of phthisis pulmonalis; of hysteria; of delirium tremens; of paralysis. It was administered in all cases in which it was considered that the patient would be likely to sink, or in which the patient was thought to be actually sinking into death. The universality of the remedy, as an aid to substances more purely medicinal, was, in fact, admitted by nearly every practitioner.

A little later, the employment of alcohol in medicine became, I will not say more systematic, but more extended. The teachings of Dr. Todd led many practitioners to "rely,"

* Water, chloride of sodium, chloride of potassa, carbonate of potassa, carbonate of lime, &c., are examples of inorganic substances; starch, sugar, fats, fibrin, albumen, casein, pepsine, &c., of organic ones.

† Outlines of Physiology, by J. Hughes Bennett, M.D., F.R.S.E., &c., p. 7. 1872.