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ORDINARY MEETING, FEBRUARY 19, 1883.

H. CADMAN JONES, ESQ. IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed.

The following Paper was then read by the Author :—

ON CERTAIN THEORIES OF LIFE. By Surgeon-General C. A. GORDON, M.D., C.B., Honorary Physician to Her Majesty the Queen. In France, Officier de la Légion d'Honneur, &c.

SYLLABUS.

1. *a.* "Science" in the sixteenth century.
   b. "Scientists" of that period.
2. Paracelsus and his theories.
3. Bishop Hall.
4. Democritus—Frascator.
5. Chinese Philosophy.
6. Buddhistic Philosophy.
7. English thought.
8. Possibility founded on assumption.
9. The microcosm and the macrocosm.
10. A comparison and a contrast.
11. Views combated.
12. Latest theories.
13. Errors of conception.
14. Experiments and scepticism.
15. A scientific Frankenstein.
16. Descartes.
17. One animal; not many.
18. Phenomena of life.
19. Summary and conclusion.

1. (*a.*) IN the sixteenth century the doctrines of astrology and of alchemy held ascendancy in Germany. Abuses of every kind were rampant; superstitions reigned supreme;

men and women everywhere saw ghosts, spectres, and wehr-wolves; "demoniacal possessions" were among the recognised ills to which rich and poor alike were liable; and jugglers, friars, and fanatics wandered through the country, making easy capital out of popular credulity.* This state of things, dating from a still more distant time, prevailed also throughout Europe generally; nor was it destined yet a while to give way before the light of advancing "knowledge."

(*b.*) The professors of alchemy were the "scientists" of that period. Of the so-called science, we read that, "as a system or delusion, it beguiled men's minds;" that among its professors were men of the highest types, most illustrious adepts, some of them men of world wide reputation in learning as well as in science. We further learn with regard to them that "they were patient and assiduous workmen, but blind to the uniformities which exist in nature; ignorant of the laws of causation which determined the class of phenomena they were engaged in producing;" that therefore they committed all their experiments to blind chance, torturing every natural object with which they were acquainted, in the hope that something good might turn up; that occasionally they were rewarded by the discovery of some new substance with which they were not before acquainted; but that, from beginning to end, their "researches" were a work of chance.†

2. A prominent "scientist" of that time was Theophrastus Bombastus Von Hohenheim—more generally known as Paracelsus.‡ It is recorded of him that he laid hold of a notion with regard to the nature of life which easily seduces the imagination of those who do not ask for rational proof, namely, that there is a constant analogy between the macrocosm, as they call it, of external nature, and the microcosm of man; that this harmony and parallelism of all things can only be made known to us by Divine revelation;§ and that therefore all the heathen philosophy was erroneous. He thought man had a sidereal—otherwise immaterial—as well as a material body; that the former, for a time at least, survived the latter—thus explaining the apparitions of dead persons, in which he firmly believed; that this starry influence was connected with each corporeal element; that to the sidereal salt was assigned the material consistence of the body, to the sidereal sulphur its growth and animal heat, and to the sidereal mercury the

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* *Biographie Universelle*, art. "Paracelse."
† Meryon's *Hist. of Med.*, vol. i. p. 158.
‡ Born near Zurich, A.D. 1493.
§ Meryon's *Hist. of Med.*, vol. i. pp. 339, 346–351.

conservation of the fluids. He maintained the animation of all things, and he peopled the world with sylphs, nymphs, gnomes, and salamanders. According to his physiology, an *archæus* or demon presided in man's stomach, whose mission it was to separate the poisonous from the nutritious part of the food, and direct each into its proper course.* Unfortunately, although Theophrastus Bombastus Von Hohenheim could so far "quote Scripture" as to speak of Divine revelation as a source of knowledge, his habits gave the lie to his assumption in this respect.† What, then, was the character and style of the man who thus for the time being became a teacher of his fellows in matters scientific? A vagrant, passing whole nights in low taverns drinking with boors as sottish as himself; who, having in open court in Bâle insulted the magistrate before whom he was brought, fled the city, to die in poverty and misery in Saltzburg. Whence came his "inspiration"? By his own account, handed down to us through his biographies, he obtained it by having, in the vestibule of *Hades*—he used a stronger term than that—got possession of the works of Galen, and in the same place held lively disputes with Avicenna. And yet, extravagant as were his theories as just expressed, they attracted many ardent (and even pious) minds at the time, and, according to the accounts from which I quote, were afterwards woven into new schemes of fanciful philosophy.

3. Bishop Hall,‡ one of the best and wisest men of the period in which he lived, was thoroughly imbued with "science" according to the interpretation just quoted. Here is the state recorded by him as concerning "the superstitious man,"—"He confessed that old wives and stars were his counsellors. His night-spell was his guard, and charms were his physician; he wore Paracelsian characters as a remedy against the toothache, and a little hallowed wax as an antidote for every ill." History records at least one prescription of a "counsellor" thus referred to; but then it was for a poor patient. Having, in the first instance, obtained a penny and a loaf of bread, she approached the patient, and in a low voice, repeated near him the lines :—

> "Thy loaf in my hand, and thy penny in my purse,
> Thou art never the better, and I—am never the worse."

Two hundred and fifty years ago, spells, charms, and specifics were worn outwardly; now the latter are taken inwardly; the

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* Meryon; quoted from Sprengel, vol. iii. pp. 311–316, 382.

† *Id.*, pp. 342–352; also *Biographie Universelle.*

‡ Joseph Hall, Bishop of Exeter and of Norwich, born 1574, died 1656. See Brand's *Popular Antiquities*, vol. iii. pp. 269, et seq.

difference in method indicating the great importance of modern advance in this particular direction.

Thus it was that the language of "scientific" opinion at the time referred to was moulded in accordance with the prevailing tendency of thought of the period, that tendency including within it the two very powerful elements of credulity and superstition. How far the same principle applies at the present day, we shall see as we proceed with this paper.

Here, however, I would beg to interpolate an explanatory remark. It is, that in the observations about to follow, I purposely omit the names of living men whose views I quote, my sole object being to deal with opinions, not with men as individuals. In the references given in foot-notes, however, means are afforded for tracing the various authors quoted. With certain of the views to be noticed I find myself in accord; with others, however, I have the misfortune to be absolutely at variance; therefore it is that in this address I am especially desirous to avoid every appearance of personality.

4. But Theophrastus Bombastus von Hohenheim had not in reality altogether evolved from his inner consciousness, even by the aid of the ghosts of Galen and Avicenna, the theories which, coming from a man of his high intellectual and moral standing, as already shown, attained the great popularity accorded to them by the learned of that time. His theories were in fact a reproduction, but with a modification, of others not less than nineteen hundred years old, even at the date when he appropriated or imitated them. Their originals, in several respects at least, are to be found in the philosophy of Democritus, regarding whom and which a few remarks are here deemed *à propos*. His birth is variously assigned to B.C. 494 and 460; he died B.C. 361. According to his doctrine, all that exists is vacuum and atoms. The atoms are the ultimate material of all things, including spirit. They are uncaused, and have existed from eternity. They are invisible, but extended, heavy, and impenetrable. They vary in shape. They are in motion, and this motion is eternal. There is an innate necessity by which similar atoms come together. Soul and fire are of one nature; the atoms of which they consist are small, smooth, and round. It is by inhaling and exhaling such atoms that life is maintained. It follows that the soul perishes with, and in the same sense as, the body. There is, in fact, no distinction made between the principle of life and the higher mental faculties. He considered that sensation is our only source or faculty of knowledge; he admits no mental faculty apart from sensation. Tradition attributes to him such sayings as: "There is nothing true;

and if there is, we do not know it." "We know nothing, not even if there is anything to know." He denied the creation of the world as in any way due to reason. He is stated to have believed in the existence of a higher order of beings than man, although of the same form, like him composed of atoms, longer-lived, still mortal, who influence human affairs, some for good, others for evil, and who appear to men in dreams. He considered the *summum bonum* of life to consist of tranquillity of mind,—a condition, according to him, incompatible with marriage.

But he who thus wrote was a bachelor. So also was Paracelsus. How, then, could either of those scientists and philosophers comprehend in their fulness the importance, the obligations, the responsibilities, or the dignity of *humanity?* I cannot say.

In the early part of the sixteenth century Frascatorio* revived the theory of atoms of Democritus, and by representing the atoms as demons he struck out a doctrine in strict keeping with the circumstances of the period. These demons were popularly believed to be emanations from the Deity; and the belief engendered a cabalistic theosophy, to which, according to the author quoted from, the medical delusions of the day were the most fitting accompaniments. The delusions here indicated were entertained in the minds of men as affiliated subjects of contemplation, just as we may observe nowadays a combination of heterodox doctrines finding a congenial lodgment in one brain.

5. Proceed we to the farthest East. In China, some centuries before Democritus in the West announced the system now alluded to, questions similar to those to which he furnished the replies quoted were being discussed, and with a result not altogether different from what occasionally transpires at the present day, namely, absolute disaccord. We read† that during the first historical dynasty of China, B.C. 1122–250, Duke Ai propounded a theme in which occur the questions, thus expressed:—

> "By which of the elements five‡ is the work of Nature done?
> And of all the ten thousand things that are, say which is the wondrous one?"

Whereupon Chi Nien exclaimed: "This is but a question of

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* Born 1483; died 1553. See Brand (John), *Observations on Popular Antiquities*, vol. iii. p. 269; Meryon's *Hist. of Medicine*, vol. i. pp. 381–383.

† *Historic China.* By Herbert A. Giles. De la Rue & Co. 1882. Pp. 22, 23.

‡ Viz., earth, wood, metal, water, fire.

natural philosophy; what difficulty is there in it?" And so he seized a stylus—for the hair-pencil, as an instrument for writing, had not then come into use in the "Central Flowery Land"—and thus he wrote:—

"By all the elements five is the work of Nature done;
And of all the ten thousand things that are, there is no particular one."

And so the promised distinction was awarded to the gallant and learned author; for he was none other than generalissimo of the Ch'in State. But no sooner was he "invested with the golden goblet" than forward sprang Wu Yüan, who declared that Chi Nien's answer did not dispose of the theme in a proper and final manner. Now, Wu Yüan also was a military officer high in rank, generalissimo of the Ch'u State; for in those early days promotion was by selection; competitive examination was in force, and there were men who could wield alike the pen and sword, even as these powerful weapons are represented by a statue of our own Lord Lawrence, "Saviour of the Punjab." And so Wu Yüan wrote:—

"By *truth** of the elements five can most good work be done;
And of all the ten thousand things that are, *man* is the wondrous one."

And so the "golden goblet passed to him." But do not the replies thus given represent the divergence of opinion still and now existing regarding the subject of this theme? The subject the same in the examples given in this and the preceding paragraph; the language alone different, but in each expressing its national train of thought.

6. Returning Westward, a system of philosophy arose in India in the sixth century before our era, which still retains its hold over many millions of our race, including the ignorant and the very highly educated; and which, if my interpretation be right, supplies the originals of many among the theories which at the present day are enunciated and accepted as the outcome of our most advanced scientific investigations in regard to things organic. The chief points of the philosophy in question necessary to be quoted for our present purpose are the following, namely:—This world, like others, is periodically destroyed. The sum of the elements of its inhabitants (men, animals, angels, &c.) who lived within it each time, produces a new world. The number of these beings never varies, save on those few occasions when one of them attains Nirvāna. In every other case, as soon as an animal dies another is produced, under more or less material

* Truth is said to be a moral equivalent of *fire*.

conditions. The article quoted continues:*—While Buddhism occasionally yielded so far to popular phraseology as to make use of the word "soul," it denies altogether that the term is anything more than a convenient expression, or that it has any counterpart in fact. According to the same system of philosophy, "There is no life outside the domain of transmigration; and by the inevitable law of change, that which causes existence of any kind would itself be the cause also of decay, and bring with it, after a time, the whole train of evils from which the tired heart of man seeks relief." "Metempsychosis gives way to metamorphosis. As one generation dies and gives way to another, so each individual in the long chain of life takes up the struggle precisely where that preceding left it off. There is nothing eternal but the law of cause and effect, and change. Nothing is, everything becomes. And so organised life passes away; there only remain the accumulated results of all its actions. One lamp is lighted at another; the second flame differs from the first, to which it owes its existence. A seed grows into a tree, and produces a seed from which arises another tree, different from the first, though resulting from it." But—the sage is recorded to have said—such inquiries lead to no profit. And few among us will question the conclusion thus expressed.

In the extracts quoted, have we not the earlier, if not original edition, of views and theories of late years being served up as if they were fresh and new? Have we not also in those extracts to a great measure the precise language which the most recent phase of science has made its own? To my mind, we certainly have to a great and very suggestive extent.

7. In 1880 the state of scientific opinion in Europe generally was described as follows:†—"Positive science is a new agent in the world. The strength of positive science lies in the fact that Nature is ever present to give it proof. Nature cannot lie, and any error in science must arise from our interpretation of her oracles. Free-thinking and free-speaking were never before so rampant as they are now. Our most learned reviews appear, month after month, laden with atheism, infidelity, and neo-paganism. Man is no longer better than the fossil monster excavated from the rocks—apes, quadrupeds, reptiles, and jelly-fish; a slavish engine; a tool of flesh and blood, to be worn out, then broken and flung away. Scientific materialism preys upon the very noblest natures.

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* "Buddhism," *Encyclop. Britan.*

† *The New Truth and the Old Faith*—Preface.

8. Among "scientific" explanations of life and its phenomena which at the present day have taken the place of those accepted in a "superstitious" and credulous age, are the following:—"Vital actions are reduced to molecular movements of the protoplasm of which the body is composed. The properties of living beings are—as much dependent upon the mere qualities and nature of the material aggregate which displays them, as the properties of a metal or the properties of a crystal.—Our future Shakespeares are potential in the fires of the sun." In other words, *life* is no more than a form of energy or motion; the vital forces of the organism merely correlates of the ordinary physical forces; the phenomena of the organism the result of transformations of the heat which it receives from the sun and energy stored up in its food.*

But then, and more recently, this sentence occurs:—"There is no agreement at present respecting the real heat of the sun; what is certain, if we take as our basis the labours of a distinguished 'scientist,'† lately deceased, is, that none of the chemical compounds known to us on earth can exist on the surface of the sun." An eminent professor writes:—"I do not know what to make of the corona. Its spectrum proves that a considerable portion of light comes from some exceedingly rare form of gaseous matter, which cannot be identified with anything known to terrestrial chemistry."‡ Therefore, if the views quoted be correct, the future Shakespeares potential must, according to science, have bodies in material different from their antetype, and consist physically of compounds unknown on earth; their potentiality depend upon solar heat, regarding which nothing is certain beyond the fact that it exists. Verily we have already reached a triumph of "science."

According to a very distinguished modern author, "*If* we admit that all parts of the organisation and instincts offer individual differences,—that there is a struggle for existence, leading to the preservation of profitable deviations of structures or instincts, and that gradations in the state of perfection of each organ *may* have existed, each good of its kind,"—then, in that case, and on those suppositions, "the difficulty, at first sight insuperably great, cannot then be considered real;" "that the more complex organs and instincts have been perfected, not by means superior to, though

* *Life and its Physical Basis*, by H. Alleyne Nicholson. *Trans.*, vol. xiv. pp. 281 to 286.

† Henri St. Clair Deville.—See *Knowledge*, Dec. 8, 1882, p. 454.

‡ Professor Young, *Popular Astronomy*, by Newcomb, p. 278.

analogous with, human reason, but by the accumulation of innumerable slight variations, each good for the immediate possessor." The same author writes: "Why do whole groups of allied species appear, though this appearance is often false, to have come in suddenly in the successive geological stages?" And then follows this sentence:—"I can answer these questions and objections on the *supposition* that the geological record is far more imperfect than most geologists believe."* In other words, in order to support a theory confessedly founded upon an assumption, it becomes necessary further to suppose that the entire fabric of our earth is itself at fault. Surely, also, the similarity between the main point thus expressed and certain points of the Indian philosophy already alluded to is rendered self-evident.

In reference to opinions of which those quoted are examples, a very able and competent critic ironically comments thus:—"I believe that for the formation of the most complex form, it is not necessary to know how to make it. That being so, there cannot be supposed to be an All-wise Creator. I believe that Natural Selection is the Great Creator. I believe that there was no intelligence presiding over the plan of Nature. Cuvier, indeed, says that there was, but what do I care for Cuvier? I believe that the 'struggle for life' which I have fancied must have exterminated millions upon millions of luckless failures. It may be assumption on my part, but I deal in assumptions. I believe that all animals have been changed by some accidental benefits; but if you ask me to point to any existing animal, and say how it could be benefited by some change, that is quite another question, and one with which I do not consider that I have anything to do. I believe that many a one of even the lowest animals in the scale has a really wondrous and beautiful organisation, and you say that if so you do not see how it can be improved. You may add, why can't they leave well alone?" † Why, indeed, can't they leave well alone?

It has been asked: How is it, according to the theory quoted, that all organic existence does not advance together to a common elevation? The difficulties are as great for the theory in view of the large number of parts it does not attempt to include, as in the facts it strives to embrace. The most diversified types of animals and plants are everywhere found under identical circumstances. In explanation of the

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* *Origin of Species*, pp. 404–408.

† See *Articles of Darwinian Faith*, by the Rev. F. O. Morris, B.A., p. 58, et. seq.

doctrine of ascent, we are told that certain orders have fallen out; but we need a scientific account of action of environment to account for this falling out,—and such an account is not forthcoming.*

9. One of the great leaders in regard to scientific thought recently expressed himself after this manner:—"The conception of the life of one of the higher animals as the summation of the lives of a cell aggregate, brought into harmonious action by a co-ordinate machinery formed by some of these cells, constitutes a permanent acquisition to physiological science. Seeing that the actions called vital, so far as we have any means of knowing, are nothing but changes of place of particles of matter, molecular physics are looked to to achieve the analysis of the living protoplasm itself into a molecular mechanism. Living matter differs from other matter in degree and not in kind; the microcosm repeats the macrocosm; and one chain of causation connects the nebulous original of suns and planetary systems with the protoplasmic foundations of life and organisation."†

And so the astrology of the sixteenth century is "science" in the latter portion of the nineteenth! Surely extremes have here met! Identical in idea and in expression is the language they severally suggest. But the idea, resuscitated, and expressed with all the force of novelty, was readily caught up, echoed and re-echoed among the spheres scientific thus, "the powers that act on the living body are the same as those which act on every portion of the globe, its *materials* and inhabitants,"‡—and so on. And, to repeat words already used, these theories attracted many ardent minds at the time.

10. In reference to the same subject an anonymous author had already written, "This large view of evolution only shifts the original plan farther back, and dates the Creator's invention from the era of the primordial nebula—or, mayhap, from all eternity; it only reveals the mystic lines of life—the secret position of all things imprinted on the flaming winds of chaos. If, then, we are told that the fervent haze of atoms composing the primitive nebula contained the promise and potency of all terrestrial life, we are still face to face with a vast design.§ It is the great task of the evolutionist of the future to trace out the development of life on the earth, and show how it

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* *Science and Religion*, p. 158.

† *Transactions of the International Medical Congress*, 1881, vol. i. pp. 99, 100.

‡ See *Critique on Criticisms on the Simplicity of Life*, p. 41.

§ *The New Truth and the Old Faith.* By a Scientific Layman. 1880, p. 86.

extended its empire through water, land, and air in every clime and habitable region. At present the evidence collected is so fragmentary, uncertain, and eked out by guesses, that an attempt to do so would draw largely on the imagination,—as, indeed, the theory has done in the past. But this protest, as it were, written in advance, was unheeded. So also were many more. As in the sixteenth century, so in our own time, an eminent scientist has got hold of "a notion which seduces the imagination of those who do not ask for a rational proof."

After all, it may be asked, are not men's minds even now, as in the sixteenth century and times long antecedent to that date, being led astray by words and names rather than by things actual and real? What is it, as a matter of fact, that is indicated by such expressions as chemico-physical force, directive force, plastic tendency, formative force, variability, struggle for life, generative variability, morphological force, evolution, and so forth, but terms which, in their ultimate solution, refer to final causes—the operation and existence of which they are intended to obscure or ignore? These several terms, introduced by modern science, are no more to be grasped and comprehended by man than are those—grander in their significance—which it is their object to supersede. But the thing cannot be. As with the one, so with the other, "belief" on our part is demanded. I, for myself, prefer to attach my belief in the theory of causation to that which, to my mind, is dignified and elevating, rather than to a doctrine which leaves me, physically and morally, no more than a mere "evolved organism."

11. The Victoria Institute took an early opportunity to combat the views thus alluded to. From a very able paper read before it the following remarks are quoted:—"We are told that the protoplasmic foundation of life and organisation is connected with the nebulous original of suns and planetary systems by one chain of causation. Can an individual be found who will undertake to defend or to expound these nebulous utterances? That talk of this kind should be deemed likely to enlighten the medical profession, or assist in any way to advance education, is most extraordinary. Is thought to be silenced by such utterances as this? So far from anything like a chain of causation having been shown, not two links of such supposed chain have yet been discovered. The more this metaphysical utterance is thought over, the more difficult does it seem to get any definite meaning out of it." *

An able writer also discusses the same subject after this

* *On the Decline of Modern Thought. Trans.*, vol. xvi. p. 201.

manner: *—"The phenomena presented by inorganic matter, or by organisms deprived of life, afford us no ground upon which to base the theory that *life* and *mind* can be 'evolved'—according to the phraseology of the day—from spontaneous self-action of either. It has been well remarked that in plants the act of living is carried on by 'the life force' causing the simpler chemical elements to be built up, or united into more complex ones; while in animals the 'life force' causing chemical change produces a change which is the reverse of what takes place in the plant; namely, *a pulling* apart of complex chemical substances, such, for example, as are contained in food, and reducing them to simpler forms. The life-processes of the plant are chiefly concerned in building up inorganic food; those of the animal in pulling to pieces organic food; yet plant and animal, in the performance of the functions special to each, produce anew very various chemical organic compounds, some of which the chemist can, but the majority of which he cannot, imitate. This principle of life, or occult power by which all organisms live, is not a mere combined working of the chemico-physical forces; it is something above physics and chemistry, though using and controlling them to its needs. Nor does the mere name applied at any particular date to this mysterious and inscrutable power afford us aid to the comprehension of its actual and demonstrable nature. The discoveries of science render manifest more and more of the wonderful workings of *life;* each new discovery but furnishes a starting-point whence further investigations are to proceed; but as to the thing itself—the aim and object of inquiry—farther and farther does it elude the search, farther and farther vanish into the inscrutable, so long as we bring to bear upon it only the means afforded by *science* pure and simple. And if these remarks are applicable in regard to plants, how much more manifest is their importance when referred to animals; how infinitely greater when transferred to man."

12. A further phase of our subject now in hand reaches us from Germany. It is this:—"Living protoplasm owes its property of *life* to the presence of aldehyde groups, which are characterised by intensely active atomic movement." Regarding death, we are told that "when death takes place, it is coeval with, and *caused by*, a transformation of these aldehyde groups into amyl groups, with diminished molecular motion, thus leading to cessation of action." †

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* *Science a Stronghold of Belief.*

† *Medical Press and Circular*, August 16, 1882, p. 142.

Similarly we follow up the changes which, according to the most recent—shall we say advanced?—teachings of science, are coeval with and cause *death*. The transformation from life unto death—otherwise of the aldehyde groups just alluded to—is, according to the same teaching, the change into one or another, or it may be all, of those chemical products; the names alone of a few, very few, I can now enumerate, thus: amyl-alcohol, amylamine, amyl-diethyl-benzene, amyl-methyl-benzene, and so on.*

We follow up the definitions thus given, and here is what, by a recognised authority on such subjects,† we are led to. We ask, In what, precisely, do aldehyde groups consist? We learn that "they are derived from primary alcohols by elimination of one or more molecules of hydrogen, without introduction of an equivalent of oxygen, so that they hold a position intermediate between the alcohols and the acids." Again: "Diatomic alcohols can yield by oxidation two classes of aldehydes, according as one or two molecules of hydrogen are removed." And so on. And then this sentence occurs: "Only a few of these compounds have been obtained."

In what manner are theories, of which those stated are examples, to be designated? It has, indeed, been said "that science is nothing but *une langue bien faite*"; or, in other words, that the one sufficient rule for discovering the nature and properties of objects is to *name* them properly.‡ But in the quotations given, have the nature and properties of the objects indicated been so named?

13. In the second quarter of the present century, a London physician of eminence thus wrote regarding "errors of conception," and his remarks are appropriate to our present theme:—Whether their objects relate to real or imaginary things, the person "reasons very correctly; he assumes things to be true, and reasons from those false premises with precision. Instances of this prevail in the world in religion, philosophy, medicine," &c. The author quoted from gives instances of such speculations from the works of an older writer; he states that upon such assumptions many followers of the leader alluded to act as if they were truths; that, having been taught such things, they uphold them as if they were realities; that they do this because they have not the fortitude to exercise their own thoughts. Men professing these opinions,

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* Fownes's *Chemistry*, 1877, p. 244.
† Op. et loc. cit.
‡ Condillac; see Meryon, *Hist. of Med.*, vol. i. p. 189.

—so says the physician who writes,—can act in a body.* He further writes: †—"The doctrine of materialism, and also the doctrine of immaterialism, being investigated, it must end in the acknowledgment of our ignorance. The nature of the mind never can be ascertained by man. When a man says that mind is material, he assumes that he knows the properties of matter; and it is certain that no man possesses any such information. We see the properties of matter, and we see the operations of the mind, and as they are evidently different, we conclude that the essence of each is different; but we are not certain of this. If any man assume that the mind is material, and that it is annihilated with the body, he assumes what he has no right to do. There may be senses and capacities suited to the perception of the powers, proportions, and substance of spirits." But such senses and capacities pertain not yet to man.

Seventy years ago, it was observed by an eminent member of the medical profession ‡ that "the wisest and best of us are apt to fall under the domination of some fixed idea—that when the mind is fixed upon some particular dogma, its capacity of judging of the doctrine in which that dogma is included in relation to others is impaired." The remark refers to certain controversies of the fifteenth and sixteenth centuries. But is it inapplicable to those of the present time? For my part, I believe that it is not.

Another author writes:—"The vital forces are a class of agencies extremely difficult to investigate, from their acting in living bodies side by side with the forces found solely operating in dead matter, and from the impossibility of subjecting living beings to experiment without risking the destruction or derangement of the vital forces, by the unavoidable interference with their normal action which experiment necessitates." §

"All the materials of our knowledge," says a very eminent writer,‖ "we share with animals. Like them, we begin with sensuous impressions; and then, like ourselves, and like ourselves only, proceed to the *general*, the *ideal*, the *eternal*. In many things, indeed, we are like the beasts of the field; but, *like ourselves*, and like ourselves only, we can rise superior to our bestial self, and strive after what is *unselfish* and *good*."

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* *Armstrong's Lectures.* Baldwin & Cradock, London, 1834, p. 717.
† *Ibid.*, p. 724.
‡ Meryon, *Hist. of Med.*, vol. i. pp. 229, 230.
§ *Dr. George Wilson's Life of Dr. John Reid*, p. 51.
‖ Max Müller. See *Evolution of the Human Race from Apes.* By T. W. Jones, F.R.S. 1874, p. 66.

An eminent divine recently said * of men of science, that they dealt with material objects outside of ourselves, and not belonging to the inner vision, to which the only realities were the things which "eye hath not seen nor ear heard, and which hath not entered into the heart of man." Repeating the idea already quoted, he says: "When men of science say they understand matter, this is exactly what they do not understand." And then he adds—shall I say prophetically, and, judging from the estimation in which what in the sixteenth century was called "science" is now held?—"Future wisdom will laugh at the unhealthy period in which we live."

14. Is it not true that the effect of all experimental science is to create a spirit of scepticism, which, if kept within proper limits, may be really useful? for we ought to prove all things, and hold fast only that which is good. If pushed beyond these limits it has this effect: that the mind becomes at last sceptical of its own scepticism; the experimenter, like the followers of Confucius, brings himself to "believe in anything, or everything, or nothing." Unhappily the train of thought thus induced is not altogether limited to things cognisable by the bodily senses. But there are exceptions to this rule. For example: one of the most accomplished of experimental philosophers is reported as expressing himself thus:—"I have noticed during years of self-observation that it is not in hours of clearness and vigour that this doctrine ('Material Atheism') commends itself to my mind; that in the presence of stronger and healthier thought it ever dissolves and disappears, as offering no solution of the mystery in which we dwell, and of which we form a part."†

But, in the meantime, the doctrines of which I have endeavoured to submit to you examples are being promulgated under the authority of names high in rank among the learned. As in the period selected by me for comparison of modern views, the system of the day, or delusion, beguiles men's minds. The manner in which it is affected by, and in its turn reacts on, current thought has been shown, and the tendency of its teaching indicated by the climax reached—that minerals, plants, animals, only differ from each other in degree; that, for purposes of "research," they are all alike to be examined exactly in accordance with one and the same method! ‡ In

* Address by Père Hyacinthe at St. James's Hall. See *Morning Post*, June 9, 1882.

† See Paper by J. E. Howard. F.R.S., *Trans*, vol. x. p. 107.

‡ See *Nineteenth Century*, Dec., 1881; also *Brit. Med. Journ.*, Dec. 17, 1881, p. 987.

fact, the doctrine of the ancient warrior and philosopher already quoted is reproduced and accepted :—"Of all the ten thousand things that are, there is no particular one."

15. Bearing in mind the character of the several types of materialistic theories I have attempted to summarise in the preceding remarks, I endeavour to picture to myself a being such as a scientific Frankenstein, operating in accordance with those theories, would produce; and this is the fancy portrait that presents itself before me :—Its body sidereal and material; its warmth maintained by sulphur; its blood mercury; in its stomach a demon; intellect, veneration, truth, affection, sense of duty, benevolence, pity, conscience, honour, nowhere; its companions, like its own "sidereal" elements, phantoms such as dance on walls at dead of night around the beds of men delirious; its life, changes of place of particles of matter, produced by co-ordinate machinery formed of cells, and kept in action by "aldehyde groups derived from primary alcohols;" its death, the transformation of such groups into amyl-diethyl-benzene, amyl-methyl-benzene, et cetera. I refuse to accept such solution of the incomprehensible. If this be really what comes to us as the revelation of modern advanced science, so-called, I decline to accept it, as being by its nature as described, self-contradictory, and repugnant alike to my intellectual and to my moral sense.

16. The purport and object of my remarks require that I for a little retrace my steps to a date already alluded to. Soon after the date of Paracelsus a new theory of the phenomena of life was promulgated, namely, that by Descartes. The chief points of that philosophy are well known; yet, inasmuch as in times quite recent they have re-acquired a measure of acceptance dangerous to true philosophy, and indeed to public ethics, it is well to recapitulate some of them, and at the same time to take into account the kind of man by whom they were promulgated. With regard, then, to Descartes and his theories, we learn that, born in 1596, he died in 1650; that early in life he began to distrust the authority of tradition and of his teachers. It is stated of him that he was a type of that self-reliant, harsh, and abstract spirit of science to which erudition and all the heritage of the past seem but elegant and unworthy trifling. His science was physics in all its branches, but especially as applied to physiology. His dissections of the heads of animals were conducted in order to explain imagination and memory, both of which he considered physical processes. Another object of his researches was to find out "if there is any means of getting a medical theory based on infallible demonstrations." "The sciences," said he, "in

their totality are but the intelligence of man." The mind is not for the sake of knowledge, but knowledge for the sake of the mind. He acknowledged the "idea of an infinite, perfect, and all-powerful Being, which cannot be the creation of ourselves," and our thoughts as necessarily given to us by "some Being who really possesses all that we in idea attribute to Him—the Creator of the material universe, and of all truth in the intellectual world."

According to his biographer, his theory reduced man and animals to automata, and indeed he termed them machines. In the animal the rule of absolute mechanism is as complete as in the cosmos. Reason and thought, the essential quality of the soul, do not belong to the brutes. There is an impassable gulf fixed between man and the lower animals. The only sure sign of reason is language, and language in this sense is not found save in man. The cries of animals are but the working of the "curiously-contrived machine, in which one portion is touched in a certain way; the wheels and springs concealed in the interior perform their work, and, it may be, a note *supposed* to express joy or pain is *evolved;* but there is no consciousness or feeling. The animals act naturally and by springs, like a watch. The greatest of all the prejudices we have retained from our infancy is that of believing animals think." And then this philosopher is said to have expressed himself that he would not believe that a beast thinks, until the beast tells him so itself. The sentience of the animal to the lash of its tyrant is none other than the sentience of the plant to the influences of light and heat.

The doctrines thus expressed won society and literature before they penetrated into the universities. Literary men opened their houses for readings, to which the intellectual world of Paris—its learned professors and fair sex—flocked to hear the new doctrines explained. In England these doctrines took but little hold; and in France they had passed away into neglect by the middle of the eighteenth century.

Have we not in the abstract given the original and greater part of what might appropriately at the present day be written regarding some living theorists and their theories? Strong in self-opinion, hard and uncompromising towards the views of other inquirers, materialistic to an extreme degree, yet owning to and confessing the existence of an ultimate source of causation not to be discussed or comprehended by means of physical investigations; unsympathetic towards his own kind, and, if possible, still more so towards inferior creatures; denying to the latter attributes beyond those possessed by machines. And last of all, in the extent and

rapidity to and with which such views, when first promulgated, found acceptance, does it not require some exercise on our part to bear the circumstance in mind that we *really* are now speaking of bygone times?

For myself I feel repelled by the philosophy of life thus presented, in a degree only less than by that first alluded to in these remarks. True, the later theories, like the older, are unsupported by evidence, such as, to quote a very high forensic authority, would be accepted in a court of law on a question of fact;* but they are even now being unearthed after a century's consignment to the tomb, and once again find acceptance by what is called the "intellectual world." Is it really the case that reasonable and reasoning man is expected humbly to grasp at such doctrines as are expressed above, culminating in a denial to sentient animals under the lash of a tyrant no sentience beyond that of a plant under the stimulus of light? If it be so, rather than receive them, I would commend to the notice of proselytes of the doctrine in question the sentiment expressed by a recent writer in the *Revue des Deux Mondes*, namely, that "Le plus je connais des hommes, le plus j'aime le chien."

17. In 1796 the views thus expressed were proclaimed afresh by a popular scientist of that date. The creed then taught and enthusiastically accepted was none other than that "there is but one animal, not many," a doctrine emphasised by learned professors, and, like those just now mentioned, greedily accepted by some willing votaries at the present day. In reference to this theory it has been reasoned thus,†—*If* the properties of organised tissues depend upon their organic structure, or, in other words, upon the nature and disposition of their component molecules; if, again, every organism differs only in degree from every other; if these organisms are all acted upon by the same natural forces, it follows that the actions of all animated beings must be similar in kind,—as similar, in truth, as in their organic structure. Mark the *if, if, if;* mark also the conclusion drawn from assumption as if it were reality. But that it is a reality remains undemonstrated.

18. According to a recognised authority on such subjects,—"Nature presents us in the different classes of animals with nearly all possible combination of organs, and in all pro-

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* *Fortnightly Review*, Feb. 1, 1882.

† *Races of Man*, by R. Knox, p. 477. See also Geoffroy St. Hilaire, quoted in *Critique on the Criticism of the Simplicity of Life*, by R. Richardson, p. 13.

portions. There are none but have some description of organs by which they are made familiar to us, and it only suffices to examine closely the effects produced by these reunions, and those which must form their partial or total absence, to deduce very probable conclusions as to the nature and use of each organ and of each form of organ. Thus, in rising from the simplest to the most complicated animal form, we are made acquainted with the functions of organs." Contrast we the definite and precise statements now quoted with the conjectural terms of those immediately preceding. In the one, all is assumption; in the other, the conditions indicated are cognisable by means of our senses, and in accordance with our experience.*

A particular organ or tissue is found, in one set of instances, in what is described as a fully developed and complete condition, the nature of the functions performed by it obvious to the observer; in other instances the same organ or tissue is represented by an "analogue" so rudimentary and seemingly undeveloped, so obviously unsuited to perform similar functions, that "scientists" are led—needlessly, perhaps—to ask themselves the question: Why is it there at all? To this they find a reply satisfactory to their own minds in their favourite doctrine that the circumstance indicates the process of "evolution" to be in progress. But whether towards, or retrogressively from, or beyond the creature in which the organ or tissue is in its highest or in its lowest condition of development, is left unstated. Reasoning such as this appears to have been well answered a little more than three years ago by a writer in a very influential review.† The argument of the writer in question had as its basis the several "developments," as they might be termed, of contrivances in use at different periods, in different countries, and by members of the several social classes, not in their nature very scientific, they being simply supports whereon to sit. In our own country every conceivable kind and shape, from the three-legged "cutty-stool" in the Highland bothy to the chair of state in the palace, is to be found—and doubtless many more inconceivable to most of us could readily be "discovered," were we to ransack the strange places in Wardour-street and its vicinity. And yet, in designing the several members of this very large class of contrivances, there are indications that each particular portion of every such contrivance had some

* *Anatomie Comparée*, 2nd edit., vol. i. p. 17, quoted in Mr. Fleming's *Essay*, p. 52.

† *The Edinburgh.*

peculiarity of its own; that the differences between individuals at what may be termed opposite ends of the chain of development were absolute, notwithstanding that one pervading *plan* was apparent through all. But in their manufacture, artisans as numerous as, it may be, or more so, than the articles of furniture themselves, were at work upon them; in the case of animal, as indeed of all life, only one Power, namely that of the Great Architect of the universe.

The phenomena of life in man differ in degree according to the circumstances and condition of individuals. Those observable in the natives of New Guinea, for example, furnish no criterion applicable to the higher and more civilised races of Europe and America. Each of these differs from the others; so do the life characters of the denizens of arctic regions from those of tropical; of feeders upon oils and fats from those on mixed diet, as do the latter from those on farinaceous; of men according to social position, training, associates and associations; in health as distinguished from illness; in illness as distinguished from health; and many other conditions of an altogether individual nature. In all that concerns intellectual life, the characters of races and individuals are no less distinctly marked and demarcated than those that are more purely corporeal. This phase of our subject, however, is of too extensive a nature to be entered upon now.

As in man so in animals, predisposition and temperament affect and modify the performance of the vital functions to an important degree, not in any way to be accounted for by materialistic or "chemical" theories. Various domesticated animals have a differential predisposition to contract particular maladies. Ruminants are affected by diseases which are not seen either in the equine or carnivorous animals; while these, again, have severally their peculiar affections. The temperament of particular animals is taken into account by veterinarians in relation to the nature, gravity, and probable complications of maladies affecting them.* And so, also, in regard to constitution, age, sex, and various other conditions familiar to observers, but not to be enumerated here. In fact, each individual creature must by itself be held to constitute a separate sphere for study by whoever would rightly comprehend its vital actions. Compare for a moment the characters and evident phenomena in the great and most important order, the vertebrates. These include cold-blooded animals, hot-blooded animals; those that live in the water, those that live upon the earth, and in it; those that fly, run,

* *Veterinary Sanitary Science*, by G. Fleming, vol. i. pp. 87, 88.

creep, and swim; those that are by nature nocturnal, and such as are diurnal; those that hybernate, those that do not; and some of which it is doubtful whether or not they ever sleep. Let us also allude to such phenomena as compensatory functions; the repair in some animals, the reproduction in others, of injured portions of their bodies; the development of some such portions under particular conditions, the atrophy of others. In regard to each of these, phenomena of life and functions are special, not only in species, but in individuals, and on occasions different according to period of the year, as well as in seasonal and meteorological changes. Therefore deductions drawn can have reference only to the particular individual and circumstances on and under which they are arrived at. This enumeration could easily, by its length, be made tedious, if it is not so already. But to assert that any one of those alluded to has either ascended or descended from any other, is to adduce as fact that which remains within the sphere of the conjectural.

On the present subject a well-known London physician has expressed himself after this manner*:—The changes which occur in every organic structure as years roll on are to be considered normal. They are in harmony with the dictates of nature; they are no more unnatural than the sere and yellow leaf which falls from the oak in autumn. Why one creature should live longer, or burn out sooner than another, is not clear; why tissues of the same composition should wear out in one animal after ten revolutions of the earth, when it takes a hundred revolutions to destroy similar ones in another, is by no means apparent. Why, for example, should a dog be worn out in ten or twelve years, its limbs stiff, its sight and hearing impaired, its intellect obtuse, and senile changes be discoverable in its brain and elsewhere, when a parrot may take a century for the production of the same destructive changes? To these, and to thousands of questions pertaining to the same category, notwithstanding all the investigations dictated by science, pursued throughout a score of centuries, all we can yet say in explanation is, Nature wills it so, and so it is. And the reply, precisely similar in purport, is considered to have been given centuries before our era dawned. Opinion has meantime oscillated from one extreme to another extreme; at one time obscured by a tide of credulity and superstition, at another by a flood of scepticism, doubt, and materialistic teaching; the absolute result in regard to these and many other questions relating to the nature and source of *life* that the investiga-

* See *Lancet*, August 6, 1881, p. 223.

tions of science have taught us nothing whatever beyond that which has been, and is, equally cognisable in the absence of such investigations. It is true we have numerous brilliant examples of *une langue bien faite*. But that is all.

19. Let us now briefly summarise the more important points which the rapid survey just made has brought before us. They are these :—

Two hundred and fifty years and more ago, the prevailing "cast of thought" in Europe generally was dominated by credulity and superstition.

The science of that day, conforming to the prevalent opinions, partook also of their character.

But, looking back from our present standpoint, we see that among the scientists who then lived there were some whose names are still respected, and whose authority continues to carry the very greatest weight and respect.

And also that inquirers were honest, earnest men, zealously and steadily pursuing their "researches" in quest of truth.

Yet that which by them was accepted as "truth" is now looked upon as "extravagant theories," and as "fanciful philosophy," with which men's minds were beguiled.

At the present day, the prevailing cast of thought is materialistic, and disbelief in whatever cannot be immediately appreciated by man's ordinary senses; the train of popular teaching is that all living things come from other living things quite different in kind, and that these become in their turn living things of a kind altogether different from what had previously been.

In accordance with this form of thought, scientific theories of the day in regard to *life* and its manifestations are enunciated.

And as in regard to the theories moulded by credulity and superstition, so with those on materialism and scepticism, men's minds are again beguiled with theories no less extravagant than were those of three hundred years ago.

Belief in astrology is now relegated to the effete superstitions of long-passed and unenlightened times.

But whereas under a bygone phase of thought "philosophers" held that man had a sidereal body, so now it is held by "scientists" that future poets are "potential in the sun"; that the energy of man and heat of the sun are but different expressions for one and the same thing; that the foundations of life and organisation are directly connected with nebulous originals of suns and planetary systems.

Thus the question naturally presents itself—Wherein lies the difference between the "fanciful philosophy" based

upon astrology in the sixteenth century, and the teachings of "exact science" at the present time? The phraseology in which they are severally expressed is in several respects identical.

The latest phase of "science" teaches the doctrine that *life* and *death* are nothing more than "conditions of aldehyde groups," which groups are themselves "derived from primary alcohols; also that only a few of these compounds have been obtained." This is not stated as an allegory, but as a simple matter of what is intended to represent scientific fact, and be accepted by reasonable man.

Such, then, being a few—a very few—out of the very many phases represented by "scientific" thought, it becomes subject of congratulation that in one great division of the civilised world a periodical specially intended to form the opinion of the rising generation thus addresses young men and women, namely, in America:—

"The great leaders in science need to be modest in claiming that their propositions are absolutely true, and should be cautious in announcing that they have made a new discovery. A leading scientist* gained for a season a brilliant reputation by announcing that he had discovered protoplasm to be the source of all organic life. But, soon after,† the great English microscopist, denied the truth of the leading scientist's theory, and asserted that bioplasm must be put in the place of protoplasm.

"The eulogies over the grave of one of the foremost among observers‡ are yet fresh. They lifted him to a place among the immortals, for his wonderful discovery of progress in creation by the law of natural selection.

"But now comes a writer § who has for years been studying with the best naturalists and biologists of Europe, and announces that life is not due to protoplasm, but to atomised charges of electricity conducted into the system by the oxygen of respiration. Variations, he says, are caused, not by natural selection, but by the action of electricity on reproductive germs. He holds to the theory of evolution, but not to the form of that doctrine which gave a world-wide reputation to its great apostle. The famous German professor, one of the highest authorities in Europe, is said to agree with the writer just quoted.‖

"It may not be to the point to ask who shall decide when

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* Professor Huxley.
‡ Mr. Darwin.
‖ Professor Helmholtz.
† Dr. Lionel Beale.
§ Mr. Towne.

scientists disagree? But it is certainly pertinent to say that such disagreements should make philosophers modest and cautious."

The results of philosophy and of scientific teaching in regard to all that concerns the mystery of life being thus unsatisfactory, what is it that we are taught by this circumstance? Is it not that the ways of that Great Power by and through which all created beings and things were brought into existence, and are maintained during their allotted span, are past finding out —by man, at least. Are we, then, to cease our investigation of Nature and Nature's works? By no means. On the contrary, let us investigate them by every lawful and legitimate means that are now or may become available; bearing in mind the while that

> "Knowledge is as food, and needs no less
> Her temperance over appetite;" *

and as we proceed in our investigation we shall find newer and still newer causes to admire and wonder. But, as to the Ultimate Power upon which those manifestations, and many others that are beyond our ken, depend, we may apply expression after expression in the vain hope of deceiving ourselves as to its mysterious nature save through the eye of faith,— and still that Power itself remain inscrutable.

One of the most eminent physiologists of the present day, and certainly one of the most highly respected, writes these words †:—"To imagine, then, that everything is gained by the interposition of 'agents,' intelligent or non-intelligent, between the Deity and the materials upon which He operates, is either to set limits to His knowledge and power, or to give to these agents an office purely nominal." No reflecting mind has any doubt that this earth and its inhabitants form a system, of which every part is perfectly adapted to the rest, and of which all the actions and changes, however independent, or even contrary, have one common tendency, the ultimate happiness of the creatures of Infinite Benevolence.

And finally, having regard to all that has now been said on the subject of *life*, how apt the remarks with which a living physician ‡ brings his interesting work to an end:—"Generation after generation still sends forth new speculators—ardent, sanguine, and undiscouraged by the

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* Milton, *Paradise Lost*, book vii.

† *Physiology, General and Comparative.* By Dr. W. B. Carpenter. 1857, p. 23.

‡ Fothergill, *Therapeutics*, p. 637.

failures of their predecessors—to toil at the same Sisyphean task, to be met by the same impassable bounds, to catch the same vanishing and partial glimpses, to be conscious of the same incompetency, to confess the same utter and disheartening defeat. One after another, they retire from the voyage of discovery weary and baffled, some in exasperation of mortified ambition, some having learned the rich lesson of humility; a few in faith and hope; many in bewilderment and despair; but none in knowledge," that is, of the kind they seek. But I bear in mind that in order to combat views and opinions that are abroad, working incalculable evil in the minds of many, more especially of the impressionable and the young among us, it is necessary, not only to refute those views and opinions, but to attack them resolutely. War to be successful must be aggressive.

The CHAIRMAN.—I have now to return the thanks of the meeting to Surgeon-General Gordon for his very interesting paper. I think it has one defect, and that is, I am afraid we all so thoroughly agree with it, that it will provoke very little discussion.

The HON. SECRETARY then read the following letter from Dr. W. B. CARPENTER, C.B., F.R.S. :—

"*February* 17, 1883.

"Dear Sir,—I am sorry that, as I have to lecture at Leicester on Monday evening, I cannot accept the invitation to the meeting. I am much obliged to Surgeon-General Gordon for his kindly mention of my scientific work; and may say that while I entirely accept 'Evolution' as an expression of the probable *order* of Creation, I am in full agreement with him as to the incapacity of any Scientific doctrine to do more than carry us back to a First Cause, whose *modus operandi* it is the province of Science to search out."

Mr. FOSTER PALMER.—I think it will be admitted that one point has been very fully brought out in the paper, namely, that "there is nothing new under the sun." There is nothing so striking to the student of history as the constant repetition of old ideas under new forms. This would appear to be due to the *in*ability of the human mind to get out of the track which has been beaten for us by our predecessors. I believe it was Aristotle who first discovered, or fancied he had discovered, that the heart was the seat of the affections, and we have never been able to get out of that fallacy, even down to the present day, although we now know that the brain is the seat of all the mental operations. Hippocrates spoke of nature as a sentient being, as a person; in all his remarks about nature he referred to it as a person; and people still speak of the laws of nature in a manner only applicable to a sentient agency. Again, belief in demoniacal possession, formerly so general, is now almost universally discarded by physiologists; while the Paracelsian idea of immaterial bodies is precisely the view held by those thinkers of the present day who call themselves spiritualists. For the

purposes of his argument, Dr. Gordon has taken us back two hundred and fifty years ; but I think we may safely go much further than that. Even at the present day English people—not only the illiterate, but people of education also—have quite as much faith in sundry shams as their Saxon ancestors of early times reposed in the Royal touch of Edward the Confessor, and, perhaps, with just as much reason ; and I must admit that even now in certain quarters the tendency to materialism sometimes runs parallel with a tendency to superstition. Another point which has been brought out by the paper is the absolute worship paid in the present day to long words and difficult sentences. Some scientific men, apparently for want of appropriate ideas, deliver themselves of long-winded sentences, which they present to the world as something entirely original. There may be something in the shape of ideas underlying this elaborate phraseology, but either the authors are unable properly to express them, or no one is able to understand them when they are expressed. When Huxley tells us that certain forms of animal life possess a "remarkable bilaterally symmetrical continuous calcareous skeleton," he has told us what each of us knew before, and raises a suspicion in the mind that this great wealth of words is somehow connected with a corresponding paucity of ideas. In paragraph sixteen, Dr. Gordon alludes to certain comparisons between a man and a dog. Professor Fleming, in his great work on "Animal Plagues," has most clearly demonstrated that, in spite of all the dreadful accusations brought against man as a tyrant and destroyer, he is and always has been the great physician and friend of the animal creation, and that if the dog is, as has been somewhat hyperbolically stated, the friend of man, he certainly ought to be, for man is in a hundredfold degree the friend of the dog ; and animals enjoying human protection experience an amount of health, happiness, and longevity, entirely out of proportion to anything possessed by those not so favoured. I think it will be found that those who have to so exaggerated a degree compared man unfavourably with the dog and other animals, have been wrong, and that their misanthropic nature explains the reason why they have made such a comparison. Of course, I do not accuse Dr. Gordon of having done this ; but I assert that the misanthropic nature of some men has been the cause of their finding so little sympathy among their fellow men, and being thereby induced to fall back on the brute creation. As to the sensibility of the latter to pain, I think that, after all, there is a certain germ of truth in one part of Descartes' theory,—namely, that the lower animals have not as great sensibility to pain as human beings.

An Associate [who desires to withdraw his speech as much as possible here referred to the benefits, perhaps indirect, which had been conferred on their time by the alchemists ; to his acquaintance with China and Japan not leading him to go with the author in some of his remarks ; to the doctrines of Buddhism, an Eastern theory of Creation, and Mr. Davis's recent work.

Dr. Caddy.—I should like to say a few words, because, whenever I have come here and gone away without saying anything, I have always regretted it. There is one point in Dr. Gordon's paper to which I desire briefly to

allude. He says that "the changes which occur in every organic structure as years roll on, are to be considered normal." How few of us can count among our own friends those who have lived during four generations? What a valuable addition it would be to our stock of knowledge if a body of experts would tell us the structures which have most conduced to longevity, and that have given an existence of four-score years. If we were to take the "seventies,"—the parrot, for instance,—zoologists might tell us many interesting details. Again, in the course of my travels I have never seen a bald head among the South Sea Islanders. They are every day in the salt water, and their hair gets a regular coating of the customary cocoa-nut oil. Then, in Nova Scotia and the Gulf of California, if you see a grey-headed Indian he must be very old indeed; while in the Negro you not only observe very beautiful teeth, but you also say there is plenty of room for them. As to the Tierra del Fuegians, they are all alike, and all evidently belong to the same race; and what a splendid figure the Negro possesses, in spite of the peculiarities of his physical formation! Is that peculiar crisp and curled condition of the hair, which we admire so much when seen in the European race, associated with the general formation of the Negro type? Is it the bone structure of the Negro that is the cause of, or a contributor to it? In considering the peculiar circumstances that have conduced to longevity, there is a wide field for observation among the inhabitants of the new world, the hill tribes, and the New Zealanders; but still I think it will be the microscope and chemical analysis that will have to solve the mystery.

Surgeon-General GORDON, C.B.—I have not many remarks to offer, and would preface what I have to say by stating that the general plan of my paper has relation to the point I have taken up, namely, that the language in which science is incorporated varies from period to period according to the peculiar turn of popular thought. In this, as far as the limits to which my paper was necessarily confined would admit, I have tried to give, as it were, the antidote—showing by quotations from recognised authorities those things which, to my mind, were calculated to neutralise those which I had previously cited. Hence it is that some remarks to which reference has been made as if they were mine, are not in reality mine, as will be seen by reference to the notes at the foot of many of the pages. I certainly have drawn certain deductions from a comparison of the different and opposing statements which seemed to me to be legitimately deducible from them, but I do not know that I have done anything more. An allusion has been made by one of the speakers to the benefits which man has conferred on the inferior animals. There can be no doubt that man has conferred very great benefits on the lower animals; but, on the other hand, the lower animals have conferred very great benefits on him; therefore, it seems to me, they are quits as far as that goes. But the allusion to which I specially refer was to a quotation given by me from a well-known French paper, the *Revue des Deux Mondes*:—"Le plus je connais des hommes, le plus j'aime le chien." My object in introducing that was to commend it to the notice of those who hold the doctrine to which I have referred, namely, those

who look on animals as simply machines, as manifesting no sentience under the lash, for instance, beyond what the plant does under the stimulus of light. I merely assert that the comparison seems to me to be of two very different things. However, as the subject of the alleged non-suffering by the lower animals of pain such as is felt by man has been taken up, I may here say that, according to the testimony of veterinary surgeons, many animals,—for instance, the dog and the horse,—do suffer, to all intents and purposes, as much actual pain as any of us, the domesticated animals suffering to a greater extent than those which are undomesticated. But there is one respect in which, according to my informants, animals suffer a great deal more than man, and that is, that whereas a man who is subjected to very severe and protracted pain faints, and becomes unconscious, the inferior animals never do this : so that, in reality, they do under these circumstances suffer more than man. But there is another respect in which there is a very material difference. A great deal of the suffering which man experiences is moral or mental, as well as physical. When a man has to undergo an operation, or to be subjected to some severe physical punishment, he knows in anticipation the results that are likely to follow. He can imagine, for example, the horrors of death, and realise the responsibilities that are attached to him if he should leave his family unprovided for ; whereas, none of the lower animals have any such feelings. Consequently, in this respect the animal has the advantage over us, because, while it only suffers physically, we suffer both physical and moral pain. A reference has been made to the alchemists of old. No doubt we owe the alchemists a great deal, but in speaking of science and other matters in relation to a particular period one is bound to take typical instances, and the particular type I took was that of Paracelsus, whom I quoted in order to show that the style and doctrines of a person with whom a theory having no solid grounds has originated may, nevertheless, become so marked as to carry with them the opinions of the most learned, and become, in fact, the fashion of the day. I may add that I introduced a certain number of personalities with reference to Paracelsus which I should not have felt justified in bringing forward with regard to any living man ; but, although it is often said we should separate altogether a man's public and private character, it seems to me that this is very often a difficult thing to do. According to my idea, some of the things enunciated by Paracelsus would have had greater weight had his private character been such as to have given them that weight. For example, with regard to some of the writings of men of the present day, although we may not agree with the opinions they enunciate, still, from the high and honourable character of those individuals, we accept their opinions with the respect due to all honourable and upright men. Their theories may be wrong, but we nevertheless receive them and treat them with respect. An allusion was made by one speaker to what we owe to the East. What he has said leads me to think that perhaps he takes me for being altogether a home-bred individual. I may state, however, that I also have been a great deal in the East, in-

cluding India, Burmah, China, and Japan ; and although I gave, as one of my authorities, the *Encyclopædia Britannica*, because I thought it right to give an authority of recognised standing, still my turn of thought with reference to the ancient philosophers whom I have quoted was formed after a good deal of intercourse with the people who are followers of their several systems of philosophy, and from a good deal of study which I have gone through, for instance, in China and in India. With regard to the doctrines of Buddhism, I would commend to the notice of the gentleman who was kind enough to comment on my remarks a work by Bishop Bigandet, of Rangoon,—a work containing a good deal of what is very interesting ; and although I have not read Mr. Davis's book, I attended all the lectures he delivered on the subject at the Royal Institution. With regard to the doctrines of creation which have been referred to, there is one circumstance which occurs to me that may be regarded as curious in its way. The idea which the Fantees on the African Gold Coast have of creation is somewhat peculiar. It so happened that I served among them, and I had, what I am about to tell you, from themselves. Their doctrine of the creation of man is this :—That when the Great Fetish created man, of course upon the Gold Coast, because their idea of the Gold Coast is that it is the most blessed part of the world, he made one division of mankind black and another white. The black men, of course, according to them, are the favourites of the Great Fetish, and were by him placed in that most delightful paradise, the Gold Coast of Africa—on the Coast of Guinea. Having made the two kinds of men, the Great Fetish presented before them two packets, the black man being allowed to select first, he selected a packet containing so much gold that the fact accounts for the name given to the coast. Nothing was left for the white man but what the black man chose to leave, and that was a box containing a book which taught the white man everything. It is a long time since I was on that coast, but the circumstance comes to my mind through an allusion made by one of the speakers, and I thought it might be of interest. In the same way, with regard to the quotation I have given at the close of section 18, in which the longevity of the parrot is compared with that of the dog ; the speaker who commented on this will find at the foot of the page an allusion to a well-known periodical, and he will also see that I state in my opening remarks my desire to avoid giving the names of individuals. If, however, he refers to the copy of the *Lancet* quoted, he will see that the quotation is from a very eminent London physician, and the object is not so much to give particulars as to the longevity of all kinds of animals, as to illustrate the manner in which the changes that take place in all organic beings are in accordance with nature, just in the same way as the fall of the sere and yellow leaf.

The meeting was then adjourned.