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JOURNAL OF
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VOL. VII.



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INTERMEDIATE MEETING, FEBRUARY 17, 1873.

THE REV. J. H. TITCOMB, M.A., IN THE CHAIR.

The Minutes of the last meeting were read and confirmed, and the following Elections were announced :—

MEMBER :—

The Rev. G. Calthorp, M.A., Vicar of St. Augustine's and Lecturer at St. John's Hall, 8, Highbury Quarant.

ASSOCIATES :—

William Bodkin, Esq., M.D., Chelmsford.

Miss Frances Locock (Life), Leaside, Kingswood Road, Dulwich.

Rev. G. Roberts, Thormaby Vicarage, Stockton-on-Tees.

Rev. R. Tapson, Crossway Place, Combe Down, Bath.

Also, the presentation of the following Work for the Library :—

“Transactions of the Royal Society.” Part 141.

From the Society.

The following paper* was then read by the Author :—

SCIENTIFIC FACTS AND CHRISTIAN EVIDENCE.

By JOHN ELIOT HOWARD, Esq., F.L.S., F.R.M.S., F.R.H.S., Memb. Pharm. Soc. and Botanical Soc. of France, &c.

PART I.—(a) THE ATOMIC THEORY.

AS the primary object of the Victoria Institute is † “to defend the revealed truth of Holy Scripture against oppositions arising not from real science, but from pseudo-science,” it seems to become a duty resting on each individual member

* Circumstances rendered it necessary for the Council to fix the reading of this Paper at an intermediate meeting. [Ed.]

† *Journal of the Transactions of the Victoria Institute*, vol. i. p. 5.

to help forward, as much as in him lies, the good work, and to distinguish between the false and the true.

2. With this intention, I present the following observations, resulting from a somewhat lengthened survey of the field of science, from a particular standpoint, which I will now proceed to explain.

3. Exactly one hundred years ago, from the date of commencing this paper (1872), the celebrated Lavoisier deposited at the French Academy a sealed packet, which may be said to have contained the germ of the modern science of chemistry. Before this era there had been an abundance of theories—dreams and speculations as to the relations of created substance; one of which, that of *phlogiston*, was so beautiful and so attractive, that it enlisted in its service, with a kind of fanatical devotion, even men such as Priestley and others, who with their own hands were accumulating facts tending to its destruction. Nevertheless, the element of truth was wanting. It was *false science*, and Lavoisier came down upon it with the irresistible logic of the balance and weights, and the theory is now no longer known except as matter of history. For this triumph of common sense applied to science he had the honour of being burnt in effigy at Berlin.* Truth made its way nevertheless, and this great chemist had the satisfaction of seeing his theory generally accepted before the revolutionary fury of France cut him off in the flower of his age. If anything could vie in importance with the discoveries he made, it would be his *method*, which consists in applying the balance to all chemical phenomena, and which is specially his own because he was its true promoter. Cavendish, Bergman, Margraf, had made quantitative analyses, but neither of them had thought of applying the study of *ponderal* relations to the solution of a theoretical question. This idea and the merit of it are due to Lavoisier. The method which he inaugurated is the only true method of chemical research. Not only has it not been replaced by any other, but we cannot even conceive the possibility of such replacement.†

4. Lavoisier assumed that in chemical reaction nothing is lost, nothing is created, matter being indestructible. This must be remembered, as we shall have to revert to the subject. He recognized as simple bodies those which, when submitted to the action of all *available* forces, remain constantly the same, indestructible, undecomposable. He recast the ancient notions on the nature of the elements, and put an end to the hope of

* M. F. Papillon, article "Lavoisier," &c., *Revue Scientifique*, 16 Mars, 1872.

† Wurtz's *History of Chemical Theory*, p. 12.

making transmutations. (Note A.) It is thus that the foundations were laid of modern chemistry as an exact science, now so strikingly contrasting with the dreams of the alchemist, that the effect produced on the minds of his contemporaries by the works of Lavoisier was (as remarked by my father,* who was then commencing to occupy himself practically with chemistry) "like sunrise after morning twilight."

5. The early part of the present century was marked by steady increase of knowledge based on the above foundations. Among the foremost names in science which its course has witnessed I rank John Dalton, who was at once a profound philosopher and a man whose personal modesty contrasted strongly with that of some would-be "thinkers" of the present day. He investigated the facts of definite and multiple proportions in the combination of bodies. He is known as the framer of the Atomic Theory, which (differing widely from the mere speculations of Lucretius and of those from whom this Roman drew the inspiration of his noble poem), sought to assign a constant and definite weight to the ultimate individual particles of each body, and assumed that combination between two kinds of matter takes place, not by penetration of their substance, but by juxtaposition of their atoms. The definite proportions in which bodies combine represent the constant ratio between the weight of the juxtaposed atoms. If a given compound be formed by the juxtaposition of atoms of different nature, each having a definite weight, it is clear that the sum of the weights of these atoms must represent the weight of the compound, and the smallest conceivable quantity of the compound will be that which contains the smallest possible number of elementary atoms. This is called a *molecule* of a compound body, and the weight of this molecule will evidently be formed of the sum of the weights of all the elementary atoms which it contains.

6. All this presupposes a certain definite view of the material universe, such as is well expressed by Newton. "All things considered, it seems probable that God in the beginning formed matter in solid, massy, hard, impenetrable, movable particles, of such sizes, figures, and with such other properties, and in such proportion to space, as most conduced to the end for which He formed them; and that these primitive particles being solids are incomparably harder than any porous bodies compounded of them, even so very hard as never to wear or break to pieces, no ordinary power being able to divide what God himself made

* Luke Howard, F.R.S., born in 1772, the year of the deposit of the sealed paper (above). Modern chemistry thus seems to me (as it were) only two generations old.

one in the first creation. Whilst the particles continue entire they may compose bodies of one and the same nature and texture in all ages; but should they wear away or break to pieces, the nature of things depending on them would be changed."

7. Thus Newton expresses the same conception of matter which I have before alluded to as lying at the foundation of all modern chemistry; also calling to mind that it constituted the basis of the oldest philosophy of which we have any record, as handed down from Chaldean sages, and through Egyptian priests to those Greek philosophers whose views are clothed in elegant verse by Lucretius:—

"Nam si primordia rerum
Commutari aliqua possent ratione revicta,
Incertum quoque jam constet quid possit oriri,
Quid nequeat."

8. My own acquaintance with the Atomic Theory commenced at the time when it began to be not only confirmed and illustrated, but carried into unexpected regions of thought; as, for instance, in relation to the simple and definite proportions in which the combination of gases takes place, as shown by Gay-Lussac, who discovered the facts, or by Berzelius, the great Swedish chemist, who not only determined the atomic weights with precision, but gave to chemistry its own language and the use of formulæ adapted to the idea of dualistic compounds. At this time Sir Humphrey Davy had illuminated the science by his brilliant discoveries, and the theory began more and more to illustrate the axiom of the book of Wisdom, that the Almighty acted in creation,—

Πάντα μέτρῳ καὶ ἀριθμῷ καὶ σταθμῷ διατάξας.

9. It was therefore with some pardonable enthusiasm that I followed this course of instruction, and certainly with the thought that the explanation of the phenomena of the visible world was much more simple than I now regard it as being. The further progress of the science has made us acquainted with many things at that time little suspected, and the application of the theory to the study of organic chemistry has shown us an almost infinitely diversified combination of organic matter, having for its basis but a very few elementary bodies. It has become necessary to assume the existence of numerous *radicals* or *compound elements*, such as *cyanogen*, which, though formed of carbon and nitrogen, acts like a simple substance; but when one such substance had been isolated, it was quite a fair and legitimate supposition that others would in due season be manifested, and now that this hope has been realized we can no longer admit the reproach made by a French chemist against

the view of things referred to: "La chimie d'aujourd'hui est la chimie des choses qui n'existent pas." We can no longer doubt the real existence of *ethyl*, and *methyl*, for instance (Note B); nor can we doubt that both are products of the same infinite Wisdom, though one of these be through its abuse, relegated by certain persons to the kingdom of darkness. Unlike *phlogiston*, these *compound elements* may be said to be fairly demonstrated as existing in reality, and not merely in the imagination of the theorists.

10. When such a theory is found useful in a thousand ways, when missing links are established through its agency, and its lights are confirmed by the test of experience, it seems sufficiently established to take its place among the most important discoveries of mankind. What, indeed, can be a greater triumph for the Baconian school of philosophy* than to show that the labours of a few microscopic chemists, of men whose ideas might be supposed to be in a manner limited to the comparatively narrow field which their researches embraced, have done more towards the elucidation of one of the most abstruse questions on which the human mind can be engaged than was effected by the profoundest intellects of the ages that preceded, furnished with all the learning of the times in which they flourished, and inured to habits of abstract and subtle disquisition? (Note C.)

11. Although not insensible to the difficulties involved, I still accept as true and proven science the Atomic Theory, believing with Professor Canizzaro that "the existing theory of molecules and atoms is but the crowning of the edifice whose foundations were laid by the chemist of Manchester." I notice with much pleasure that this learned Professor pressed upon the Chemical Society the importance of the recognition of this view of the subject. In the Faraday lecture, delivered before the Society on May 30, 1872, whilst adverting to the "complete transformation through which our science is passing," he recalls the minds of his audience to the era of which we have been thinking. "Go back," he says, "to the times of Dalton, and read, in the history of chemistry by Thomas Thomson, the confession by that chemist of the effect produced on his own mind by the explanation of the Atomic Theory which Dalton gave him in the course of a short conversation. 'I was enchanted,' he says, 'with the new light which immediately burst upon my mind, and I saw at a glance the immense importance of such a theory.'"

* Professor Daubeny, *Introduction to the Atomic Theory*, p. 3.

PART I.—(b) OBJECTIONS TO THE THEORY.

12. The Atomic Theory is so useful, practically, that even those who theoretically express their disbelief, themselves continually make use of and profit by its guidance. It is, in fact, to the chemist, in his studies, what *Bradshaw* is to the traveller by railway, a sometimes perplexing, but on the whole an absolutely necessary, companion to his journey. It is quite true that "though we admit the Atomic Theory, we have no positive proof of its truth, nor are we likely to obtain such proof." No one has ever been "able to adduce an atom itself as the best proof of its own existence." The obvious answer to such objections is, that such proof is not consistent with the limited powers of our organs of sense. (Note D.) But there are more formidable intellectual difficulties in the way when we consider the subject either from a mathematical or from a metaphysical point of view. Dr. Mills, a recent writer on the Atomic Theory, reasons thus:—"If we must assume at all, let us assume as little as possible. The system of Boscovich is, in these respects, superior to the Atomic; it assumes much less, and does not contradict the facts of nature. In it *matter and the atom disappear*, and we find that substances are constituted of *centres of force*, attractive and repulsive."

13. This system is, however, much older than Boscovich, since the Indian philosophy from an unknown antiquity has advocated similar views. According to cosmogonies of the Greeks, Eros (or *attraction*) was the oldest of the gods.* It is curious that Dr. Priestley, whilst attempting to show that mind is not spiritual, was led by the tenor of his argument to push Boscovich's doctrine so far as almost to deny the materiality of body, for he contends that we have no proof of substance *being anything more than powers of attraction and repulsion*, thus denying to it solidity, impenetrability, and the like. "Since matter," he concludes, "has in fact no properties but those of attraction and repulsion, it ought to rise in our esteem as making a nearer approach to the nature of spiritual and immaterial beings, as we are tempted to call those who are opposed to gross matter."

14. Dr. Mills is of opinion that the logical mind will find (if his argument be sound) that the Atomic Theory has no experimental basis, is untrue to nature generally, and consists in the main of a materialistic fallacy derived from appetite more than from

* See Smith's *Dictionary of Biography and Mythology*, sub voce.

judgment; while, on the other hand, arises the idea of MOTION with its subordinate laws, true both to nature and to the life of man, the highest product of the scientific and pure reason and the noblest generalization the world has yet known, because it is the only one that neither limits nor *enslaves*.

15. The celebrated Leibnitz advanced under the guidance of M. Huygens still further on this road. He says that M. Huygens made him understand that *monads* or simple substances are the only true substances. "I found then," he says "that *their nature consists in force*, and that it was thus necessary to conceive them after the notion we have of *souls*." (!) "Material atoms," he further explains, "are contrary to reason, seeing that they are composed of parts. Those are only substantial atoms, that is to say, real units, absolutely without parts, which are the principles of action and the last elements in the analysis of substances. They may be called *metaphysical points*. They have something *vital* in them and a *kind of perception*."

16. There exists at the present moment a strong counter-eddy of thought, carrying us back from whatever had been supposed to be learnt as to the constitution of matter, and threatening to land many of the votaries of speculative science in the nihilism of Eastern philosophy. This tendency is referred to in a paper "on Darwinism and Theology," by Edward Fry, in the *Spectator* of September 21st, 1872. The writer says, "I have no fear even of the tendencies of modern science. I may read it wrongly (as I know that I read it little and ignorantly), but to me its tendencies seem towards a *sublime spirituality*, towards the belief that *all matter is but force*, and *all force is but mind*."

17. This tendency to "sublime spirituality" is well illustrated in the most advanced school of modern Germany. I find in the *Revue Scientifique* of 7th September, 1872, under the head *Une Philosophie nouvelle en Allemagne*, that the origin of the school appears to have been in the writings of Schopenhauer, who published in 1819 his great work, entitled *The World considered as Representation and Will*. He says: "I have had the happiness of being initiated in the *Vedas*, a great benefit in my eyes; for this age is, according to me, destined to receive from the Sanscrit literature an impulsion equal to that which the sixteenth century received from the renaissance of the Greeks." It is easy to trace in his notions the influence of the speculations of Buddhism. Indeed, he was at so little pains to conceal the source of his inspiration, that he obtained at great expense an image of Buddha, which "he showed with pride and, perhaps, with malice, to his visitors;" one of whom, M. Foucher, relates these circumstances. In this Indian philosophy everything is *maya*, illusion; the world is a dream.

"Sufficiently enlightened man would recognize the vanity of his desires, and would die of disgust." *Nirvana*, the utter and final extinction of being, is the only hope. Such is "the sublime spirituality" towards which we are tending—a spirituality which, according to a great poet, found its first rise in the bosom of "Lucifer," and its first disciple in the unhappy "Cain." Hartmann seems to be at present the guiding star amongst these wise men of the East. (Note E.)

18. For myself, I look upon all this sublime spirituality as literally *weighed in the balances and found wanting*. I not only believe in the existence of the material universe, but also that the Creator formed everything very good, and that His works still proclaim the truth, which is contradicted by the philosophy we are considering: "The invisible things of Him, from the creation of the world, are clearly seen, being understood by the things that are made, even His eternal power and Godhead, so that they are without excuse."

19. The Theory of Atoms was at first allied to Atheistic speculations; but, when more fully understood, it becomes favourable to views of creative wisdom, and as Cudworth observes,* "there seems a natural connection between it and theology." On the other hand, the *denial of all real existence of the material world*, must be set down as equally repugnant to religion and to common sense.

PART II.—MOTION.

20. In the preceding part we have felt the difficulty of recognizing as scientific fact the Atomic Theory. We have learnt, it is to be hoped, a lesson of caution, which we must not forget, when carrying forward our investigations into a region where the balance and the weight threaten to fail us, and we have to look for other methods of investigating truth.

21. We have seen that "the idea of MOTION" is vaunted as the highest discovery of "the scientific and pure reason" of this century, now verging towards its decadence. For my own part, I must admit that my reason is so far from being "pure reason"—so "*enslaved*" is it by the fetters of common sense—that I am unable to conceive of motion where "matter and the atom have disappeared," and there remains *nothing to be moved*.

* Daubeny, on the *Atomic Theory*, p. 12.

A dance of metaphysical *centres of force*, or of *mathematical points*, is not within the compass of my argument.

22. I do not, however, either deny or omit to consider the view of motion which pervades our modern discoveries as to the constitution of matter, although I cannot but apprehend that this, our second step, will seem to many as perilous as leaving the solid rock and planting our feet upon the sea. It is, perhaps, impossible to discipline our minds to receive as a *fact* the idea of endless and perpetual motion. Yet, it is probable that in the very least particles we have the reproduction of that which meets our view in the largest agglomerations of matter. When we look up to the heavens on a calm, still night, *repose* seems to be the very feature which stamps itself upon the mind as marking the scene, and yet the instructed mental eye beholds in the same scene nothing but the orderly play of giant forces. Even so must we regard that which appears to be most solid in the earth itself, as the theatre of incessant motion.

23. The old philosophy of the Grecian world was not unacquainted with speculative ideas of this kind, since Leucippus accounted for the origin of all things by a certain whirling motion (*δίνη*) impressed in some undefined manner upon atomic primaries.

24. In the (so-called) oracles of Zoroaster I find much that in the light of modern science is remarkable, and amongst others the statement that all things remain in a restless whirling by reason of the Divine will: so at least I should render the expressions of the original,—

Πατρὸς πείθηνιδι βουλῆ. (Note F.)

25. It has been reserved to our days to bring out to the light that which seems to be now demonstrated truth or scientific fact on this subject. For though some great minds saw from afar the distant outlines of the land, they could not go in to possess it. Bacon wrote with remarkable foresight that "*heat* is a *motion* expansive, restrained and acting in its strife upon the smaller particles of bodies; but the expansion [he says] is thus modified, while it expands all ways, it has, at the same time, an inclination upwards. And the struggle in the particles is modified also. It is not sluggish, but hurried and with violence."

26. Count Rumford, and afterwards Sir H. Davy, have since shown that heat is a kind of molecular motion; but no one has contributed so much to our knowledge on this subject as Professor Tyndall, who is always instructive when he describes that which he understands. It might be well for himself and for others if he did not venture on the elucidation of much more important subjects, which it is evident are out of the compass of his vision.

27. The lectures "on heat considered as a mode of motion," by this distinguished Professor, are to my mind models of the former kind of instruction. In commencing these lectures he was careful to describe to his hearers an apparatus which he had contrived—a thermo-electric pile,—by means of which the smallest amount of heat received was caused to generate an electric current. This was rendered perceptible by a needle, the motion of which was made clearly visible to every person in the room. Thus possessed of a most accurate and delicate test of the slightest changes of temperature, he led on his audience from one step in demonstration to another, and that on the firm basis of actually *proven* science; for the thermo-electric pile may fairly be allowed to take the place of our favourite balance and weights. As the Professor observes most truly, "No chemist ever weighed the perfume of a rose, but in radiant heat we have a test more refined than the chemist's balance." Indeed, the chemist can no longer refuse to urge his inquiries amongst the imponderables; but in so doing he soon finds that a whole world of investigation opens before him, and one in which it becomes more and more difficult to secure such determinative elements as shall prove to himself and to others that he is not mistaken in his theories.

28. After philosophers had become aware of the manner in which sound was produced and transmitted, analogy led some of them to suppose that light might be produced and transmitted in a somewhat similar manner. And perhaps in the whole history of science there was never a question more hotly contested than this one. Sir Isaac Newton supposed light to consist of minute particles darted out from luminous bodies. This was the celebrated "Emission Theory," destined in all probability to accompany the theory of "caloric," and others of a more recent conception, into the limbo of vanity; for light travels at the velocity of 192,900 miles in a second; and if light consisted of ponderable particles, it would indeed be past all belief that these could strike the retina of the eye without absolutely destroying its texture. Professor Tyndall reduces this amount to inches, and finds the number to be 12,165,120,000. "Now it is found that 39,000 waves of red light placed end to end would make up an inch; multiply the number of inches in 192,000 miles by 39,000 and we obtain the number of waves of red light in 192,000. This number is 474,439,680,000,000. *All these waves enter the eye in a single second.* To produce the impression of red in the brain, the retina must be hit at this almost incredible rate!"

29. Huyghens, the contemporary of Newton, found great difficulty in conceiving of the cannonade of particles rendered

necessary by the "Emission Theory." This celebrated man entertained the view that light was produced by vibrations similar to those of sound; but it was not till the era of Dr. Thomas Young that the theory of *undulations* had any chance of coping with the rival theory of *emission*; so slow is the progress of truth against a current of error upheld by great names. For I must hold that the Emission Theory is false science, and the Undulatory Theory is the true explanation.

30. Young was led to his discoveries regarding light by a series of investigations on sound. He rose from the known to the unknown, from the tangible to the intangible.

31. I conclude then that heat is indeed a mode of *motion*, and as Sir Humphrey Davy said long ago, that "it seems possible to account for all the phenomena of heat if it be supposed that in *solids* the particles are in a constant state of *vibration*, those of the hottest bodies moving with the greatest velocity; and that in *liquids* and *elastic fluids*, besides the vibratory motion the particles move round their own axis with different velocities. This refers to three states of matter, the solid,—the fluid, the gaseous or *aëriform*; but when heat becomes radiant we can only explain its complete analogy to light by supposing that motion is communicated to the particles of a *luminiferous ether*." To this statement I shall have to return, but, before concluding the consideration of the ether in question I must request those gentlemen from whom on this point I venture to differ, kindly to remember that I do not consider that I have sufficiently proved the views to which I have given in my adhesion. My examination tends chiefly to show that the amount of *proven* scientific truth is much less than is supposed, and that the belief in scientific facts depends chiefly on the training which the mind has previously received. Thus it is probably the amount of attention which I have been compelled to give to the practical phenomena of chemistry which induces me to entertain convictions on evidence which I can only partially produce, and beg that it may be understood that their establishment is not the object of this paper.

PART III.—LUMINIFEROUS ETHER.

32. The preceding remarks belong especially to the subject of this part, which, though rendered necessary to the completeness of my argument, involves me of necessity in a measure of controversial discussion. I have expressed my belief in the

Undulatory Theory of Light, as opposed to the Emission Theory of Newton, esteeming the former to be true, and the latter false science.

33. But if I am right in this I must necessarily conclude that the undulations, pulsations, or vibrations must take place in some medium which is not of the gross and material (that is, ponderable) nature of that which we usually call matter.

34. It is not a little remarkable that the profound contemplations of Sir Isaac Newton should have led him to the following inquiries:—"Is not heat conveyed through a vacuum by the *vibrations of a much more subtle medium than air*? Is not this medium the same by which light is refracted, and reflected, and communicates heat to bodies, and is put into fits of easy transmission and reflexion? Do not hot bodies communicate their heat to cold ones by the vibrations of this medium? And is it not exceedingly more rare and subtle than the air, and exceedingly more elastic and active? and does it not readily pervade all bodies? and is it not by its elastic force expanded through all the heavens." It is remarkable that the undulatory theory of light, in displacing his own, should have lent the most beautiful and convincing evidence to the truth of these suggestions. How little can we rest upon the authority of great names in science, when the same individual at different times may so contradict his own opinions.

35. And that in a point of the utmost importance, for it must be admitted that such a scientific fact, if true, is of the grandest dimensions. This imponderable ether, if it exists, must necessarily fill all space, and extend as far as the light is visible of the most distant stars. Now, "it has been calculated that some of the stars seen with Lord Rosse's telescope shine from such an enormous distance that light takes upwards of 50,000 years in travelling to us from them. Now, consider for a moment the flight of a light ray from a star at this distance on one side of our system to another as far off on the opposite side. For 100,000 years the light speeds onwards, each second sweeping over nearly 200,000 miles, past stars and systems. It rushes on, but far away; on every hand are other stars and other systems, to which it comes not near. During 5,000 generations of mortal men, if one can conceive that our race could last out that time, the pulsations of the ether are transmitted along the tremendous line which separates the two stars."†

* *Optics*, by Sir Isaac Newton.

† *The Orbs around us*, Proctor, p. 45.

36. The luminiferous ether must then exceed in bulk that of material substance as much as the interstellar spaces exceed the bulk of the stars themselves. All this must be filled by self-repulsive and (thence) elastic atoms of ether whose distance one from the other must be almost inconceivably small. The thickness of a soap-bubble before it bursts has been proved to be only four ten-millionths of an inch, but the inference deduced from the waves of light is that the mean distance of the atoms of ether must be less than one ten-millionth of an inch.* If these figures present difficulty we are only at the commencement of our troubles, for another difficulty must be overcome in the conception of this great scientific fact, since profound investigators such as Fresnel and Cauchy are led to suppose from the character of its vibrations that the notion under which we must conceive of it is an immense *imponderable solid* of the same elastic contexture in all directions, as well in the interior of crystals as in the air, glass, † &c. So that the Latin word *firmamentum*,—English, firmament,—comes to be, after all, though quite accidentally, the best description of the vault of heaven above us.

37. Within us also must this subtle substance penetrate, having most intimate relations with us, though we are all unconscious of its presence; and yet perhaps not wholly unconscious either, for who does not know that a wind from the East or other trivial circumstance will cause a surprising difference in our sensations—in no way to be accounted for but by some variation in the agent which we call electricity.

38. It is impossible to overrate the importance of the knowledge of light and its undulations to the chemist. By means of these he is enabled to discern, with more or less certainty, the composition of the sun and of other heavenly bodies, and to derive information, not otherwise to be obtained, concerning substances of earthly mould. I will only mention one kind of research which illustrates the connection of Part III. of my argument with Part II., or the relation of ethereal vibrations to the vibrations of ponderable matter.

39. I refer to a recently published paper by Professor Lommel, on the relation of chlorophyll to light; ‡ apologizing for the abstract character of the chemical statements. It seems requisite to my argument to show by one instance out of many,

* Birks on *Matter and Ether*, p. 18.

† Vide "Théorie des Ondes Lumineuses," Saint Venant, *Annales de Chimie et de Physique*, Mars, 1872.

‡ In the *Annalen* of Poggendorf, abstracted in the *Chemical News* of Sept. 13, 1872.

that the notion of the existence of a luminiferous ether, capable by its vibrations (and perhaps in other ways) of affecting the relations of ponderable matter has become *essential* to the thoughts of the modern chemist.

40. The Professor says: "Euler established the principle that a substance absorbs all those rays of light with whose *rate of vibrations* the vibrations of its smallest particle can agree.

"Each molecule of a substance, according to its chemical structure, has *certain determinate rates of vibration*. If it is struck by a wave [of ether] whose *period agrees with one of those proper to itself*, it is set in motion, or has its motion strengthened if it has already been vibrating. The wave gives up its energy, wholly or partly, to the molecule, goes through the substance weakened, or does not go through it at all, *i.e.*, it is absorbed."

41. We have arrived at the conclusion (in accordance with the above principle) that the chlorophyll, or green of the leaves, derives all its power of fixing carbon, that is of growth and increase, *from the action of the rays of light upon it*. This, indeed, has been abundantly proved in other ways. Thus it has been shown, that if a tuber of potato is allowed to vegetate in the dark, although it puts forth leaves and shoots, and does its utmost (so to speak) to form a plant, yet being deficient in the effects of light, and consequently not assimilating carbon, it forms all this pseudo-growth at the expense of the substance stored up in the tuber, and in the end weighs no more than it did at the beginning.

42. Thus, without the luminiferous ether there could be no light, without the vibration of its waves no vegetation, and without vegetation the world would be a waste, devoid of vegetable and consequently of animal life.

43. All our existence here rests, then, upon a scientific fact, which the disciples of M. Comte are bound to reject as incapable of proof, and excluded from belief by the golden maxim, "the first commandment of science."

PART IV.—THE SPIRITUAL WORLD.

44. Professor Huxley enunciates that there is a path that leads to truth so certainly that any one who will follow it must needs reach the goal, whether his capacity be great or small. And that there is one guiding rule by which a man may always find

the path, and keep himself from straying when he has found it. This golden rule is, "Give unqualified assent to no proposition but those the truth of which is so clear and distinct that they cannot be doubted." This the Professor is pleased to call "the first commandment of science;" but if we apply it to the matter in hand, we shall find it break down altogether. The question whether the above propositions concerning the Undulatory Theory and the Luminiferous Ether are clear and distinct so that they cannot be doubted, will be answered in different ways by different minds, according to their previous training and their present power to grasp the evidence adduced. Perhaps different nations, such as France and England, would, by a majority of their learned men, give a differing vote. One thing is clear to me, that *Positivism* has no *locus standi* as to scientific facts. Is it not quite as difficult to prove any of the propositions we have been considering as to demonstrate the existence of the spiritual world? Do we not indeed begin to see that this latter is but the complement of the former?

45. Science conducts us to the threshold of the real temple of the Universe, but over its awful portal is inscribed the prohibition to enter there. No mortal has ever lifted the veil which conceals the real form of things. (Note G.)

46. Have we not arrived by fair deduction at the knowledge of the treasure-house and the sphere of development of the most tremendous forces of nature? and not only so, but that which seems to stand in nearest relation to the spiritual world? (Note H.)

47. What more wonderful display of irresistible power than the sudden flash of lightning? And this has on different occasions indicated, according to the Scriptures, the acceptance of sacrifice by the Almighty—a truth which seems to have spread into all nations. Sacred to Jove, the thunderer (Taranis), amongst our ancestors was the oak on which his bolt was accustomed to fall. Sacred to Jupiter amongst the Romans the building which he struck.

48. What more lovely sight than the rainbow! And this, according to Scripture, was made the covenant "token" with Noah and with the world. Amongst the Aryan nations the rainbow (Iris) (Note I) was the messenger between gods and "men, the goddess shielding the Britons;"* and the fractured rainbow falling to earth indicates, according to the (Scandinavian) *Edda*, the approaching final conflagration.

49. In Genesis (Note J) we have the Spirit of God (*Ruach Elohim*) brooding, dove-like, on the face of the *mayim* (whatever is meant by the expression), and the fiat goes forth from

* *Mythology &c., of the British Druids*, p. 268, &c.

the Almighty Creator, "Let there be light, and there was light;" thus the vibrations of the luminiferous ether appear to be the first response or echo, as it were, to the word of the Almighty Creator.*

50. The creation of light having been thus recorded, and the distinction established (lest we should fall down and worship the light†) between the Creator and the creature, we are more fully instructed in the relationship of the spiritual to the material. We are told of the Almighty "dwelling in the *inaccessible* light," as though there were a yet more retired sanctuary, a holy of holies, into which we could not penetrate, and where light and life found their primal source and full accord, for "with Thee is the fountain of life. In Thy light shall we see light." I must not pursue this deeply interesting subject, but the writings of the beloved Apostle will tell, to all who desire it, the secret how the life and the light were together manifested, and how the heavenly city "had no need of the sun, neither of the moon, to shine in it, for the glory of God did lighten it, and the Lamb is the light thereof."

51. I cannot forbear to notice, however, as specially remarkable in reference to the action of the *spiritual* world upon the *material*, the description given of the appearance of the Lord Jesus to Saul. Suddenly there shone round about him a light from heaven, and "through the glory of that light" his sight was for the time extinguished, and when miraculously restored, "there fell from his eyes as it had been scales." The whole is narrated to us by Luke, "the beloved physician," who evidently entered with interest into the physical result of the heavenly interference.

52. It is obvious that no metaphysical meaning is here intended, that no merely mental process is implied, and that we are led to conceive an effect upon the organs of vision similar but superior to the damaging result of the too near approach of a flash of lightning.

53. The different accounts we have in Scripture of the appearance of angels—the messengers of the heavenly court—seem to imply that they have spiritual bodies, which may have strong analogy in their composition with that of the luminiferous ether. It is said in Scripture that "He maketh His angels spirits, His ministers a flaming fire;" that is, as I suppose, capable of so assimilating to themselves the particles of ether as

* The last portion of the sentence in Hebrew, exactly repeats the first, as creation must be supposed to repeat the idea of the Creator.

† Or rather the *lightbearers*—the sun, moon, and stars—mentioned afterwards as such.

to appear as *clothed in light*, of so identifying themselves with the thunders and lightnings of Mount Sinai as to be undistinguishable in the description, of ascending in the flame of the altar, of calling forth a burst of fire from a rock by the pointing of a staff, and as easily of spreading their wings on the blast and destroying the life of 180,000 men in one night. To roll with power the stone from the door of the sepulchre, or to smite Peter on the side with a gentle touch sufficient to wake the sleeper, evince alike their power over the material world—guided by perfect intelligence.

54. But it will be objected that all these things are impossible and incredible, because they are contrary to the laws of nature. We have then to consider what this expression (the laws of nature) really means.

55. In the charming and instructive book of the Duke of Argyll, the noble author enlightens us “on the confusion of thought, arising very much out of the ambiguity of language.” He gives us *five* meanings in which the word *law* is habitually used in science, which are certainly *four* too many to form the basis of accurate reasoning. He also informs us, that of all the senses in which the word *law* is used, there is only *one* in which it is true that laws are immutable or invariable, and that is the sense in which law is used to *designate an individual force*.

56. Let us, then, adhere to this simply rigid interpretation, and we are delivered from an almost infinity of plausible sophisms. A miracle, such, for instance, as iron being made to swim, is impossible no doubt, as *contrary to the law of gravitation*, otherwise it would not be a miracle. But, then, if we are compelled to believe in the existence of another and a spiritual world, having uncontrollable power to set aside the laws of this material creation,—also of an Almighty Being, having infinite dominion,—the question becomes simply one of *testimony*, not of *science*, and reads thus: Is there sufficient human testimony to lead us to believe that the order of this world, or what we call the laws of nature, has been interfered with and those laws set (in such instances) aside?

I have sought to show in Part I. (a) that the *balance and weights* are the special criterion by which to judge our theories regarding ponderable matter. In Part I. (b) I have endeavoured to prove that the abandonment of this test, and the denial of the real existence of matter, lead to mysticism. In Part II. I have argued that the more abstract idea of *motion* is still capable of being tested by the thermo-electric pile. In Part III. I have ventured on still more intangible ground, that of an *ether* scarcely capable of any test which can convey demonstra-

tion to an untrained mind. This appropriately leads to the contemplation of the subject of Part IV., the *spiritual world*, in considering which we must abandon the weights and scales, the thermo-electric pile, the mathematical reasoning as to the luminiferous ether, and receive proof by a totally different method of conviction,—that of human testimony.

This leads to my final discussion.

PART V.—ON CHRISTIAN EVIDENCE.

57. I have been describing various methods of arriving at the truth of scientific facts, and the measure of credence to be accorded thereto; but, when I turn my attention to the Christian religion, I find myself on different ground altogether,—that of *testimony*: and though wholly diverse from the philosophy of experiment and induction, I am bound to say that belief in human testimony is the mode by which almost all knowledge, whether of a secular or of a spiritual nature, reaches us from our earliest infancy. What, indeed, would be the amount of our acquirements, if we individually believed nothing but that which we had either observed or excogitated by ourselves alone?

58. In the New Testament, then, I find that all our blessing is made to rest, not on the sandy foundation of innate ideas and feelings, gradually superinduced from a lower origin, but on *testimony*, in the first place divine, and then human. Thus, in the Gospel of John* we are told that “God so loved the world that He gave his only begotten Son, that whosoever *believeth* in Him should not perish, but have everlasting life.” “He that *believeth* on Him is not condemned, but he that believeth not is condemned already, *because* he hath not believed in the name of the only begotten Son of God.” Everything is made to depend upon the reception or rejection of an authoritative testimony, borne in the first place by an authorized Testimony-bearer from the bosom of God. “He that hath received his testimony hath set to his seal that God is true.” † The Apostles were called to be in their special place testimony-bearers, and thus the Apostle John records and registers (as it were in court) his witness to what he saw when he stood by the cross: “And he that saw it *bare record*, and *his record is true*, and he knoweth that he saith true, that *ye might believe*.” ‡ In his

* John i., iii., vi., &c. † John iii. 33. ‡ John xix. 35.

first epistle the same Apostle declares that which he and his fellow testimony-bearers had seen and heard, in order that his audience might have fellowship with them. He says,* "We have seen and do testify that the Father sent the Son to be the Saviour of the world;" and he carefully contrasts the importance of this testimony with that of the testimony of man, which we are continually in the habit of receiving. The Apostle Paul coincides, in almost similar language, in the declaration † "that if thou shalt confess with thy mouth the Lord Jesus, and shalt believe in thine heart that God hath raised Him from the dead, thou shalt be saved." He goes on to inquire, "How then shall they call on Him on whom they have *not believed*, and how shall they *believe* in Him of whom they have not heard, and how shall they hear without a preacher?" It is of primary importance that those who occupy the place of testimony-bearers should themselves *believe*. He says further: "And how shall they preach except they be sent?"

59. We arrive then at this conclusion, that the message of the gospel must be either accepted or rejected as a concrete whole. That it is sufficiently authenticated we are elsewhere taught, ‡ and in such a manner that those who believe the message are under the obligation of being "ready always to give an answer to every man that asketh them a *reason* § of the hope that is in them, with meekness and fear," each individual believer of the message becoming thus an additional witness (*μάρτυς*) and if necessary a martyr to the truth which he receives; but I do not find any permission for discussion of the message itself, in whole or in part, with those who do not receive it. It claims to be authoritative and dogmatic, and submission and not criticism is called for on the part of those who hear.

60. This may seem to some *slavery* and bondage, but to those who receive the message it brings liberty and peace. I very thankfully acknowledge myself to be of the number of those who receive the testimony; and, feeling the need of the pardon and life which it brings, rejoice therein as fully suited to our nature in all its most deeply felt necessities as to reconciliation with the One from whom the message comes.

61. Not to enlarge further nor to venture on questions of theology, I maintain that the position of the believer is the only humble and right one; and that Christian evidence, though in many respects different from that of scientific fact, rests on

* 1 John i.

† Rom. x.

‡ 1 Cor. xv.; Acts xvii. 31; &c. &c.

§ 1 Pet. iii. 15.

logical grounds that are not to be overthrown, which are not even *touched* by the oppositions of science.

62. To receive the truth, thus attested, in the love of it, doubtless requires preparation of heart; for the humbling statements of Revelation as to the fallen condition of our human nature are not self-evident as mathematical demonstrations are, and cannot be welcome to the pride of man. Again, the revelation of heavenly truths is quite above, though not contrary to, our reason. The glad tidings of great joy which shall be to all people shines down upon earth from a higher sphere.

63. Wisdom thus descends from heaven, and, like the bow of promise, forms herself a pathway to the skies. She rests not on earth; she asks no aid of science; she does not kindle her radiant hues at any mundane source of light. All she asks from this dark world is the blackness of its storm-clouds on which to trace the message of Heaven's own truth and love. Faith, hope, and charity unite to form her bright prism, fetching its radiance from afar. Follow her guidance, and you shall find untold treasure at her feet, for wisdom is better than rubies, and all the things thou canst desire are not to be compared unto her.

NOTES.

NOTE A.—Nevertheless I read as follows in a journal devoted to chemistry :—

“It is pleasing to think that, perhaps, after all, the dream of the old alchemist was not so wild as it is thought to be ; and still more pleasing is it to think that *some day it may possibly be realized.*”—C. T. Kingzett, in *Chemical News*, Sept. 20, 1872.

NOTE B.—The formulæ as assigned by *Berzelius* slightly modernized :—

COMPOUNDS OF ETHYL.

- C₄ H₅, radical ethyl.
- C₄ H₅ Cl, chloride of ethyl.
- C₄ H₅ O, oxide of ethyl (*ether*).
- C₄ H₅ O + H O, hydrate of oxide of ethyl (alcohol).
- C₄ H₅ O + C₄ H₃ O₂, acetate of oxide of ethyl (acetic ether).

COMPOUNDS OF POTASSIUM.

- K, radical potassium.
- K Cl, chloride of potassium.
- KO, oxide of potassium.
- KO + HO, hydrate of oxide of potassium (caustic potash).
- KO + C₄ H₃ O₂, acetate of oxide of potassium.

I do not stay to consider in what manner “the theory of substitution* took possession of the *radicals*,” how the theory of “*types*” arose, nor how the new conception of “*atomicity*” threw light on the constitution of things. The barriers which custom had raised up between mineral and organic chemistry have been overthrown ; and the discovery that the atoms of all elementary bodies have the same specific heat has led to a new system of atomic weights.

* Wurtz, p. 114.

NOTE C.—“It is remarkable that the most primitive philosophy of any with which we are acquainted, that philosophy which the most distinguished of the Greeks borrowed from, *too often without acknowledgment*, from which Plato adopted his *Ideas* and Aristotle his *First Matter*, affords, even in the imperfect and disguised condition in which it has come down to us, a nearer approximation to the principles of modern science than the doctrines of the Grecian schools that succeeded it ; as if, according to the conjecture of some writers, there really had existed amongst the priests of Egypt, or in more eastern climes, although carefully concealed from the vulgar, an insight into the mysteries of nature such as almost rivalled that of the present day, but of which lore a few scattered fragments only have been preserved by the blind reverence of the periods succeeding, when all knowledge had been lost of their purport, or of the relation they might have borne to the scientific structure of which they constituted a part.”—Daubeny, on the *Atomic Theory*, p. 25.

NOTE D.—Sir W. Thomson deduces from a number of considerations the following as an approximation to the size of atoms :—

“The four demonstrations that we have given all establish that in liquids and in solids, transparent or translucent, the medium distance of the centres of two molecules contiguous is comprised between 1-10,000th and 200,000th part of a millimetre.

“To form an idea of the manner in which, after what precedes, these bodies are constituted, let us imagine a drop of rain or a globe of glass of the size of a pear, and suppose them enlarged so as to equal the volume of the earth, their atoms being enlarged in the same proportion. The sphere thus obtained would be composed of little spheres larger than grains of lead (shot) and smaller than cricket-balls or oranges.”

NOTE E.—*Hartmann*. In reference to this most advanced school of modern thought the *Revue Scientifique* remarks :—“We are in the presence of a *system profoundly, wisely, elaborated, and which criticism is obliged to regard seriously*. Is it the commencement of an occidental Buddhism ? Will the European descendants of the Aryan race, like their brothers of the East, aspire to the supreme *Nirvana* and give themselves as Quietists to ascetism ? (*s'immobiliser dans l'ascétisme*).

NOTE F.—*Oracles of Zoroaster*. I raise no question as to the authorship of the Greek verses indicated, but take them as they are,—full of interest from their intrinsic depth of thought. The quotation is *exact* from “Cory's Ancient Fragments,” p. 103. Cory translates “subservient to the persuasive counsel of the Father.”

NOTE G.—Plutarch records that on the temple of Isis at Sais was inscribed the sentence, “I am that which is, and which was, and is to come, and my veil no man has ever lifted.”

NOTE H.—Whilst writing, the telegraphic wire conveys a message to the other side of the world and brings back a reply, over 25,000 miles, in so short a time, that, as the *Times* records, Nov. 16, 1872, “The chairman opened yesterday’s proceedings by sending a telegram to the Mayor of Adelaide, and an answer was received before he had got far in the speech-making after dinner.”

The *Adelaide Observer*, of July 20, 1872, gives the following details of the telegraphic route from Falmouth to Port Augusta :—

	Miles.
Falmouth to Gibraltar, <i>viâ</i> Lisbon cable	1,250
Gibraltar to Malta (cable)	981
Malta to Alexandria (cable)	819
Alexandria to Suez (overland line)	224
Suez to Aden (cable)	1,308
Aden to Bombay	1,664
Bombay to Madras (overland)	600
Madras to Penang (cable)	1,213
Penang to Singapore (cable)	301
Singapore to Batavia (cable)	560
Batavia to Bangoewangi (wire)	480
Bangoewangi to Port Darwin (cable)	970
Port Darwin to Port Augusta (wire)	1,800
Port Augusta to Adelaide	212
Total	12,382
Lisbon to Falmouth	268
Total	12,650

But this gives but a feeble conception of the swiftness with which the thrill of magnetic influence is communicated, and the following is more directly to the point. On the 1st September, 1859, Messrs. Carrington and Hodgson were observing the sun in different localities. Their scrutiny was directed to certain large spots which at that time marked the sun’s face. Suddenly a bright light was seen by each observer to break out on the sun’s surface and travel slowly in appearance, but in reality at the rate of about 7,000 miles in a minute across a part of the solar disk. Now, it was found afterwards that the self-registering magnetic instruments at Kew had

made at that very instant a strongly marked jerk. It was learned that at that moment a magnetic storm prevailed at the West Indies, in South America, and in Australia. The signalmen in the telegraph stations at Washington to Philadelphia received strong electric shocks. The pen of Bain's telegraph was followed by a flame of fire, and in Norway the telegraph machinery was set on fire. At night great auroras were seen in both hemispheres.*

"The magnetic vibrations thrill in *one moment* through the whole frame of our earth!"—Proctor, *Light Science*, p. 34.

NOTE I.—The Rainbow, according to the old legend, indicates gold hidden at the point of junction with the earth.

NOTE J.—I think the suggestions of Mungo Ponton in *The Beginning* are well worth attentive consideration in this connection.

The CHAIRMAN.—I am sure, Mr. Howard, that I may tender you the thanks of this meeting for your interesting paper. (Hear.) By way of opening the discussion, I will just refer to an expression contained in these pages,—“Counter eddy of thought.” If there should be any such in the minds of those present, I shall be very pleased to have it fully enunciated, in order that we may receive the information which other minds may bring to bear upon the subject. I have no doubt that there is abundant subject-matter in this paper for differences of opinion. With regard to the scientific argument here broached, for the existence of bodily organization in angels; I know that is only a subordinate part of the paper, but it fell in with a line of thought in which I often indulge. The theory set forth is that probably angels have spiritual bodies; with the composition of which the luminiferous ether, of which he speaks in Part III., may have some connection. Into that point I shall scarcely enter; but that angels, as created spirits, must be supposed to have bodies—impalpable, invisible, refined, and subtly etherealized, as distinct from pure spirit, I take to be essentially necessary. God is the only spirit purely such, unconditioned, and separated by an almost infinite interval from any created being whatsoever. It is often said, and especially by the Positive school of philosophy, that as an angel is never seen—“as the microscope or telescope cannot detect one”—it is absurd to think about the matter, and therefore it must be confined to the

* Sir J. Herschel's *Familiar Lectures*, p. 81. Chambers's *Hand-Book of Astronomy*, p. 6. Carrington and Hodgson's *Monthly Notes*, R.A.S., vol. xx. pp. 13, 16. Proctor, *The Sun, &c.*, p. 206. Proctor, *Other Worlds than ours*, p. 33. Meteorological Society's *Proceedings*, vol. i. p. 66. *Monthly Mic. Journal*, March, 1873, p. 132.

region of things unknowable, which cannot be thought of. But is the fact that a thing is invisible, impalpable, and unknowable by the external senses, any reasonable argument that it does not exist? Surely this paper disproves that view. This luminiferous ether itself is invisible and impalpable, if it exists. Again, it is an acknowledged fact in modern science that there are no breaks in nature, but that there is a law of continuity running throughout creation. Start from the very simplest and lowest form of sponge, and see how the gradation is traceable, even up to the highest form of life,—namely, man. But man becomes dissolved by death, and if his spirit be immaterial—that spirit goes into another portion of the universe, to find a great break between itself and the Deity; but surely, by the laws of analogy, we may expect to find that break filled up in the unseen ethereal world above; and if that be so, there is the very thing which is asked for in regard to the existence of angels—other spirits linking themselves between the lower forms of man's spirit and the highest form of all—God's uncreated spirit. There would be a great destruction of that law of continuity, if we did not suppose that there was in the unseen world something created to fill up the interval between the throne of the Deity and the disembodied soul of man. I should now like to say one word upon the latter part of Mr. Howard's paper, to which I must take some friendly exception. I refer more particularly to what is said in section 59. I may have misunderstood Mr. Howard, but gather from him that, as Christian believers, we have very little, if any room at all for criticism of Scripture. Now, in the interests of the human mind and of freedom of thought, subject of course to true faith and humble reverence for God's word, I take liberty to dispute that position; and I venture to do it upon one or two grounds. When the message of God is ascertained, I fully concur with the author of this paper, as all of us would, that it is authoritative, and then, that submission, and not criticism, is called for on the part of those who hear, or rather who believe: let us remember the Bereans, who were accounted more noble than those in Thessalonica, because they searched the Scriptures to see "whether those things were so." In other words, they criticised to see if the evidence was conformable to their judgment and reason. The lesson was only received as authoritative, because they had previously criticised, and found it was right. When laying down this thought then, that when the message has been distinctly substantiated to our consciences as God's message, we should receive it with all reverence; there is an antecedent position which this paper does not do justice to,—the criticism of the testimony; but possibly this is on account of the largeness of the subject, and the limited space at Mr. Howard's command. These are some of the thoughts which suggest themselves to my mind, and I think they should in some measure be taken into consideration. If Mr. Howard had modified some of the expressions contained in the latter part of his paper so as to have admitted this line of thought, or rather, if he had not excluded some points which I venture to say are of importance, I should not have said so much.

Rev. C. A. Row.—There is a great deal of philosophical interest attaching

to the question taken up by Mr. Titcomb, and after many years of thought I have arrived at substantially the same conclusions on these metaphysical points and difficulties as are contained in this paper. Take the existence of the material world, it involves a very considerable degree of difficulty, if people are to use the ordinary rational processes to prove its existence. I think there is much greater proof, at any rate, of the spiritual world than of the actual objective existence of a material world, so far as it is a matter of logical proof; but of late years having somewhat mistrusted the character of that logic, I have not interested myself in it so much. It is true that I do not see this table before me, but certain qualities which are traceable to my eye and to my mind; and if we follow out that course of reasoning, we come to this conclusion, that there is no such thing as a material universe existing at all. Whatever we may say of the logic of all this, it is unquestionably very difficult to answer; and with all our reasoning, we come back to the full belief that there is a material world after all, and we must fall back upon some objective principles of belief. There are many portions of this paper which show the supreme greatness of the Creator in the creation of these infinitely minute points, and I am inclined to think that the atomic theory here set forth is the correct theory of the universe; but as to whether it is true or not, it is impossible to give a positive and absolute proof. With regard to the last part of the paper, I think Mr. Howard has not gone into the point sufficiently as a matter of Christian evidence. I will draw attention to one fact alone, namely, that there is such a thing as moral evidence of the truth of revelation as distinct from the mere evidence of testimony, and I hold that the Evangelist quoted distinctly proves that there is such a thing. According to my own views, I do think that the grand and glorious character of our Lord is the strongest evidence of the truth of Christianity, and after that comes the evidence of miracles or testimony. I do not wish to say one word against the high importance of testimony,—my last paper read here was written to sift what is valuable in testimony from what is not, and I do not yield to the author of this paper in the great importance which I attach to testimony as a witness to Christianity, but I think Mr. Howard has gone beyond the mark, and has excluded the whole range of legitimate criticism; if the evidence of revelation is simply an evidence of testimony, I cannot see how the moral evidence of it is to hold its ground: if I simply believed in revelation by the outward evidence of testimony, I should be more doubtful of its truth than I am. I do not see the connection between the 58th and 59th paragraphs of the paper. Mr. Howard says:—

“We arrive, then, at this conclusion, that the message must be either accepted or rejected as a concrete whole.”

Is it not open to me to doubt whether the Second Epistle of St. Peter was written by him, where the testimony is very much below what it is with regard to the two short Epistles of St. John? I would even go a step further, and assert the right of criticising the contents of revelation by my moral

sense, and if the revelation were strongly attested, yet if it attributed to God a character utterly unworthy of the Supreme Being, I should persist in rejecting it. I endeavoured to lay down in my own paper, that if a miracle came to me strongly attested—take the miracle of St. Ambrose, as attested in a letter to his sister—still if that miracle contradicted my moral sense, I should not believe the testimony, but should reject it at once. Many of the miracles of mediæval history are not devoid of a fair share of outward testimony.

Rev. G. W. WELDON.—I confess that while I agree in the main with what has fallen from Mr. Titcomb and the last speaker, I am much inclined to approximate nearer in my thoughts to the author of this paper, and I will tell you why. When Mr. Titcomb said that the people of Berea were more noble than the people of Thessalonica, in that they searched the Scriptures daily, that—if what St. Paul said were true—confirms what Mr. Howard says in his paper, because they merely asked the question, “Is this man speaking according to the testimony which we already possess?” They were right in criticising St. Paul, as even St. John says, “Believe not every spirit, but try the spirits whether they be of God.” The only way of doing that was by an appeal to the testimony already received; and, so far, it was hardly a case in point for breaking down Mr. Howard’s views. With regard to what was said by Mr. Row, I do not think it is a question whether St. Peter or St. Paul wrote the second epistle; it is only a question whether what has been received as St. Peter’s epistle should be received at all. That is the point. As in the case of the Epistle of St. Paul to the Hebrews, he may have written it or not. Good men, thorough believers in the inspiration of the New Testament, do not believe he wrote it: but the question is, is the record divine and authoritative? If so, it makes very little difference who wrote it; for the books of the Bible, having passed through the alembic of critical analysis, should be accepted as above testimony.

Mr. Row.—I meant as to whether or not the book is canonical?

Mr. WELDON.—Well, the real point that I wished to refer to is this, that as Mr. Howard says with regard to moral sense, I do not think our moral sense is a fair interpreter of the truth or falsehood of a miracle. We can only believe on testimony as to the truth of a miracle handed down to us; and if our moral sense were applied to the miracles contained in the Bible, there are several of them that I should reject; but on an appeal to fact and testimony by divine authority, I accept them. I will give an illustration of what I mean. A friend of mine in Cambridgeshire, a very good farmer, who knew nothing about moral sense or critical interpretation, said to me on the subject of Jonah and the whale, “I do not know anything about verification and all that sort of thing, but if the Bible told me, not that the whale swallowed Jonah, but that Jonah swallowed the whale, I should believe it on the authority of the Bible.” Then the question of the angel of death killing 185,000 people in one night is a question of testimony. Therefore, though I think Mr. Howard may find it convenient to make a little alteration with reference to authoritative and dogmatic submission, not

criticism, I do not think it is true, as Mr. Titcomb says, that we are called on to use scholarship to assist facts ; but when once we have arrived at such a thing, Christianity claims for itself an authoritative and dogmatic statement, which refers after all to the testimony of a divine commission. There is one thing at the beginning of Mr. Howard's paper which I heard with much satisfaction, which was his statement, that, after all, how very little had been proved. I think we shall find, as we go on in life, that those who have given most time, and thought, and study to these matters will confess that they have made greater proficiency in ascertaining the extent of their own ignorance than in anything else. When clever men bring certain facts before the world, I still have the greatest satisfaction in feeling that, after all, very little has been proved, and that it is a great blessing that we have our primitive revelation, making known facts which are not known by reason, but which come direct from the Great First Cause. (Cheers.)

Mr. A. V. NEWTON.—I do not know whether I misunderstood one part of the argument in the paper, but it seems to me that the writer has built upon the fact that we cannot prove the existence of the luminiferous ether, and notwithstanding that we cannot prove it absolutely, we know it to exist ; and upon that he raises the argument that we may believe there is a spiritual world, although we cannot prove it. I do not know whether my understanding of the argument is really a misunderstanding, but I should be glad to know whether it is or not. We know quite well of the existence of light, and it may possibly be that light could not exist without there being such a thing as luminiferous ether ; but it does not appear to me that we can get any safe deduction, such as the existence of the spiritual world, from a belief that something exists which is the cause of something else existing of which we have a proof.

Mr. Row.—It is an answer to an objection, is it not ? We cannot prove the existence of the luminiferous ether, but yet we believe it does exist ; therefore something may exist which we cannot prove. Mr. Howard's object is to show that we may believe a thing, although it is beyond the region of proof ; and that seems to me to be a very good illustration, as I understand it.

Rev. J. W. BUCKLEY.—My great difficulty in these discussions is, that we do not seem to have very good starting-points. In mathematics we have axioms and postulates, and we know what we are about. I confess that, whether it is from ignorance or credulity, I cannot help believing in the existence both of a material and of a spiritual world. I do not know how to disbelieve it. We have certain intuitive powers given to us, almost like instinct. For instance, if anybody tells me this chair does not exist, but is merely an impression coming to the eye and mind, then there is no such thing as matter. I think we must start with the idea that there is a material world ; for unless you grant me that, I have nothing at all to base my logic upon ; and such a discussion as this, however interesting, becomes almost useless. The paper seems to me to say that we have not proved some material things at all, and yet that we must admit them ; that we must suppose there is an atmosphere and a luminiferous ether, though we have no proof of it

whatever. I should say that we have very much more proof of the existence of those matters connected with religion, with which the paper deals, than of anything else in the paper. We have the clearest possible testimony—if testimony is worth anything, and is not a kind of myth—as some say matter is—that a spiritual world exists. We have independent testimony with regard to God's Word, and we have a revelation given to us. Nothing can get over one great fact which exists outside the Scriptures,—I mean the existence of the chosen people of God.* There we have an external proof. If you say you will believe nothing but what you have absolute proof of, then all truth vanishes into thin air: the question is, whether we have a sufficient proof of many things. The existence of God, tested by mere reason, is a matter of the balance of argument, after all. If I say I will not trust my intuitive conviction—which, thank God, I do trust—I enter into an argument of some kind. But we must have something to start from. Well, I am here, and have existence. Something must have caused that existence. But I must proceed in an argument upon the basis of that existence. If you do not grant me that, I am gone altogether; but if you do grant that, there must have been some previous existence; and I am persuaded by a balance of probabilities. There was one point in the paper which struck me very much; viz. that matters of religion commend themselves to our reason, but not to our comprehension. Now reason tells us that there must have been, in infinity past, some existence which caused all other existences; and thus I am driven to confess the existence of a God. I always feel that the great difficulty in these discussions is, that we cannot agree upon a definite basis on which to found our logic. If we cannot start with the belief of certain things upon our own intuition, we cannot come to a conclusion.

The CHAIRMAN.—If there is one thing which is satisfactorily established in the paper, it is that it lays down a completely solid platform. It proves the existence of a spiritual world,—not mathematically, for that is impossible, but so satisfactorily that large numbers of minds can receive it; and on that basis it is said that there are analogies from which we might prove Christianity, and on that basis we have sufficiently solid ground to go upon.

Mr. BUCKLEY.—It was far from my intention to attack the paper. I consider that, as regards religion, I spoke in its favour; for I think it shows, that whereas science sometimes calls things facts which have not been proved, the existence of a spiritual world is proved with much more completeness. I was only alluding to the generally loose manner in which subjects of immense importance and great weight are discussed, without first of all laying down clear and distinct grounds on which reasoning and discussion should be based. My observations were intended to be perfectly general.

The CHAIRMAN.—With reference to what Mr. Weldon said, I may remark

* Hume has made a remark to the same effect. [Ed.]

that Luther, with all his grand and massive faith and reverence for God's Holy Word, at one time rejected the Second Epistle of St. James, as not to be received with the rest of Scripture.

Mr. HOWARD.—I hope that the ladies and gentlemen present will remember the small space into which I had to compress my remarks. That portion of the paper which deals with Christian evidence only occupies two or three pages, and it is impossible to say everything that one wants to say in so small a space, without being susceptible of misinterpretation. The Chairman's remarks first claim my attention, because, from a little misunderstanding of what I intended to say, he makes me hold opinions which are as far as possible from those which I do hold. The Chairman thought that I identified the Scriptures with the testimony. Now in writing that paper any one will see that though I have not been able to explain sufficiently, from want of space, I have pointed out some passages which show there is a certain testimony in the Scriptures which we have to receive, and by our reception or rejection of which our eternal state is regulated. "God so loved the world, that He gave," and so forth. Now if we put the Scriptures in place of the testimony, you will see at once that we should exclude Luther from salvation, if we do not distinguish between canonical orthodoxy and faith in Christ. There is in my paper a desire to draw a very marked difference between the testimony which it is essential that a man should believe in order to become a Christian, and other truths of Revelation, and to leave out of sight various other matters, although they are in their place extremely important; such as the testimony of a man's own experience, and the witness of the Church, which is immensely important and by no means to be neglected. But how could I press all these things into two or three pages? I wished simply to call attention to what struck my own mind very much,—the different groundwork on which we believe Christianity to that on which we believe Science. In the first part of the paper I have shown that the ground on which we believe the atomic theory is the balance and weights—it is not a mere shadowy, indefinite nothing at all, such as has been alluded to by Mr. Buckley, but it is that which is capable of being weighed in a balance. Then, in the second part, I take the question of motion, and I say that Professor Tyndall established, in the first place, a mode of ascertaining the slightest operation of heat conceivable, and that on satisfactory ground he proved distinctly what he undertook to prove. Then, further, I ventured on still more difficult ground—that of the luminiferous ether; and beyond that we may suppose that there is something still more difficult to grasp with our reason. I have endeavoured, therefore, to present the different groundwork of our belief in these different steps, if I may so speak; beginning with that which is more solid and substantial and ponderable, and gradually drawing further and further from that which can be so easily proved to that which is more difficult. I have sought to show that the belief in any of these various things—the atomic theory, motion, and the luminiferous ether, will be according to the previous training and preparation of the mind; for that

which is proof to one person is not to another—and that seems to me to be an important question in reference to our reception of the testimony of Scripture, and to Christianity. The testimony requires a particular preparation of the mind to receive it. I do not know whether I have made myself understood, but I would be the last person to endeavour to maintain such sentiments as our Chairman has imputed to me about criticism, especially as I have published plenty of criticism about such points.

The CHAIRMAN.—I did not suppose you held that view, but you seemed to hold it.

Mr. HOWARD.—Criticism before the reception of the testimony is very important, and indeed we are invited by the Scriptures themselves to prove all things, and hold fast that which is good. I do not know that I need say any more. As to the moral sense and intuitive perception of the truth, these questions could not of course be entered upon in such a paper as this.

The Meeting was then adjourned.