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A table of contents for *Journal of the Transactions of the Victoria Institute* can be found here:

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JOURNAL OF THE TRANSACTIONS
OF
THE VICTORIA INSTITUTE.

VOL. VII.

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CONTENTS OF VOL. VII.

	<i>Page</i>
PREFACE	x
COUNCIL AND OFFICERS FOR 1873-4	xi
OBJECTS OF THE VICTORIA INSTITUTE	xii
TERMS OF MEMBERSHIP, &c.	xiii
FORM OF BEQUEST	xiv

JOURNAL OF TRANSACTIONS.

ORDINARY MEETING, 8TH JANUARY, 1872	1
INTERMEDIATE MEETING, 22ND JANUARY, 1872	2
ORDINARY MEETING, 5TH FEBRUARY, 1872	3
NATURAL THEOLOGY CONSIDERED WITH REFERENCE TO MODERN PHILOSOPHY. BY REV. G. HENSLOW, M.A., F.L.S., F.G.S., M.V.I.	4
DISCUSSION ON MR. HENSLOW'S PAPER	39
INTERMEDIATE MEETING, 19TH FEBRUARY, 1872	54
ON FATALISM. BY THE REV. J. ROBBINS, D.D. (PRINCIPALLY FROM THE FRENCH OF THE REV. E. BERSIER)	54
INTERMEDIATE MEETING, 18TH MARCH, 1872	73
DARWINISM TESTED BY RECENT RESEARCHES IN LANGUAGE. BY FREDERICK BATEMAN, ESQ., M.D. &c.	73
APPENDIX TO MR. BATEMAN'S PAPER	92

	<i>Page</i>
ORDINARY MEETING, 1ST APRIL, 1872	96
FORCE AND ITS MANIFESTATIONS. BY THE REV. J. M'CANN, D.D., F.R.S.L., F.G.S.	97
DISCUSSION ON DR. M'CANN'S PAPER	123
INTERMEDIATE MEETING, 15TH APRIL, 1872	133
ORDINARY MEETING, 6TH MAY, 1872	134
ORDINARY MEETING, 3RD JUNE, 1872	135
PROFESSOR TYNDALL'S "FRAGMENTS OF SCIENCE FOR UNSCIENTIFIC PEOPLE," IN RELATION TO THEOLOGY AND RELIGION. BY THE REV. W. IRONS, D.D.	137
DISCUSSION ON DR. IRONS'S PAPER	152
ANNUAL GENERAL MEETING	170
DISCUSSION ON THE ANNUAL REPORT	178
ANNUAL ADDRESS. BY PROFESSOR KIRK	187
DISCUSSION ON THE ANNUAL ADDRESS	215
ORDINARY MEETING, 2ND DECEMBER, 1872	218
FORCE AND ENERGY. BY CHARLES BROOKE, M.A., F.R.S., V.P.V.I.	220
DISCUSSION ON MR. BROOKE'S PAPER	242
ORDINARY MEETING, 6TH JANUARY, 1873	253
ON DARWINISM AND ITS EFFECTS UPON RELIGIOUS THOUGHT. BY C. R. BREE, ESQ., M.D., F.Z.S.	253
DISCUSSION ON MR. BREE'S PAPER	270
INTERMEDIATE MEETING, 20TH JANUARY, 1873	286
ORDINARY MEETING, 3RD FEBRUARY, 1873	287
REMARKS ON SOME OF THE CURRENT PRINCIPLES OF HISTORICAL CRITICISM. BY THE REV. C. A. ROW, M.A. &c.	287
DISCUSSION ON MR. ROW'S PAPER	309
INTERMEDIATE MEETING, 17TH FEBRUARY, 1873	324
SCIENTIFIC FACTS AND CHRISTIAN EVIDENCE. BY JOHN ELIOT HOWARD, ESQ., F.L.S., F.R.M.S., F.R.H.S. &c.	324
NOTES TO THE FOREGOING PAPER	344
DISCUSSION ON MR. HOWARD'S PAPER	347
ORDINARY MEETING, 3RD MARCH, 1873	355

	<i>Page</i>
THE LAW OF CREATION : UNITY OF PLAN ; VARIETY OF FORM. BY-THE REV. G. W. WELDON, M.A., B.M.	355
DISCUSSION ON MR. WELDON'S PAPER	374
THE PRESENT ASPECT OF INQUIRIES AS TO THE INTRODUCTION OF GENERA AND SPECIES IN GEOLOGICAL TIMES. BY PRINCIPAL J. W. DAWSON, LL.D., F.R.S.	388
MEETING (<i>Int.</i>), 17TH MARCH, 1873	391

APPENDICES (A. B. & C.).

(A.) LIST OF MEMBERS, ASSOCIATES, AND HONORARY FOREIGN CORRESPONDENTS FOR 1873	393*
(B.) LIST OF BOOKS IN THE LIBRARY	429
NAMES OF THE DONORS OF BOOKS, &C., RECEIVED SINCE 1ST JANUARY, 1873	447
(C.) OBJECTS, CONSTITUTION, AND BYE-LAWS	449

P R E F A C E .

THE seventh volume of the *Journal of the Transactions* of the VICTORIA INSTITUTE is now issued.

The firm support which the Members and Associates have of late accorded to the Society has contributed much to the progress which it is making. The year 1873 has witnessed an addition to the number of the supporters slightly in advance of that of 1872; and, on account of the many Literary and Scientific men that are now to be found in its ranks, the importance of the papers submitted, and of the discussions thereon, has greatly increased. It may also be added that the Society has been enabled considerably to extend the circulation of its publications.*

The present volume of the *Transactions* contains several of the most important papers hitherto issued by the Institute, each dealing with some point of special interest. Circumstances connected with the publication of the second may require a few prefatory remarks:—The growing influence in the present day, of the doctrine of Fatalism, rendering it desirable that the Institute should take up the subject, the Rev. J. Robbins, D.D., kindly undertook to prepare a lecture † thereon, for an intermediate meeting; and

* With a view to the better carrying out the objects of the Society, the Council has commenced the issue of a "people's edition" of the most popular papers.

† According to the Rules, lectures delivered at such meetings are not printed, unless by a special resolution of the Council.

in so doing, sought the aid of the most esteemed authorities upon the subject, pre-eminently among these the Rev. E. Bersier, of whose valuable arguments he gave an admirable translation, and by whose permission the Council has been enabled to include the lecture, arranged as a paper, in the present volume.

Whilst upon this subject, it seems desirable to draw attention to the numerous and increasing number of works now being written by unknown authors, and containing crude and often exploded ideas upon subjects such as the most learned ever approach with diffidence: the public injury done by such works can scarce be over-estimated. These considerations not only indicate the importance of carefully considered publications, such as those of the VICTORIA INSTITUTE, but amply warrant the Council in having increased the strictness of the rules under which any papers are now published by the Society, and in being careful that all special points of importance therein not taken up in the discussions, are dealt with in special communications, such as those which conclude the first and last papers in the present volume.

F. PETRIE,

Hon. Sec. and Editor.

DECEMBER 31st, 1873.

JOURNAL OF THE TRANSACTIONS

OF THE

VICTORIA INSTITUTE,

OR

PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.

ORDINARY MEETING, 8TH JANUARY, 1872.

REV. ROBINSON THORNTON, D.D., VICE-PRESIDENT, IN THE CHAIR.

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

MEMBERS :—The Rev. Moses Margoliouth, Ph.D., LL.D. (Assistant Minister of St. Paul's, Onslow Square), 22, Pelham Crescent, Brompton, S.W. ; Iltudus T. Prichard, Esq., Barrister-at-Law, 4, Garden Court, Temple, E.C., and 57, Grenville Park, Blackheath, S.E.

ASSOCIATES :—Mrs. A. E. Allen, 71, Long Acre, W.C. ; Rev. James C. Vivian, Raiatea, South Pacific.

Also the presentation of the following Books for the Library :—

“Proceedings of the Royal Society.” Part CXXX. *From the Society.*

“Proceedings of the Royal University of Norway.” 6 Parts.
From the University.

“Publications of the Swedenborg Society.” 34 Volumes and 10 Pamphlets.
From the Society.

“Denudation in Relation to Sedimentary Stratification.” By G. Race, Esq.
From the Author.

“Paley’s Evidences of Christianity.”
From the Protestant Educational Institute, per Rev. G. R. Badenoch.

A Paper “On Chance Impossible,—an Attempt to show that Atheism has no Foundation in Nature,”—by J. H. WHEATLEY, Esq., Ph.D., &c., was then read by the Rev. G. Henslow, M.A. (the author being unable to be present by reason of ill-health).

A discussion ensued, in which the Revs. J. H. Titcomb, C. A. Row, Dr. J. McCann, G. Henslow, Dr. S. Wainwright, Dr. J. H. Rigg, T. M. Gorman, and the Chairman took part, after which the meeting was adjourned.

* * * This paper is not inserted, as Dr. Wheatley was not only unable to be present at the meeting and take part in the discussion, but, by reason of ill-health, had written the paper under such difficulties as prevented his taking up fully the important subject on which it treated; the members and associates will, however, be glad to hear that he has kindly promised, so soon as his health permits, to give an exhaustive essay upon his subject.

INTERMEDIATE MEETING, 22ND JANUARY, 1872.

MR. CHARLES BROOKE, F.R.S., VICE-PRESIDENT, IN THE CHAIR.

The Minutes of the last meeting were read and confirmed, and the following presentation of works for the Library announced :—

‘Matter.’ By the Rev. J. G. MacVicar, D.D., LL.D. *From the Author.*

‘The Chemistry of Natural Substances.’ By the same. *From the Author.*

Mr. W. M. ORD, M.D., then delivered a Lecture “On the Influence of Colloid Matters upon Crystalline Form.” A discussion followed, in which the Chairman and Dr. Fraser took part. Dr. Ord having replied, the meeting was then adjourned.

ORDINARY MEETING, 5TH FEBRUARY, 1872.

THE REV. J. H. RIGG, D.D., IN THE CHAIR.

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

MEMBERS:—The Hon. Sir T. D. Archibald (Puisne Justice of the Court of Queen's Bench), Inglewood, Bickley, Kent; James Batten, Esq., Highfield, Bickley, Kent; Mark Oldroyd, Esq., Dewsbury; John Rae, Esq., LL.D., F.S.A., Chislehurst; Arthur Powell Townend, Esq., Chislehurst; Thomas Townend, Esq., Chislehurst; W. R. Winch, Esq., Chislehurst.

ASSOCIATES:—Sydney Gedge, Esq., M.A. (Corpus Christi College, Cambridge), Mitcham Hall, Surrey [Life]; Rev. John Adams, M.A. (Oxon), Vicarage, Stockross, Newbury; Rev. Canon Edward Hoare, M.A., Tunbridge Wells.

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

“Antidote against Modern Geology.” By Patrick M'Farlane, Esq. (2 copies.)
From the Author.

“The Harmony of the Bible.” By the Rev. Arthur Rigg, B.A.
From C. Brooke, Esq., F.R.S.

The following paper was then read by the Author:—

ANALYSIS OF “NATURAL THEOLOGY” CONSIDERED WITH REFERENCE TO MODERN PHILOSOPHY.

	PAGE
<i>Introduction</i>	4
<i>Definition of typical views</i>	5
<i>The Lucretian Philosophy</i>	7
<i>Teleological views</i>	9
Design No. 1.—STRUCTURE.—Rudimentary organs—Neglect of them by writers on Natural Theology—their value to the doctrine of Evolution— <i>Relative character of Design</i>	10
Design No. 2.—USE.—Mistaken uses—the relative character of use—Actual and potential use—Four applications of the term Use	13
Design No. 3.—LIFE (or the Spiritual Element).—Intimate connection between this, the question of man's existence and of his connection with animals—Strictures on Mr. Lewes's expressions, “bungling,” &c.	16
Designs Nos. 4 and 5.—PLAN and RANGE OF LIFE up to Man—Man's position—Strictures on Mr. Lewes's remarks on “types”	19
Design No. 6.—ADAPTATIONS of Man and Animals to their sphere of existence somewhat overrated—Illustrations of those of man and animals—the law of IDEALITY—Strictures on some remarks of Mr. H. Spencer—Misuse of the term “Evil”—Its limitations	23
Design No. 7.—ELABORATION of the present condition of the INORGANIC WORLD	19
<i>Chance, its varieties and meanings</i>	27
<i>Perfection</i> —the idea considered—its relative character maintained	32
<i>Law, its meaning and usage</i> —The doctrine of Evolution	35
<i>Conclusion</i>	38

NATURAL THEOLOGY CONSIDERED WITH REFERENCE TO MODERN PHILOSOPHY. By Rev. G. HENSLow, M.A., F.L.S., F.G.S., M.V.I.

Introduction.

NATURAL THEOLOGY, or “the Discovery of Evidences of Design attesting to the existing attributes of the Deity collected from appearances of Nature,”* or “the consideration of the Power, Wisdom, and Goodness of God as manifested in the Creation,”† is a subject which has engaged the attention and interest of devout men of at least the Jewish and Christian faiths from the earliest periods until now.

That God has created all things, as well as ordained all the circumstances of the universe, was the firm belief of probably the most ancient writer whose works have come down to us in the Book of Job. It forms the basis of the Mosaic dispensation. The Psalms and Proverbs, as well as the Book of Ecclesiasticus and others, breathe the same spirit. And if we turn to Gentile writings, we find exactly the same views embodied in the Shastah of Brahmah; for what could be nobler than the following?‡—

“God is One : Creator of all that is. God is like a perfect sphere, without beginning or end. God rules and governs all creation by a general Providence resulting from first-determined and fixed principles. Thou shalt not make inquiry into the essence and nature of the existence of the Eternal One, nor by what laws he governs. An inquiring into either is vain and criminal. It is enough that day by day and night by night thou seest in his works his Wisdom, Power, and Mercy. Benefit thereby !”

Again, if we pass on to later times—the early days of Christianity—we find S. Paul making it an express point of his argument wherewith to convince the heathen Greeks at Athens (see Acts xvii. 22—25); and again, in his Epistle to the Romans

* Archdeacon Paley's *Natural Theology*.

† See the *Bridgewater Treatises*.

‡ Quoted in Holwell's *Events relative to the Religion of the Gentoos of India*.

(i., 20) he declares that the attributes of God—the invisible things of the Godhead—should have been recognized by them from the visible creation, and that those who have not so seen them are without excuse.

That the Deity, one and the same with the Lord God Jehovah, the Personal God of Israel, was the Creator of the universe,—that all animate and inanimate objects of this world owe their existence to His divine power—has, therefore, undoubtedly been in some form or other the creed of the large majority of mankind in all ages.

During the last two centuries many volumes have been written in this country with the express purpose of bringing out more fully the objects of natural theology. Thus we find the names of More, Cudworth, Stillingfleet, Parker, Rae, and Boyle in the last century; while Paley, the authors of the *Bridge-water Treatises*, Brougham, Smith, and others in the present, who have discussed from various points of view and with ever varying illustration the doctrines of natural theology.

On the other hand it must not be forgotten that there have ever been atheists, pantheists, materialists, positivists, &c., who would not concede the existence of design or recognize an overruling Mind apart from Nature at all. Such was Lucretius, the poetical exponent of the Democritical philosophy; while atheists, pantheists, and materialists of various denominations have ever been and are only too numerous at the present day. But besides such dissentients to the belief of a Personal God, the newly-established doctrine of Evolution has amongst its advocates men who, while believing in God as the Creator of the world, yet professedly deny design to be anywhere present in it. So far, therefore, are they in opposition to the writers mentioned above.

The main object of the present essay is to endeavour to find an answer to the question, Is design* compatible with evolution? I would state, before entering upon the inquiry, my firm conviction that it is; and that both *design* and *evolution* are incontrovertible facts of creation.

Definitions of Views on Natural Theology.

In accounting for the existence of the works of creation, various elements of cause, so to say, must be considered. I think it will be, therefore, not without advantage to attempt to classify chief or typical opinions by some such method as the following.

* It will be seen, hereafter, that the word "design" must have a more extended meaning than the somewhat restricted use hitherto assigned to it.

1. That there is NO GOD, consequently NO DESIGN at all in nature, and NO REASON displayed; but that all things are due solely to CHANCE.

This is the hypothesis of Lucretius and the Epicureans.

2. That the formative energy of structure may or may not be due to God; but as God is unknowable, Deity is an unallowable element in philosophical considerations: in other words, an agency external to the organism as originating "types" is not recognized. That all structures are the resultants of IMMANENT MOMENTA and of the POLARITIES OF SUBSTANCE; so that organs and forms issue from them in accordance with concurrent conditions.

This is the view of the modern Positivist.

3. That the CREATOR IS GOD, that *everything* is DESIGNED and *created by fiat*, with a display of REASON everywhere. That NO CHANCE has interfered; the results being generally ABSOLUTELY PERFECT, both in organs and organisms.

This is the view of the majority of natural theologians.

4. That the CREATOR IS GOD: but there is NO DESIGN; that the existence of organisms, and therefore all organic structures, has been brought about by law [evolution]; though CHANCE has largely affected the processes of elaboration of species; which processes have resulted in MUCH IMPERFECTION. This, I think, will represent the *true* Darwinian view.

5. That the CREATOR IS GOD. That He has created all things by LAW [evolution], with *one* partial exception or special interference, viz., *man*. That DESIGN, in the ordinary sense of the word, cannot be severed from many structures; that CHANCE has largely contributed to modify special results, which never rise beyond an *inideal*,* or RELATIVE STATE OF PERFECTION. And lastly, to fully grasp the rationale of Creation, FAITH (not *credulity*) and HUMILITY are as needful to the student of nature as they are to the believer in revelation.

This is the view of the present writer.

These representations must not be regarded as being rigidly exact. Indeed, it is impossible to draw up any definitions which will embrace the precise opinions of all who hold main ideas in common, but differ in minor details. I think, however, that they will give a fair notion of the principal points of diversity existing, and represent typical forms of thought. In considering these views in detail, attention will be given more especially to the third; while the opinions of the Positivist and of Mr. Darwin will be alluded to when dis-

* *Inideal* and *inideality* are terms proposed to express this relative state of perfection, and signify that the *ideal* is never reached.

cussing the different elements of the teleological view respectively.

The Philosophy of Lucretius.

The first, Epicurean or Democrital view is scarcely worth considering at any length. The arguments are so puerile as to be, at this age, absolutely contemptible. For instance, Lucretius, starting from the dictum that *nothing can proceed from nothing*, asserts all bodies, and indeed all souls, to be composed of solid material atoms: the composition of all things to have resulted from the cohesion of atoms meeting in their course *downwards*, as they are supposed by him to have been impressed from all eternity with proper motions. But he fails to show how such proper motions were acquired, and does not perceive that in infinite space, direction is *absolute*, and not *relative*; so that "downwards" has no meaning at all. He maintains that the soul, being material and intimately connected with the body, perishes with it; and consequently, ridiculing the fear of death, boasts that he has, by his philosophy, freed men's minds from its terrors.

Perhaps his greatest perversion of reason appears in his assertion that eyes, hands, feet, &c., were not made for seeing, handling, and walking, but that men, finding them well adapted for these purposes, used them for such: * their origin having been simply due to a fortuitous concourse of atoms meeting in their downward and slanting courses through space—and which atoms have thereby formed them by their closer unions. Such processes, by the nature of the case, could not involve intention or design. Nature, he adds, is the origin of all living creatures, natural wombs having formed (how formed he does not describe) on the surface of the earth, to which they adhered by fibres, gave rise to the first races. Such are specimens of his positive statements. On the other hand, he maintains that the world could not have been made by the Gods for the sake of man or their own pleasure, from the many evils existing in it. Now this is a most important assertion. Although his conclusion is erroneous, yet this very reason goes a long way towards establishing that spirit of scepticism, not only in natural theology, but in a belief in a God at all, which is so prevalent at the present day. There are other and perhaps as weighty objections raised by unbelievers; but this is one. On the other hand, the so-called physical evils of the world have been far too

* I am well aware that Positivism maintains that "structure is the cause of function, not function the cause of structure;" but that does not lessen the absurdity of the above.

much ignored by writers on natural theology. The consequence is that their arguments are often very one-sided, and lie open to attack where they are not ably prepared to defend them.

Now, the idea of design being utterly rejected by Lucretius, the "Argument of Design" is obviously in direct opposition to his scheme of philosophy. The two ideas are based on totally different assumptions. On the one hand, *chance* forms the groundwork; on the other hand, it is assumed that, as man works, so God has worked; that, since man can design, invent, and construct, so, when he sees some curiously constructed object he never saw before, he at once judges from his own experience, and pronounces upon the design of that object. Hence it is that because he does invent, contrive, and construct things both like and even totally unlike anything in nature, as a watch or a steam-engine, the idea is *forced upon him* that an eye *was made* for seeing and an ear for hearing. And, moreover, by no mental effort can he throw off the impression that there is really some Higher Power who out of His own intelligence made it.*

With Lucretius an eye was made by chance cohesion of atoms moving in space without order and without law!

With the Darwinian the eye was evolved by a long series of gradual improvement, still influenced by chance, but guided by law; yet to this result he inconsistently denies the application of the term "design"; though he cannot but recognize the creation as the work of God's laws.†

I shall have occasion to revert to this, and will say no more than that there are grounds for showing that the Darwinian believes in design in spite of himself.‡

The argument of design is, therefore, directly opposed to the

* I cannot speak for Pantheists, who profess to do so; but I have strong reasons for suspecting the above statement to be true, even with them. See what is said below about Lotze.

† See *The Descent of Man*, vol. ii. p. 396.

‡ In order to avoid misapprehension, it will be as well to observe that an evolutionist like myself is not necessarily a Darwinian. Evolution is a great fact of nature; and Mr. Darwin is to be thanked for having brought it out from obscurity and elevated it upon an enduring pedestal; but he has endeavoured to account for it by the process of *natural selection*, just as the author of the *Vestiges of Creation* endeavoured to account for it by an *inherent principle of progressive development*. Both these authors have put prominently before us what are undoubtedly real facts in nature; for natural selection is an indubitable truth, and the principle of progression is an obvious fact; but neither the one nor the other can account for a vast amount of phenomena. This natural selection, so largely due to chance, cannot, in spite of Mr. Darwin, account for the structure of the eye. The painfully elaborate reasoning in the *Origin of Species*, both as to this, as well as the bee-cell, clearly shows to my mind the hopelessness of the task he has set himself. Again,

hypothesis of Lucretius; for had not man any inventive powers at all, there would have been some show of reason in his philosophy.

Thus, we might argue,—man, feeling instinctively the pangs of hunger, would eat what he accidentally found to suit him, and could with justice say that he had no reason for supposing that it was made for him to eat, but, finding it agreeable, he used it as food.* Again, having no knowledge or belief in any futurity, he could see no use in his existence; but finding out that some things or circumstances gave him the sensation of pleasure, others of pain, he could only be led to think that it was best to get as much of the former as possible, and avoid as much of the latter. We know too well to what this would lead!

Now, reverse this view, and look on the other picture, where man recognizes God, sees His actions in the hosts of heaven and the myriads on earth; sees in himself the final stroke of that elaborate design which has taken incalculable ages to work out, and which no being on earth but himself could understand; feels in his own soul an internal evidence to the existence of Deity of which he is a reflection, and feels in himself an instinctive yearning for better things to come, together with the conception of the possibility of a realization of his hopes; the very existence of which conception is an evidence of his natural fitness for eternity.

The ordinary Teleological Views of Natural Theologians.

Dismissing the Epicurean hypothesis, let us take up the third, which more nearly concerns us, or that which is held by the majority of teleologists. Their stand-point is that all things were created by God as we see them now. That every species of animal and plant is an absolute entity designed and executed by the Great Artificer, and that all structures are *perfect* † in form and function; so that every portion of struc-

the principle of necessary progressive development leaves untouched the fact that animals of the lowest groups abound at the present day, *i.e.*, it ignores the principle of *Retention of Type*, which must be united hand to hand with that of evolution.

* The only illustration that I can think of at the moment which would tally with the Lucretian idea is, that writing-clerks, finding their ears suitable for holding their pens, use them as such.

† Some modification of the idea of *perfection* of organs is held by a few teleologists who have more extensive knowledge of facts than the majority; and so have not failed to recognize the existence of rudimentary and “useless” organs, perceiving thereby the *relative* and not *absolute* character of nature’s perfections.—See *Plurality of Worlds* (by Dr. Whewell), p. 345.

ture in an organism has its designed use. Moreover every adaptation of the creature to its sphere of existence or surrounding conditions is a proof of a wise and prescient Designer and witness to a divine intelligence. *Reason* is displayed in every direction, and chance is eliminated altogether.

As these opinions will form the chief matter for review in this essay, it will be necessary to consider carefully each of the elements involved in this view.

First, then, let us clearly define what is implied by design; and as there are several phases of it, it will be well to enumerate and then consider them in order, thus:—

1. Design in organs, *e. g.* eye, hand, heart, &c.
2. Design in the uses of such organs.
3. Design in the spiritual element or life of an organism, which requires such bodily structures; inclusive of man.
4. Design in the plan of animal life, or the unity of type observable in groups of organized beings.
5. Design in the range of animal life from an "amœba" up to man.
6. Design in the adaptations of man, of animals and plants to their sphere of existence.
7. Design in the elaboration of the present condition of the inorganic world through past geologic ages.

Design No. 1.—The first and most obvious may be called *design of structure*. This has been well explained and illustrated by Archdeacon Paley in the Introduction to his *Natural Theology* in his argument of the watch, by which he wishes to show that, as man designs, if not creates, constructs and produces an object which of itself witnesses to great intelligence, so do the works of Nature, *e. g.*, the eye, hand, or heart, as well as leaves, flowers, and fruits of plants, by a like reasoning witness to a far higher and superhuman intelligence. Now it must be observed that the argument of design as limited to structure does not rise higher than to prove the existence of that intelligence, and the power of the intelligent being who possesses it to put such designs into execution. And it is worth repeating, that however much men may try and persuade themselves to the contrary, by no effort of mind is it possible to sever the idea of design from such structures as I have mentioned. The Lucretian idea *cannot* be entertained now. Our minds cannot separate such from the existence of a spiritual agency that has brought them into existence.* But while the

* Of course this position will not be allowed by the Positivist, at least so far as the assertion of the impossibility of severing design from nature is concerned. For, starting from the dictum that Deity is unknowable, and that the finite mind cannot pronounce at all upon final causes, the Positivist

conviction of design is forced upon us in contemplating such organs as I have mentioned, we must bear in mind that there exist a great number of structures, not only of such a character as to leave us in doubt as to their use, but which are so atrophied and rudimentary that it would be grossly illogical to say they had any use at all. Now, natural theologians for the most part have ignored these latter altogether; while those few who do refer to them imagine they have escaped the difficulty of explaining their presence by saying that they are only witnesses to the conformity of plan—"a specimen of pedantic trifling," Mr. Lewes says,* "worthy of no intellect above the Pongo's." Thus, Dr. Whewell (who did not live to read this statement) says in his *Plurality of Worlds*, p. 345:—"In the plan of creation we have a profusion of examples where similar visible structures do not answer a similar purpose,—where, so far as we can see, the structure answers no purpose in many cases, but exists, as we may say, for the sake of similarity, the similarity being a general law, the result, it would seem, of a creative energy, which is wider in its operation than the particular purpose."

The consideration of rudimentary organs has arisen of late years into a prominence quite unexpected, in consequence of the great value they afford to the deductions of biological science. In fact, the now thoroughly-established doctrine (at least amongst scientific men) of evolution owes its existence in great part to their presence; nor, indeed, could it dispense with them.

I do not think it needful on the present occasion to give illustrations of rudimentary organs beyond what I may occasionally have to mention, as their existence is indisputable. But their importance in regard to my subject does not so much lie in their support to the doctrine of evolution as in their

denies us the right of using the word design as indicative of mind apart from *immanent* causes.

That God is unknowable in His essence and action—"that His judgments are unsearchable and His ways past finding out" (Rom. xi. 33), I readily admit; but I maintain, dealing with purely objective structures, not only is it perfectly logical to attribute design to the eye (without attempting to discover how it came into existence), and utterly illogical to deny it. I do not pretend now, for argument's sake, to pronounce who, or of what character, the Being was who made it, but simply to say, there is palpable design, and of such a character as transcends the power of man.

The immediate causes of its structure may be *inmanent momenta in matter*. And here I would join hands with the Positivist, provided he see they cannot be self-existent; but, constituted as our minds are, with their inevitable tendencies to pronounce like results as due to like causes, I cannot understand how any man can think he speaks logically who denies mind as, in some sort, connected with the origin of such organic structures.

* See "Mr. Darwin's Hypotheses," by Mr. G. H. Lewes, in April, June, and July Nos. of *Fortnightly Review*, 1868.

witness to the *relative character of design* in structure revealed by their presence. Hence, as will be seen more fully hereafter, it cannot be too strongly borne in mind—indeed it may be laid down as a universal law—that no structure can be called absolutely perfect, or than which we cannot conceive a better. So that from such an elaborate organ as the eye to a mere pigment spot of an echinoderm, or from the well-developed legs of the majority of lizards to the rudimentary and useless representative of legs in certain snake-like genera, organs of varying degrees of character can be found which impress us proportionately with corresponding degrees of evidence to design. The word “design” cannot convey more than the structures themselves; and as structures apparently adapted for certain ends in some organism are found less and less so in kindred forms, so design, as applied to the former, from being very pronounced, becomes, as it were, less and less so until it disappears altogether. Thus, if the following genera be compared, it will be seen how a gradual degeneration of the limbs indicates, so to say, a corresponding dying out of purpose, till at last nothing remains but rudiments of legs under the skin, in which the purpose of locomotion is finally gone, and design has disappeared altogether: *Zonurus griseus*, *Tachydromus sexlineatus*, *Sauropis tetradactylus*, *Chamaesauria anguina*, *Pseudopus Pallasii*. (These genera will be found illustrated in the *English Cyclopædia*, v. s. *Zonuridæ*.) Now these examples are isolated instances in as many distinct *contemporary* genera. The same phenomenon may be witnessed in hereditary but long antecedent forms. Thus, the *Plagiolophus* had three well-developed toes, the central one being slightly the larger. In the *Hipparion* of a later epoch the two lateral ones became much smaller, and nearly resemble the pair of rudimentary toes of a cow, while the central toe and its supporting bones are proportionally larger. In the present epoch we have its descendant, the horse, with only one toe (the hoof), the two rudimentary ones having disappeared altogether, nothing but the “splint-bones” remaining. Nature is replete with such illustrations of rudiments, and the tertiary strata at least abound with evidence of “generalized” types and “transitional” forms. Hence we see that while, on the one hand, innumerable examples can be found, such as teleologists have hitherto seized upon for their illustrations, and which to a believer in a personal creating God evince unmistakable and admirable design; on the other hand, a large class of structures can be pointed out which either scarcely admit of the word at all, or else seem to militate against it altogether.

The explanation, then, hitherto offered by natural theologians of the existence of rudimentary organs is quite inadequate, not

to say unphilosophical, and directly opposed to the very principles upon which the argument of design is based. On the other hand, they form one of the strongest witnesses to evolution. They may be said to be a necessary part of it; for, were any abrupt changes of structure constantly occurring, we should at once begin to infer that some power was as constantly at work to interfere and make such changes, somewhat after the notions of the cataclysms and recreations of early geological theorists. When such sudden breaks appear to occur, the balance of probability is greatly in favour of the inference of the previous existence of, but now extinct forms, which once united such well-differentiated types as may now exist.

It may be objected that I have regarded rudimentary organs too much in the light of atrophied conditions, and not as origins for future development; and it is worth while observing that there are two ways of regarding them, both, however, equally in harmony with the doctrine of evolution; and in many cases it is at present impossible to say with certainty which would be the correct view. Thus, in the case of the lizards, it may be that the condition of the limbs of the *Pseudopus*, which are rudimentary and concealed beneath the skin, was the forerunner of the state of the limbs represented by the other genera given above. We cannot say. The argument, however, is equally sound on either supposition. On the first, the design of the limbs dies out, and is replaced by the snake-like method of progression; on the other, the latter mode of locomotion gradually disappears, and is replaced by limbs.

Design No. 2.—I must now consider the second instance of design, or USE.* Having acknowledged an organ, as the eye, to be designed, we see design in the use of it. Here is the supposed stronghold of the teleologist. Many organs seem so obviously intended for definite uses, that they love to dilate upon the requisite adaptations which conspire to fulfil the use of an organ. Thus no one can deny the use of sight to the eye, or hearing to the ear, and so forth. And no one can deny that the mechanism or structure of such organ is most admirable. But natural theologians very often go too far, and try to discover a use in everything; the result is, they not unfrequently

* It will probably be felt immediately that, as a general rule, *structure* and *use* stand or fall together. But there are some instances where an organ, by its elaborate or peculiar structure, seems to justify a purpose, yet that purpose may remain undiscovered. Such, for example, was the spleen. When, however, we see an organ with a decided use, as the leg of a lizard, which is used for running, I repeat that we are justified in describing such an organ as useless when it remains concealed, in a rudimentary condition, under the skin.

foist upon organs and organisms a use or design, which further experience shows clearly was never intended. For example: That the pollen of flowers is destined to fall upon the stigmas in order to secure a development of seed is an undoubted and admitted fact. That the stamens should be in the same flowers as the stigmas was looked upon as an instance of perfection; and flowers having all the members well represented were accordingly placed at the head of the list. Now in Dr. Whewell's contribution to the Bridgewater Treatises, and in Archdeacon Paley's work on *Natural Theology*, these authors both allude to the statement attributed to Linnæus, that pendulous flowers have their stigmas at a lower level than that of the anthers, so that the pollen may fall from them upon the former; while in erect flowers, the anthers, they say, are elevated above the stigma, so as to secure the same end. Now how much of this is true? how much is fact? The first statement, that pollen must fall on stigmas to secure seed, is the only one that will stand investigation; and even that requires qualification, as we shall see. With regard to the second; in a great many plants the "sexes" are separated; that is to say, in some, as the cucumber, the stamens are never in the same flower with the pistils. In others, as the yew-tree, willows, &c., the flowers bearing stamens are not even on the same tree or plant as those having the pistils. Now, with regard to the next statement brought forward by the late Master of Trinity, Cambridge, as an argument of design. This is true for some flowers, *e. g.*, tulip and fuchsia; but it is *not* true for crocus, mallow, and many others. In addition to this, some flowers furnish both conditions (primrose and loosestrife), and in others the pollen is so situated that it cannot possibly escape from its confinement without external mechanical agency, and which is effected artificially in nature by insects, as in orchidaceæ. These and other facts have led physiologists to discover a very different "use" or law in nature, and which is expressed by saying that it is more beneficial for a stigma to receive pollen from the stamens of a different flower (of the same kind) than from those of the flower in which it is itself. Hence there is more reason for believing the "intention" to be that of securing the crossing of distinct flowers, as it is called, by the transmission of pollen from one to the other by insect and other agency; without, however, excluding, in those cases where the two organs are together, the possibility of the pollen of any flower falling upon and so fertilizing the stigma of the same flower. Notwithstanding this, it has been discovered by Mr. Darwin that the pollen of *Linum grandiflorum* (scarlet-flax) is absolutely effete upon the stigma of the flower from which it (the

pollen) is taken, though quite available for another flower ! The innumerable contrivances to secure intercrossing are infinitely more varied and marvellous than was ever contemplated by Linnæus, Paley, or the late Master of Trinity College, Cambridge.

Another instance of false reasoning, which I have heard brought before this Society, is the following :—“ Mountain grasses are viviparous (that is, produce a kind of bulb instead of flowers and seeds) in order that the winds, so prevalent at high altitudes, may not waft the seeds into the valleys below ” ! One other instance, and which will be found in the Bridgewater Treatise of Dr. Roget (*On Animal and Vegetable Physiology*, vol. i. p. 95, 8vo. ed.), who says : “ The different kinds of hairs, of down, of thorns and prickles, which are found on the surface of different plants, have various uses, some of which are easily understood (?), particularly that of defending the plant from molestation by animals. The sting of the nettle is of this class.” Dr. Roget does not seem to have been aware of the fact that the caterpillars of several kinds of insects feed upon nettle-leaves ! With regard to mountain grasses being viviparous, it is an unfair statement, which might lead one to suppose that *all* mountain grasses are so. They are rather the exception than otherwise. Again it might be asked, how is it that the creeping willows, to the seeds of which silky hairs are attached, for the express purpose of wafting them away, flourish and carpet the mountain-tops of the Alps ?

These few instances will be sufficient to show how cautious we must be in assigning a use to certain organs and organisms which experience may subsequently prove was never intended ! It is by such hasty generalizations that teleologists only bring down contempt upon themselves, which natural theology is compelled to share.

Another application of the word “ use ” must now be considered. The healthy and vigorous action of any organ depends upon its exercise ; and an increase of growth is the result of use, while a decrease or atrophied condition is the consequence of disuse. Thus when we see a bird fly, we are justified in saying that the use of its wings is for flight ; but when we look at the rudimentary condition of the wings of an ostrich or apteryx, and supposing we know of no other birds, such a conclusion could never be drawn. Seeing, however, that the absence of the power of flying is exceptional, we have reason to believe, in accordance with the above law, that the power has gone in consequence of disuse. So the wing is now *useless*. But such *uselessness* is not always the case of atrophy. Take the penguin. Here, too, the wing is useless for flying, but observation tells us that it does admirably well for swimming. It

is not, then, *absolutely* useless, for its use is changed.* The ostrich and apteryx, however, neither fly nor swim, and as yet no new use has been acquired. Hence, shall we say that their wings are actually *absolutely useless*? In one sense, yes; but perhaps in another sense, no! if such an alternative be allowable. For flight the wing *is* absolutely useless: it has no actual use, but it may still retain a *potential use*; for many instances have occurred which have led naturalists to consider that rudimentary organs may be capable of such development as to acquire functional power (as in the case of mammæ of male sex, androgynous flowers, &c.), or perhaps even of a development into some new direction, as may be the case of the penguin, where a normal use has, according to such hypothesis, been displaced by another with corresponding modification of form.

We may therefore consider the *uses* of organs under the following heads:—

1. When the organs have their functions in full vigour,—as the wings of the majority of birds.
2. When the organs are becoming gradually atrophied,—as in domesticated birds; and their uses consequently enfeebled.
3. When the use is entirely gone,—as in the wings of the apteryx.

Obs.—In case 2, with perhaps 3, the organs are presumably capable of redevelopment with their uses restored. Whether an organ may become so atrophied that it is absolutely incapable of redevelopment is unknown; but the probability is that such is the case.

4. When the organs are adapted to an entirely new use,—as in the wings of the penguin.

N.B. Never forgetting, in any case of rudimentary organs, that they may represent *anterior* and not *posterior* conditions of organs with full functional power.

Design No. 3.—I now pass on to the third instance of design: the spiritual element. Having considered *organs* and their *uses*, we must regard the *beings* that use them,—the spiritual part of creation or life. And the pertinent question at once arises—“Why have animals existed at all?” or, “What is the object and design of life?” Let these questions be put touching any living object, plant or animal, that has ever lived, and no answer is forthcoming! Take man into consideration and the answer becomes plain enough. We must answer the higher question first—“Why am I here?” or, “Why does my

* We must not forget the other alternative, that the wing of the penguin may represent the anterior condition intended for flight.

spiritual part live and require this body of organs for its terrestrial existence?"

It appears to me that in the answer to this question is involved that of the former. The first, but least important answer, is that I could not live without animals and vegetables: *their* existence is essential to *mine*. But this obviously cannot be a complete answer, for such a necessity applies to a very small number of them.

The question "Why do I exist?" finds no satisfactory answer from nature. We *must* turn to Revelation to be completely satisfied; and no answer equals this: It was the will of God that there should be a *being* who could be *moral*, and that, he should pass through a period of probation before he be fitted to enjoy that state to which his spiritual part is naturally best adapted.

Now turn to the former question, "Why do animals exist?" or, "Why did the world see long series of developments," successive types ascending the scale of life, each in turn gaining its ascendancy, acquiring a maximum of development in some direction or other, and then gradually subsiding, yielding its position to its successor, until man entered upon the scene too, and he in turn took his place at the head of the world and then subdued it. A more complete reply will be obtained when we have considered the fourth instance of design; for it is only when we take note of the fact that a large group of animals (the vertebrates) are constituted on the same plan as man; conspicuously by their osteological characters; that we see not only a bond of union between him and them, but the design of their existence only finds its end or climax in man, whose bodily structures furnish the last links in the chain of animal creation. Physiologists have shown beyond question that in *bodily structure* he cannot be separated from the primates; that the human fœtus obeys the same laws of development and differentiation which govern the fœtuses of all other creatures: that is, it passes through certain representative forms of other vertebrates in succession upwards. Moreover, man has rudimentary organs in an exactly similar manner to all other animals. Now observe the consequence of this. The *facts* upon which the doctrine of evolution rests in its application to the animal kingdom thus become necessarily applicable to man's bodily structure also. If, therefore, evolution be true for the former, *it must be true for man's body also*. Thus far, then, at least, man cannot be severed from other animals. Away with that contemptibly false pride which ridicules, ignores, or falsifies these facts, facts which are real synonyms of truth. What care I from what I may have been descended? I am myself,

and I know my destiny, and if I have learnt my duty and mission in this world, no one is to blame but myself if I do not do it. It neither prevents nor helps me to do this, to hear either that I was or was not descended from an ape, an ascidian, or an amœba! If the probability be proved to outweigh the improbability, I am ready to accept it; and I care not so long as truth prevail.*

Having alluded to embryology, I would here venture to insert a few strictures upon Mr. Lewes's remarks touching this subject. He calls the processes through which the embryo passes "bungling." Now, granting that, for the sake of argument, he assumes a Deity to have done this, surely he is philosophizing subjectively; for how can he, any more than a teleologist, pronounce what is, and what is not, "bungling" to an Infinite Mind? He is deciding, out of his own conceptions, what is and what is not derogatory to a Deity. The Teleologist does not presume to do so: yet he is a Positivist, and denounces subjective philosophy! He appears to overlook in this case that what invariably takes place is subject to inductive law; and that the fact that all animals pass through representative conditions of inferior types in succession, while in the embryonic condition, is therefore a law of nature. If it be so, he, as a Positivist, ought to accept it as such. I regard it as a powerful witness to evolution, and that such was the method by which God chose to work, and see nothing derogatory about it at all!

I strongly protest against the expressions "tentative" and "blundering," "Nature feeling her way," &c. When we consider that the result always comes out all right; human fœtuses go on blundering every day all over the world, *yet there is no error in the result.* Nay, more, the fœtuses of all animals do the same—the results are equally good, whatever the species. If we can infer anything from this, it is that this "blundering" method is always a very successful one; and we, as human beings, have no cause to complain of having been

* In this essay I do not profess to deal with metaphysical subjects. I have therefore made no mention of the *soul* of man. I will only repeat words which I have elsewhere said (*Geology and Genesis: a Plea for the Doctrine of Evolution.* A Sermon. Hardwicke). "Admit that man's bodily structure agrees closely with that of apes; admit that his mental powers are of a *like kind* to those of the lower animals; deduct as much as there is of agreement between them from man, and what is left? An enormous amount of intellectual power; a morality which they do not possess at all, as well as the power to appreciate and love an abstraction or an idea; and I say there is no species, no genus, no family in nature that has ever existed or does exist, which affords us any ground for conceiving such an enormous impulse, as man has obtained somewhere, to have come to him by natural laws alone."

representatives of a fish, or even a hairy quadruped. As I have said, *I am Myself*, and care not what I have been. If it be truth, I am perfectly willing to abide by it; but instead of, or rather in that "bungling" recognize *law*. I refrain from pronouncing subjectively what God might or ought to have done with me, as well as from finding fault with what He did with me when "He fashioned me in the womb." (Job xxxi. 15.)

Geology has greatly extended our knowledge of the forms of beings, and has brought to light a vastly enlarged panorama of organized creatures, so that the question of design of their existence becomes more and more pressing. We may add, too, that we see a corresponding or somewhat analogous development in the inorganic world; the crust of the earth changing and elaborating itself æon after æon, fitting itself more and more for *our* existence, by producing that immense variety of substances, metals, marbles, &c., which are so invaluable to us.* When we consider all this, at which I have but here hinted, we cannot shut our eyes to the fact that a great design or purpose has been steadily maintained throughout, and that purpose was MAN. Man comes in at the right time, closes the series, and the argument of design is furnished with its final cause. The great doctrine of evolution thus throws a very different light upon the matter to the old statement that "everything was made for man, and is of some use to him." There was a truth, no doubt, underlying it, but it expressed a far too limited and presumptuous a view of the real state of things.

Man alone can look out upon the world and understand his position and destiny. He alone can recognize the broad line which severs him from all other members of creation, while he can yet recognize the links which unite him to them. He alone can see Mind in all around him, and recognize his own as a feeble image of the Creator's.

Designs Nos. 4 and 5.—The earlier and later forms of teleology may be called the "Creative Fiat" and the "Creative Plan." The second may be thus described: The organic world is part of a general scheme, in which each species represents an idea in the Divine Mind; and must be taken as an item in a plan conceived from the first in all its details, although realized in successive epochs.

The difference between them is not real, but apparent only, and has arisen out of deference to geological discovery. In other words, the *fiat* is transferred from one single period to a succession of periods. Whatever objections can be raised against contempo-

* This I considered as the 7th instance of design. I shall not, however, dwell more upon it in this essay.

aneous and specific creations, will be found to hold good with successive typical creations, or "realizations of ideas."

Now, the most potent objections lie in the fact that many species are connected by intermediate and often minutely gradational forms. Thus, just as the gradations of varieties connecting osculant species bear a *primâ facie* probability against each individual of coexisting species having been called into existence by a special creative fiat; and again, as osculant genera and osculant orders connecting prominently typical existing groups impart the same impression; so do the links found between "forms" and "types" of successive geological ages (in addition to those found frequently in contemporaneous periods) bear exactly the same *primâ facie* evidence against successive creative fiats having been made.

The following examples will furnish sufficient illustration of this. Of contemporaneous *geological* periods there are forms which unite the mastodon and elephant, the former genus being now extinct. In the Oolitic periods the *Dinosauria* furnished the link between reptiles and birds. In the Carboniferous epoch the *Archegosaurus* retains old piscine characters of Devonian fish, and links them on to the amphibia; while the amphibia, as a large group, stand intermediate between fishes and reptiles. Again, the extinct *Ictitherium* of the Miocene epoch has become differentiated into hyenas and civets, now representing two distinct families. The extinct *Palæotherium* of the Eocene and the Horse of modern times are united by the Hipparion and other forms of the Miocene and Pliocene epochs. And lastly, the very distinct shells of our seashore, *Purpura lapillus* and *Fusus antiquus*, are connected by intermediate forms during the Red Crag (Pliocene) epoch.

Again, just as in applying the argument of design to such plans or types as we see in nature, so identically the same features will appear transitional in discussing the design of individual organs. We saw that in some parts of the organism it seemed very pronounced, as in the well-developed limbs of certain lizards; while in others we could scarcely or not at all see it, as in their rudimentary or useless structures. These, however, it will be remembered, had a significance which cannot be overrated, for they bear incontestable evidence to evolution. Similarly when we consider the organs of many other animals so admirably adapted for their respective modes of life, design seems obvious; but when we examine transitional forms, and see those very structures, which appeared to be marvellous instances of design, becoming useless, while new processes take their place, we can only say that as design dies out in one direction it gradually appears in another.

More and more as the subject develops itself under investigation, and as we pass from the individual to its species and thence to its genus, and so on upwards till we see the whole of the animal kingdom or the vegetable kingdom linked together, more and more does the fact, that what we call *design* is a *relative* and not an *absolute* thing, become forced upon us; and if the term is to be retained in conjunction with evolution, it *must* be allowed to have no such determinate meaning as has hitherto been applied to it by teleologists. Whether, however, these plans or types, specific or ordinal, were conceived in the Divine Mind simply and immediately upon, or long before, their execution, is beside the real question. Whether, too, each type as it appeared was a *necessary* result of the laws of God's evolution, is beside the question, which is this: Recognizing objective types as real facts in nature, did God as a Being external to creation conceive them in any way *at all*, or are they simply the necessary issue of "concurrent conditions"; all external agency being excluded? I prefer to believe that God, as an external Personal agent, had something to do with them.

I cannot see that the statements,—“Every part [of an organism] is the effect of a pre-existing part” (p. 617, *Fortnightly Review*, No. XVIII. 1868); that, “the polarities of the organic substance assume the form” [of the organism]; that, “the type emerges from the momenta” (p. 621), or that “the type (or arrangement of parts) is the result of concurrent conditions, not the cause of their concurrence” (p. 366),—throw any light upon the question at all; they are the positivist's attempts at expression of facts, but are in no way explanatory, and simply amount to a denial of design of the types or forms of animals and vegetables; that they were but the necessary result of [fortuitous?] concurrent conditions. Have we not here something very like the Lucretian fortuitous concourse of atoms?

But suppose we admit that this materialistic or positive view is equally good with that of a Personal God, so far as both may be supposed to furnish a *vera causa* of the origin of organs and forms.* Then it is at this point that Revelation steps in and turns the balance in favour of a Personal God external to creation, and Who has worked by laws and evolved the present state of things from chaos.

Mr. Lewes further remarks (p. 621), that—

“The type does not *dominate* the momenta, it *emerges* from them; the animal organism is not cast in a mould, but the imaginary mould is the form which the polarities of the organic substances assume. It would seem

* Mr. Lewes defines *organs* as structures possessing definite functions; while he applies the word *forms* to rudimentary and useless structures.

very absurd to suppose that crystals assumed their definite shapes (when the liquid which held their molecules in solution is evaporated) under the determining impulse of phantom-crystals, or ideas; yet it has not been thought absurd to assume phantom forms of organizations." (p. 622.)

Now, if we are to understand from this passage that the issue of an organism, whether merely an offspring similar to its parents, or the ultimate development of a new species altogether, is in any way to be compared to the production of a crystal from evaporation, the burden lies with Mr. Lewes to show that the *causative momenta* are analogous or are of similarly influencing power. In the one case there is *life*, in the other there is not. Life may be nothing more than physical forces, but no one will deny, as long as he can judge of it by its effects, *i. e.* as long as the organism under examination is alive, these effects do not justify us in saying that there is any analogy between them, or that they can be compared, any more than an organic cell admits of comparison with a crystal.

Mr. Lewes goes on to say that "the conception of type, as a determining influence arises from the fallacy of taking the resultant for a principle." But is it a fallacy? The whole question of final causes depends upon the answer to this question. Principles of nature are only deducible from resultants or facts; and science can only reason from the known to the unknown. It is from the facts of nature that the principle of evolution has been deduced. The *vera causa* of evolution and which includes all types and plans, is placed, however, in different directions by the teleologist and the positivist; the latter, ignoring any determining influence, puts it in the hands of the "momenta" or "polarities of the organic substance"; the former, recognizing some determining influence, places it in the hands of God.

The positivist, however, does not attempt, as far as I can discover, to account for the "*momenta*" of nature; except as "*immanent* properties." But whence came they, on the principle of conservation of force; what were their antecedents? Are they self-existent, eternal? But as this question opens up the deeper one as to whether God be Personal or Impersonal, whether force be eternal or not, &c., I must leave the matter there, only quoting one more sentence from Mr. Lewes, who says: "Even Lotze, who has argued so victoriously against the vitalists, and has made it clear (?) that an organism is a mechanism, cannot relinquish the conception of legislative ideas, though he significantly adds, these have no power in themselves, but only in as far as they are grounded in mechanical conditions." Why "significantly"? Surely we have here a wit-

ness to the usual way by which truth forces herself upon the mind? for she is far more truly and oftener *felt* than reasoned out. Lotze may argue as much as he pleases, but his intuitions are evidently rebelling against his logic. The still small voice whispers behind, as it will and must do in time to all, "There is a God for all that," who made him and all the world.

It will be desirable to observe, for it seems to have been overlooked by Mr. Lewes, that the notion of creative fiat in all probability arose from the interpretation of theologians of Genesis i.; and that confirmatory evidences appeared to be unmistakably derived from nature, because, until comparatively recent times, known species were few and their differences more obvious than their resemblances. I do not think, therefore, that the charge of having "inferred that species were ideas in the Divine Mind" is so truly applicable to the theologian as opponents seem to suppose; for it was simply regarded as an unmistakable doctrine of the Bible. All that the modern theologian has to do, therefore, is to confess that his interpretation of the first chapter of Genesis was inadequate, and requires correction; and that he has to thank science for having pointed out his mistake.

Design No. 6.—There is yet another phase of Design, and which forms the subject of one of the *Bridgewater Treatises*, viz.: "On the Adaptation of External Nature to the Physical Condition of Man," by John Kidd, M.D., F.R.S.

I cannot but think that many adaptations of man and animals, and plants, as well to their sphere of existence, have been much overrated; for, in fact, they are practically greatly limited. The conclusion now arrived at from a study of such adaptations has been expressed by scientific men as follows:—Animals and plants [and I will include man] do not necessarily live where conditions may be best suited to them, but where other animals and plants, or physical conditions, will let them live. This is the result of that intense "struggle for existence" which is a universal fact, and covers the sphere of man's existence, as well as that of all other living organisms. It requires but a slight observation, provided the mind free itself from preconceived ideas, to see that no animal or plant is absolutely and perfectly adjusted to its sphere of existence for every day of its life. These adjustments are ever varying round a mean condition of a fair state of comfort and happiness. Averages in this world must be looked for only. A vast amount of very imperfect adaptations must be taken into account in considering the conditions of life upon this planet.

I do not think it necessary to enter into many details to establish these facts. Evidences of it can be found in many works, notably *The Origin of Species*, and *Wallace on Natural*

Selection, not to add in a moderate amount of careful observation about him by the reader himself: but perhaps a few remarks upon the relative condition of man in his adaptation to his environment may not be out of place; for this element of adaptation in the argument of design has always seemed to me to be too much depended upon.

Starting with the truism that man can now exist upon this world—a possibility which, perhaps, did not exist in the greater portion of the world's history—we have to consider the degree of perfection to which that adaptability has arrived; and a careful scrutiny will not bring out more than a relatively perfect view. Consider his wants. Food stands foremost. Now his calculations on the produce of his fields can never be absolute. He may be in no way to blame; but, after all his strivings, his harvest may be ruined. Again: one of the most essential elements which nature furnishes to sustain our immense manufactures is coal. We may regard coal as providentially stored up for us; but we can conceive—if it be God's providence—that it might have been far more accessible and less dangerous to procure; for even with the most careful processes being adopted for its extraction, enormous danger to life always exists. So too, with regard to accidents and calamities by fires, earthquakes, and water. Who can foretell the fate of man, who is ever liable to destruction from natural causes which he cannot always avoid, and which he has no power to control? Not to mention diseases, hundreds of instances show an absence of a conceivably perfect adaptation between himself and his environment, and which will be apparent to any one who will reflect upon it. For example: in Dr. Kidd's contribution to the *Bridgewater Treatises*, he alludes to the beneficial effect of wind as dissipating intense heat, and as a preventive against the evils of a stagnant atmosphere,—“those currents of air which administer in various modes as well to the luxury and comforts of man, as to his most important wants” (p. 135, 8vo. ed.). But in his description he alludes as much to the destructive effects of wind as to its benefit, and to the existence of stagnant air producing (?) horrible effects, as goitre in Switzerland; while of hurricanes he can only say, “but on some occasions we have immediate demonstration of their remedying a greater evil [than the destruction of life and property which they cause]; viz., dissipating swarms of ants in the island of Grenada!” It may be questioned in passing whether the latter really is a greater evil than the destruction of hundreds of human beings! Again: of Swiss valleys, all that he can say is, “We may well be thankful that our lot has not been cast in certain regions of the earth, in those Alpine valleys, for instance, whose scarcely

human [*? sic*] inhabitants attest the dreadful consequences of a confined atmosphere." Now what are we to infer from this? And I might add much more to it; such as the atmosphere being the vehicle of epidemics, &c.; but that the physical adjustment of man to the atmosphere is anything but absolutely satisfactory. But we must remember this,—that an atheist or infidel might easily appeal to Dr. Kidd's descriptions, and tauntingly ask, "Is this the work of your Beneficent God?" Moreover, if we consider man's adjustment to external conditions, or external conditions to him, everything else besides the atmosphere furnishes similar "evils." In other words, there are the same relatively perfect or imperfect conditions, than which he can conceive far better, wishes for far better, and which he—if he does hope at all—hopes for far better hereafter.

We thus, then, find that man is not exempt from this invariable law of imperfect adaptations.

The Law of Inideality.

But, apart from infidels, many will feel disposed to ask, "Is not all this very derogatory to the Deity, who is a God of love and mercy?" I at once, and unhesitatingly, say "No!" I again say that it is not for man to pronounce what may or may not be derogatory to God. The finite mind cannot estimate the wisdom of the Infinite. It is this unphilosophical way of weighing God's actions in our own mental balance which has brought so much contempt upon the methods and assertions of the teleologist.

I maintain that natural theology, as a science, must be studied *objectively* (and not as hitherto, *subjectively*), like all other sciences. Theological deductions will only be sound as long as they are based upon a full and *thoroughly impartial* observation of the phenomena of the world. We can only discover His laws by a close examination of His works, their inter-actions, and their actions upon ourselves; and the universal principle or law—applicable, as we have seen, to all cases of design, including the adaptation of man and animals to their sphere of existence I propose to call the *Law of Inideality*; by which I would signify that nothing in nature ever reaches that *ideal* stage of perfection which is conceivable by man. It expresses what I have hitherto called *relative perfection or imperfection*. I call it a law, because law is expressive of an order of facts, and this law admits of universal application, applies to every class of "design," and is, therefore, a universal witness to the will of God.

Under this same head of adaptation I would allude to a statement of Mr. Herbert Spencer, who, in his usually powerful reasoning in support of evolution, has made one slip (as it seems

to me) in dealing with this subject in his article on the special creative hypothesis. (*Principles of Biology*, vol. i. p. 344.) In speaking of the parasites to which man is subjected, he asks, "Shall we say that man, 'the head and crown of things,' was provided as a habitat for these parasites? or shall we say that these degraded (?) creatures, incapable of thought or enjoyment (?), were created that they might cause unhappiness to man? One or other of these alternatives must be chosen by those who contend that every kind of organism was separately devised by the Creator. Which do they prefer? *With the conception of two antagonistic powers, which severally work good and evil in the world, the facts are congruous enough.*"

In the first place, I would remark that, of the two alternatives given above, the first is obviously absurd. It is axiomatic that man has higher functions and destinies than to supply food for parasites. Of the second, I would emphatically deny that, *because* parasites live on man, that *therefore* they were created to cause unhappiness; not to notice the two questionable words he has used. Some, such as *tenia*, may cause great distress; but, of some others, we should be utterly unconscious until told of the fact of their existence upon our persons; and I suspect people, as a rule, are not aware of the presence of more than four or five, the majority causing little or no inconvenience at all. The *purpose* of causing unhappiness greatly fails of its end. The real question, however, is far wider than pure personal inconvenience, even if it amount to an occasional death of the individual. It is this: Were all "evils," from unpleasant things up to destruction of life, designed to cause unhappiness? That is the question, to which I emphatically reply, "Certainly not."

Again. The sentence which I have italicised is one which appears to me utterly absurd under any hypothesis whatever. For, if parasites be an "evil" work here spoken of, and man, presumably, the "good," *the argument cannot stop with man*; and we shall soon become utterly perplexed to know which animals are "good" and which are "evil." If those which prey on others, such as parasites on man, be (as is evidently intended by Mr. Spencer) evil, then, *à fortiori*, all carnivorous animals must be "evil," and we must presume all herbivorous "good"; and man himself must therefore be "evil" too. But we have seen that he was "good," and his parasites "evil," which is absurd. *Cor.* Of what character are those animals, such as the rat and pig, which partake of a mixed diet?

The habitual use of this word "evil" has come down to us, I suspect, from the distortions of subjective philosophy; or, rather, subjective philosophy has merely expressed the idea of evil, which was hereditary from all antiquity, and inherent in

the mind of man since he became morally evil. Man being evil himself, looked out upon the world through a glass darkly, and so all nature seemed coloured with the murky aspect of his own morbid phantasy.

Recognize this world as never furnishing more than a relative condition of things; while the purpose and design of that, too, is not difficult to see, now we have the light of Revelation thrown upon it; namely, as a state of probation for man, to fit him for a higher destiny than any which this world can furnish; accept this as a great and universal truth, and you will not discolour your view of creation by erroneous views of God's goodness, much less by atheistic ideas!

We are told that "the pure in heart shall see God," and that "all things work together for the good of those who love Him!" Learn, then, to succumb to His will, try to adapt yourself to the conditions in which you are placed, not the conditions which are about you to yourself—that is reversing a natural law—and you will begin to suspect that what you irrationally called "physical evils" were, after all, but blessings in disguise. (Cf. S. James i. 2.)

The very idea of "evil" as applied to nature is, to my mind, totally uncalled for, and gladly would I limit it to sin and its effects (and even these latter, as often as not, are clearly blessings). It is not for us to find fault with nature, but to accept it as we find it, as the best for our good; and I repeat, man would never have dreamt of regarding things as evils if he was not evil himself, and so considered everything about him evil too. Here, then, come in the elements of faith and humility, which I alluded to as essential elements of the character of a student of nature.

Chance.

The preceding remarks on design will, I think, cover all that need be here said upon its former use by teleologists, and the new extension of its meaning which I would venture to give it. I now pass on to consider the next element of the argument which enters into the subject of this essay, namely, that of *chance*,—an element which forms so important an item in the process of natural selection, but which natural theologians have been very loth to admit, as being derogatory to their ideal and subjective method of Divine working.

What is meant by chance? We use the word often enough, but, when we think about it, it does not appear to be so easy of explanation as we might have at first imagined, for we discover that it may be employed in more than one sense. Let us consider some of them.

Can we mean by chance an event without a cause? Certainly not. Does it imply that the causes are so obscure and so baffle our conceptions and investigations, that we say the effects or results which we can appreciate have taken place by chance? If so, it may be somewhat of the meaning of the word; yet this can scarcely be so always, for we do not say that a plant ripens its fruit by chance, though we understand not the laws of its development nor the processes of its fructification.

To such results we assign the term *law*, and not chance, solely because we see the same effects issuing from similar causes. If the expected result do not, however, occur, as when a plant refuses to ripen its seed, we consider that it is due to some unaccountable interference of unexpected conditions. These may sometimes be accounted for in a general way, as, *e. g.*, excessive wet, blight of fungus or caterpillar, &c.; but as often not; so that, as the result is often practically uncertain, we cultivate crops knowingly at a certain risk, saying that it will be all chance whether we get a good harvest or not. Such, then, may be considered as one form of chance, namely, when events take place contrary to our expectations. A very general signification, however, would seem to imply undesignedness in the results, or when "an event takes place to the exclusion of some other event which, as far as *human* experience, judgment, or foresight can calculate, might as easily [and, perhaps, with more probability] have occurred." (*Walker's Dictionary*, s. v. "Chance.")

Thus, for example of undesignedness. A man travels from London to York, his friend travels from York to London, neither being aware of the intentions of the other. They meet *by chance*. Here, then, we have an undesigned coincidence.

A familiar instance of the latter definition, given by Walker, will be found in racing. Two men may run; one, from former experience, and from appearing to be the better runner, may be expected to win, yet from some *chance* the other may. Another explanation of the word will be found in a cause, or series of causes, although known as to their nature, yet cannot be traced and calculated. Thus a die falls from the box with ace uppermost. This we attribute to *chance*; but if we knew the position of the die in the box, all the forces and their directions which are brought into play by shaking the box, all the parabolic curves which the die describes, and all the attendant circumstances of motion upon the die, the result would be *certainty*. These causes, however, are not traceable; and we say, accordingly, that the result of the ace being uppermost was purely a matter of *chance*.

A further use of the word chance is made when we refer to future events, over the circumstances of which we have no control. When we say, "Leave it to chance," what do we mean? Simply this; that although by our previous knowledge of certain laws we might construct a proper deduction upon them, in accordance with which we might predict the future event,—in other words, expect the same result to follow after a repetition of the same circumstances; yet we know not but that certain other events or causes might intervene to subvert or alter the strict fulfilment of those known laws. Therefore we cannot be sure of the ultimate result, and we express our incapacity by saying we must leave the issue to *chance*.

The difference, therefore, between the case of a plant ripening its fruit and a die falling from the box is this: in the former case, without knowing what the laws are which govern the plant, we see the same result constantly recurring under the same circumstances; and this reduces itself to *inductive* law, while we presume tacitly that the same secondary causes are brought into play every time we see the same result occurring. But when we throw a die, we can form no inductive law in obedience to which the die will *always* appear with the ace uppermost. Experience tells us that however nearly in the same way we may shake the box and throw it out, we cannot calculate upon any particular face being uppermost; we may arrive at some degree of probability, but no certainty. So that we apply the word chance to those results for which we can trace no inductive law. And this brings us to consider its application in nature as concerning the conditions of existence for any individual organism.

Observation clearly shows that a plant or an animal is not always, if ever, placed under conditions best suited to it. Its position in the world is due to chance; or at most it can be only said to live where its existence is possible, not where conditions are most favourable. Now this is the average condition of things, and we may remember that although circumstances affecting the individual may seem to occur capriciously, yet when a large number are examined, *law* is perceptible as governing the *averages*. Thus, a large array of facts connected with social life seem, when isolated, to be due to chance, and subject to no law; yet when they are classified and averages obtained, it is found that these averages are not only subject to law, but such laws as can be practically acted upon, though individual cases may seem to belie the deduction. It is on this principle that the tables of life assurances are constructed, which are expressive of the laws which govern the rates of mortality.

In nature, then, we place under the head of chance all results

of which the immediate or secondary causes are untraceable, and which we cannot reduce to inductive law. That they are subject to law may be—nay more, is—a reasonable inference, though we are powerless to trace even the appearance of law. It is only to those persons who do not see this that the word chance in the sense in which it is used by naturalists implies anything derogatory or lawless. When Mr. Darwin speaks of chance in connection with natural selection, he alludes to what are facts, though he leaves his readers to infer that *chance* is but an expression for certain phenomena of which the laws are as yet untraceable. This may be illustrated by the weather. In this climate it has been found impossible to reduce the changes to anything like system or law beyond the most general; and it seems to be “all a chance” whether we are to have fine or wet days. Yet observations are beginning to show that there is law governing the averages, though we are powerless to bring every day’s phenomena into a general system. If we compare tropical countries with our own, we find they are far more regular, and consequently can be predicted with much greater precision.

Now it is due to the fact that chance seems to occupy so large a share of Mr. Darwin’s system of the origin of species by natural selection, that his opponents one and all have taken him to task for it; as implying a creation without a creator, and for reviving, with but slight improvement upon, the old Democrital philosophy. Even when he does let fall one or it may be a few little waifs to show, as it were, whither the wind listeth, it is instantly caught up by an opponent, paraded as a mistake on Mr. Darwin’s part, and that he evidently never could have intended it to be there. Thus does the M.A., author of *Darwinism Demolished*, make a rhetorical sally upon the gentle admission that the “works of the Creator greatly surpass those of man.* It is in this want of some distinct assertion from Mr. Darwin of natural selection being due to law (assumed but unrepresented by perceptible facts) that he has not done justice to himself; nor has he cared to consider the short-sighted charges, not only of non-scientific, but even many scientific men themselves. He has laid himself open to misconstruction, and, as history itself can now show, has aroused an enormous amount of bitterness of feeling, while innumerable speeches have been delivered, and even books of goodly proportions have issued from the press, to disprove what

* I quote from memory, p. 220, *Origin of Species*, 4th ed., not having the M.A.’s work before me, but the tenour of the remarks is strongly impressed upon my memory.—The exact title of the work alluded to by Mr. Henslow is *The Darwinian Theory of the Transmutation of Species examined*, by “a Graduate of the University of Cambridge” (*J. Nisbet*).—Ed.

Mr. Darwin has never yet asserted to be his belief, and which may be expressed briefly thus: that "the origin of species by natural selection is *not* subject to higher law." A few sentences in the *Origin of Species* and one strong protest in his *Descent of Man* are all, as far as I can remember, that he has uttered. It is to be deeply regretted; for I believe I am right in saying that in his indifference to preconceived prejudices, in his fearless exposition of what he believes to be the truth, he has raised a great stumbling-block to the general acceptance of the theory of evolution, which, though no doubt destined ultimately to hold sway, yet has been retarded in its progress by one of its greatest advocates.

As an illustration of an utter perversion of interpretation of Mr. Darwin and others' writings, I take the following sentence from Bishop Perry's *Science and the Bible*, who, speaking of *The Vestiges of Creation*, *The Origin of Species*, and *Protoplasm*, thus writes:—"If I have spoken of these three works with severity, it has been because the object of the writers obviously (?) is to produce in their readers a disbelief of the Bible"!

Notwithstanding that I am attempting to place Mr. Darwin on a right footing with his numerous misjudging readers, I must take him to task for misjudging himself. He tells us he does not believe in design; but I find in his work that he believes in the Creator, "Whose works far surpass those of man." What can that sentence imply but an *intuitive* recognition of the very basis of the argument for design? Mr. Darwin can no more throw off those feelings than Lotze. God's works may have been evolved, and not directly created; but, take creation as we find it, and design defies us everywhere! It is solely on *design*, and nothing else, that we recognize the superiority of nature's works, and that superiority forces us to acknowledge their author as God.

When Mr. Darwin makes that solemn protest wherein he says (*Descent of Man*, vol. ii. p. 396), "The birth both of the species and the individual are equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance. The understanding revolts at such a conclusion, whether or not we are able to believe that every slight variation of structure,—the union of each pair in marriage,—the dissemination of each seed,—and other such events, have all been ordained for some special purpose," he recognizes sequence as law, and law as the will of God,—and that *is* design. Mr. Darwin believes in it in spite of himself, though he may, as I do, disbelieve in a special act of creation for each organism.

Perfection.

The next element entering into the view of the ordinary teleologist and which must be noticed, is that of *perfection*. So much has been already said about the imperfections of nature, which I call the law of *inideality*, that the general, nay, universal, absence of absolute perfection will be almost inferred. It will suffice, therefore, to allude to three* only of the phases of design; viz., in organs, in their uses, and in the adjustment of creatures to their environments.

This idea of perfection is not equally maintained by all teleologists. In the writings of some of the more advanced thinkers, such as the late Master of Trinity College, Cambridge, there appear qualifying expressions when alluding to structures in which they cannot help seeing certain imperfections. Thus, in the *Plurality of Worlds* (p. 345), Dr. Whewell alludes to rudimentary organs, which he admits have no use to the beings in which they occur. But, as we have seen, he does not advance further than what appears to be the general explanation of all others who allude to them, viz., "that they exist for the sake of similarity," and he adds "this similarity is a general law, the result it would seem of a creative energy which is wider in its operation than the particular purpose." This explanation (?) of Dr. Whewell's is worthy of criticism, for it fairly expresses the general interpretation hitherto given by natural theologians of these seemingly mysterious structures. The expression "they exist for the sake of similarity" taken *per se* seems to lead us to a *reductio ad absurdum*, for let us remember that the argument of design professes to reason from man to God. Does, then, man leave rudiments of other designs in every kind of work which comes under the same general plan? Take for example ecclesiastical buildings. Does he tack on to a plainly-built chapel a few unfinished pinnacles which find their proper place on the tower of a cathedral? Certainly not! The perfection of art in each building consists in the unity or harmony of its design as carried out in the details of its own "style."

Nor will such an idea of purpose hold good if we admit development in the progress of architecture. Thus, could we say that man leaves rudiments of antiquated styles *with the express purpose* of showing that his modern edifices are constructed on an older plan? Assuredly not! I introduce this hypothetical

* I purposely avoid alluding to the imperfections of the spiritual part of man and animals, as that would lead me away into metaphysical subjects, with which this essay is not concerned.

question in order to allude to the fact that man *does* introduce rudimentary and useless structures in modern art, which, however, *had* their uses, but which are now obsolete, but *not with such purpose*.

One illustration will suffice. In the days when roads were bad, it was necessary to have straps with loops, by which to hold on inside the carriages or coaches. When roads became good, coaches were still made with them, though their "use" had gone. First-class railway carriages, which were originally three coaches united, *have them still*. Again; boots, before vulcanized indiarubber was invented, were usually laced up over the instep; when elastic sides were adopted, *imitation lacing* was inserted. Many other instances might be given besides these two, which are suggested by Mr. Wallace.

Now, if the modern coachbuilder or railway-carriage manufacturer were asked why he still made these useless appendages, whatever his answer, I am quite sure it would not be *in order to show* that modern carriages are built on the same plan as those of the sixteenth century! If then we argue from the rudiments in man's works to those in creation, this explanation usually given is utterly preposterous, and Mr. Lewes may well say that it is "a specimen of pedantic trifling worthy of no intellect above the Pongo's." (p. 615.)

Besides atrophied and rudimentary organs, which, when compared with their homologies in full development and activity, evince an absence of that perfection which is so insisted upon by teleologists, the very organs taken to prove perfection of design and execution, such as the eye, *witness to a great want of perfection*.

Now, if it can be shown that so highly elaborate a structure as the eye is relatively perfect only, we need not attempt to prove it for any other.

Purposely omitting all diseases to which the eye is subject, the first imperfections I will notice are long and short sight. Again, eyesight is of great variability of strength. In many cases the weakness (due to degeneration and atrophy, but not disease) amounts to a positive defect. Some persons have no appreciation of distinct colours, all appearing alike; or else they cannot distinguish between complementary colours, such as red and green. In other persons, called "moon-blind," they cannot see after a certain hour of the day. Again, the achromatism is said not to be absolutely perfect, while the power of adjustment to strong light is greatly limited; and in many cases sight fails under certain employments, such as type-setting, &c., and so on.

I am not complaining that our eyes are not absolutely

perfect. All I mean to imply is this: that I can conceive of the possibility of better eyes than those with which man and animals are endowed, though what we possess are quite equal on the average, to our requirements.

The same remarks will apply to all other organs. If such imperfections are obvious on a slight consideration, whence came the idea of perfection?

I think the fact is, that an examination of the anatomy of the eye proves it to be marvellously constructed. There is a wonderful adjustment of all its parts, which immeasurably surpasses the finest execution of the most complicated optical instrument ever made by man. That the teleologist, remembering that he is told that everything, when created, was "very good," is carried away by his zeal to exalt the glorious works of the Creator, thinks he sees absolute perfection, by overlooking its relative character.

The observations made under the head of "use," when speaking of design, will have prepared the reader to infer that *uses* are not absolutely perfect; *i. e.*, the structures not being perfect themselves, their uses naturally fail to attain to that degree of perfection of which we can conceive a possibility. This is seen in rudimentary organs and their homologies, where the use, from having been admirable in the latter instances, becomes evanescent in the former. Similarly is it with the eye; if the structure be not perfect, the use obviously cannot be perfect.

There is an objection always raised by teleologists to this argument of relative use or imperfection which must be noticed. They remark that we have no right to call any structure at all "useless," for, if we knew more, its use would become apparent. If so, the burden of proof lies with the objector. But is not this a mere assumption, based upon his own subjective ideas of what ought to be characteristic of the Deity? What I have already stated is a sufficient answer to this objection, only remarking that, because *some* organs, on degradation, assume a new function, does not warrant the assumption that *all* do so.

The third instance of imperfection to which I alluded, consists in the adaptations of organisms, whether animals, inclusive of man, or plants, to their sphere of existence. The remarks made under this head in treating of design show clearly enough, that in no case whatever is there that conceivably possible state of absolute perfection, which some teleologists seem to affect in their ideas.

Perfection is the last element of the ordinary views of natural theologians to be reviewed. In considering these views it was

necessary to criticise certain objections raised by some evolutionists, such as the Darwinians, that there is no design; while natural law, which plays so important a part in all views of evolution, was scarcely alluded to.

In taking up the third, or Darwinian view of creation, law, therefore, is the only element which remains to be considered.

Law.

According to the views advocated in this paper, natural law takes the place of a direct fiat in creation. It is necessary, therefore, to point out clearly the meaning of the word law as applied to nature. This the Duke of Argyll has done for us in his *Reign of Law*, p. 64, where he maintains that "Law in its original sense signifies 'an expression of human will enforced by power,' [and] the instincts of mankind finding utterance in their language, have not failed to see that the phenomena of nature are only really conceivable to us, as in like manner the expression of a will enforcing itself with power."

The word, however, is now retained even by those who deny the analogy as well as by those who recognize it, and is used merely to signify an observed order of facts, whether traceable to causal forces or not, and whether the combination of forces which, by their resultant, produce the order of facts, have any reference to the fulfilment of purpose or not.

Thus, if we dissolve alum, and evaporate the solution, and so recrystallize it, we can tell beforehand the exact number of degrees that will be between any two faces of the crystals, before a single particle of alum assumes the solid state.

Again, we can examine the motions of the heavenly bodies, and foretell to a minute an eclipse 1,000 years beforehand. Here then we have fixed and invariable law.

Now, in applying this term to organism, we note a certain marked peculiarity in the resulting effect of the combination of forces which act upon an individual endowed with life, and very different from that of forces acting upon inorganic matter. Consider the latter first. There is an exactness about them which admits of positive foreknowledge; and in examining minerals of nature the composition of one found early in the world's history is identical with that found yesterday. Similarly the physical force of gravitation by which the rain-drop impressed its form on the Silurian slates was identically the same as produces them now. But now turn to the organic world. Although it is true that a large number of observed orders of facts can be mentioned which represent fixed laws; such, for example, as the structure of some animals compels them to be

carnivorous, others gramminivorous; some are viviparous, others oviparous, &c. Yet there are certain other facts and orders of facts which do not seem invariable. Such notably is the case that, although *parents produce offspring like themselves* (this being usually a recognized law), yet *they never are absolutely like them*; such differences as may appear in the offspring being due, it is said in our ignorance, to the "laws of variation." This, however, is no explanation, but themselves are orders of facts, and therefore we are once more driven backwards to find higher law or will.

Here, then, we observe the difference between the laws of variation in the offspring of living beings and laws governing the lifeless physical phenomena of the world. The result of the latter can be with tolerable or perfect accuracy predicted. The resultant of laws of variation can never be foreseen. No one can tell what are the preceding forces which give rise to variation at all, nor in what direction the offspring may vary. Here, then, is the occasion where chance is apt to find a place in theories of specific origin; but, as I have already said, taking a long and consecutive view of nature's offspring we are compelled to acknowledge the presence of an over-ruling Law, though we cannot see it in the individual variations.

Some of those forces which produce variation in the offspring have been thought to be the exercise of muscular action, an inherent principle of progression; while food and external conditions acting upon the organs of reproduction is reservedly suggested by Mr. Darwin, though he prefers to state more emphatically that "our ignorance of the laws of variation is profound." (*Origin of Species*, 4th edit., p. 195.)

Now, as evolution hinges upon these so-called laws of variation, especial attention must be paid to them: for while we can all recognize family likenesses, yet we can at once distinguish any two members of a family from each other. This may be a truism, but it lies at the bottom of evolution, for all that. If, therefore, an offspring *can* be different, however slight, from its parent, there are no *à priori* reasonable grounds for asserting that the second generation may not differ from the first as much as the first differs from the original parents, until at last a being may be produced so far different from the original parents, that it would (if its history were unknown) be classed by a naturalist as a different genus altogether.

This, it will be remembered, has actually been done in the case of pigeons, as described by Mr. Darwin in his *Origin of Species*. On the other hand, some opponents of his views have maintained that the power of variation is limited; if so, the

onus probandi rests with them, and no proof has ever yet been given. Whereas the possibility of the other view has been proved, and the probability of its truth elsewhere derived amounts to a moral conviction.

I would only here add one more remark upon this objection, and that is, because well-marked types may and have continued unchanged for indefinite periods, that does not controvert the possibility of their subsequently changing when new forces are brought to bear upon them by being in altered conditions; nor does it at all interfere with the doctrine of evolution.

It is worth while here observing that no form of the doctrine of evolution can be maintained which does not recognize this fact, which has been called a "Retention of Type"; by which is meant that co-existent with a gradual evolution of forms of life in an ascending scale, there are members of nearly every group still living and retaining the characters generally of a comparatively lower grade of that group. To say that naturally less highly organized or complex forms are less liable to vary, and are more adaptable to surrounding conditions, is to state a palpable fact, and accounts so far for their present existence. Such *retention of types* must, therefore, be recognized by every one who holds to the doctrine of evolution.

Now, admit the fact of indefinite variation in offspring; admit the possibility of a higher, but apparently untraceable, law regulating the variation with an ultimate purpose, as Mr. Darwin does in the passage I have quoted, wherein he says: "The birth of the species and of the individual are equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance,"—and you will find no difficulty in embracing the doctrine of evolution. Secondary causes, such, for example, as natural selection, may be the means of controlling those variations, favouring some rather than others; but those secondary causes are themselves subject to higher laws, which are recognizable when we take in a broad and extended view of nature, but apparently absent in a contracted view: and it is the contracted view which encourages all ideas of chance without a higher and Providential Power.

The fourth view, or that of the author of this essay, requires no further elucidation than is expressed in the terms given on p. 4, as he ventures to think each point or element has been established in considering those of the other views.

Conclusion.

The general result which will be gathered from this essay, the writer trusts, will be, that if the word "design" is to be retained at all, it must have a far more extended and qualified, if not very different meaning to that which has hitherto been assigned to it. At present it fails to embrace a very large class of structural phenomena in living creatures: it fails to account for the so-called evils inflicted by physical forces which in their more beneficent forms are loudly applauded as witnesses to the goodness of God: thus, electricity in its use to man for telegraphic purposes might be pronounced as designed as much as coal and steam; but the teleologist hesitates to say it was made to kill when pent up in a thunderstorm. Or again, that although God has given us coal, natural theologians do not recognize the awful destruction of life which year after year is unavoidably made in getting it, as a judgment upon his presumption.

The word design, therefore, cannot be any longer entertained in so absolute a sense as heretofore. All those so-called "physical evils" *must* be taken into account in any scheme of creation which professes to have at least some show of philosophy and comprehensiveness. And although, as the writer in the *Quarterly* (for July, 1869) has forcibly shown, that in such structures as the eye and hand design "clings to the facts," and by no mental effort can we throw it off—witness Lotze!—yet to some students those innumerable cases of imperfection, as seen in rudimentary organs and ill-adaptations, and so forth—"bunglings," as they have been called by materialists—weigh so heavily upon their minds that they cannot see the power of *law* which governs them, and which *itself* is a proof of design. There can be no law without a lawgiver. Order, method, law, and plan are but expressions of mind. In the words of Mr. Darwin, I say, "that the understanding revolts at such a conclusion, whether or not we are able to believe that every slight variation of structure,—the union of each pair in marriage,—the dissemination of each seed,—and other events, have all been ordained for some special purpose."

With regard, then, to the present aspect of the argument of design, two important deductions have been made,—first that design is never more than *relative*, and not *absolute* in nature; and secondly, that we must no longer adopt any such comparison between man's method and God's method of making, as has been implied in the argument of design; for, while man operates upon the materials furnished him by the world, combines and adjusts the forces of nature, and so elaborates

structures, as steam-engines, clocks, &c. ; and, moreover, only in the sense of *improvements* can evolution be applied to his works,—God does not operate in such a way at all. He evolves, by means of natural laws established of His own will, those structures and organisms which appear to our sight to be so full of what we call design when applied to human productions. We must, however, distinctly bear in mind that no examinations or speculations can disclose to us the real method of God's working which gives rise to such appearances as are usually called designed. There they are as objective facts, but to state how they came about is a mystery which philosophy will never solve.

The CHAIRMAN.—I have much pleasure in proposing a vote of thanks to Mr. Henslow for his paper, which appears to me to contain a great deal of truth ; and also to suggest some points for our consideration, which may go a good way towards the solution of difficulties that seem to be pressing, and towards the nearer approach to a union of different schools of thought, each of which may hold a great deal of truth. Whether Mr. Henslow's paper has fully brought out, at every point, all that is in harmony with the more old-fashioned notions, I will not undertake to say. Here and there he was on a certain track which, if followed out, would have led to a fuller and more pronounced comparison of his own scientific views with those views of creation which have been held in the past, and which, though imperfect in their expression, as all such views must be, had, as I have no doubt Mr. Henslow will himself say, substantial truth at their basis. We must all admit that this paper is full of scientific thought, and evidently the production of one who has given a very reverent and very religious consideration to the whole breadth of the subject before us, both as respects the relations of Deity with this world, and the work of Deity in this world. (Hear, hear.) I must confess, however, that there is one point in which the paper has a little disappointed me. I thought that the author would have spoken more of that gap to which he himself referred when I was last here. I mean the gap between inorganic matter with its laws, and life. Now, he has spoken of evolution as if it were one complete, continuous, consecutive thing, the links of which melted into each other right up to man, and as if man were the only object in the whole series of successive existences, which did not coincide with the theory—man the only creature which, upon the pure principles of evolution — of consecutive evolution — could not be harmonized with the evolution theory. But it has appeared to me, in trying to think over this matter, that there is not only a gap at the end, but at the beginning also. Professor Huxley has himself intimated, in a form, negative indeed, that we have not the least reason to believe that such a thing as life has ever been developed out of inorganic matter ; that, so far as scientific evidence bears upon the subject, a negative conclusion is the only conclusion that is admissible ; and that, though life may bind up under its seal

inorganic principles, under its own peculiar power and force, yet there is not the least evidence to show that the mere laws which govern inorganic matter could of themselves have led to a single vital organism. If this is so, it will, I apprehend, be a point for discussion to-night ; and it is one, no doubt, to which Mr. Henslow will himself refer when he replies. It has also struck me on this point—and Mr. Henslow will probably agree with me—that if, as he has said, man is the antecedent type of perfection held in view throughout, then, so far as we can speak at all of any work of God, man must be held to combine within himself, mentally and bodily, what, for want of a better word, we must call a series and coalition of antecedent ideas, wrought into a unity, and carried upwards into a new and higher and altogether distinct living kind, or creature ; that there must have been a gradational ascent towards this result ; and that although Mr. Henslow may deny, while others affirm, that there are any distinct groups of ideas—any distinct species—that have been observed and identified in creation, of which all the varieties of creaturely results have been but, if I may so say, dialectic forms, yet still, unless we admit that there are ideas in the Divine mind according to which the Divine Being has been continually at work, we are literally without any words or terms by which we can express anything we think on the matter at all, and the whole of our attempts at speculation will have to give way. This is the course of thought which has been very much in my own mind. Another matter that I should like to mention is this : Mr. Henslow has shown us with truth, although his words perhaps impinged rather violently on our feelings, that even that wonderful organ the eye is not in itself perfect. Probably no single eye has ever been absolutely perfect ; but it has occurred to me that that is hardly so forcible an objection or bar to the argument from design as it seems, for in truth the argument from design simply goes to this, that in the case of the eye or any similar analogous instance, it is the idea which is clothed in the eye, which is in itself so infinitely perfect an idea as to be an argument for design. There is no person who holds the argument from design but would admit,—owing to what he himself would call accidental causes, diseases, and so on, arising from the infinite combinations of circumstances to which human creatures or any others are liable,—that with the ideal intent and perfection of the eye there must actually be joined imperfections in that organ, just as the eye itself is clothed in flesh. No one who upheld the design argument would admit that it was an answer to say that these instances of defective eyes proved that the eye was not absolutely perfect ; on the contrary, we should contend that when we came to consider the perfection of thought, purpose, and plan, exhibited in the eye, any incidental failure in that perfection did not in the least degree derogate from the merit of the argument from design. (Cheers.) Perhaps I have now trespassed further than I should have done upon the meeting, but with very great sincerity I propose a vote of thanks to Mr. Henslow, and I do it with the more pleasure, because I believe it to be of the highest conceivable value that Christian gentlemen who would shrink with the greatest fear and trembling from any wrong, lest they should grieve God or any child of God,

are yet trying to come at the truth, and are holding fast by scientific men and scientific truths, while at the same time they hold fast by us with all the spiritual sympathies of their nature. I think it is of infinite advantage that such men should come before us, and that they should read such papers as the one which has been brought before us this evening. (Cheers.)

Rev. C. A. Row.—I feel greatly indebted to Mr. Henslow for this paper, as I think it is the most important paper we have had for some time, although we may not agree with all its conclusions. In the first place, it is important, inasmuch as it shows plainly that it is possible to hold a doctrine of development, and yet to be a strict theist and a true Christian. This is a matter of considerable importance, for many people in controversy with unbelievers and atheists represent that you cannot hold such views and be a theist or a Christian, though I have always maintained that that is a great mistake. I want now to make a few observations for the purpose of improving rather than controverting the paper, and in doing so, I will not touch upon evolution at all, for I think the paper is far more valuable in reference to the "design argument." I wish Mr. Henslow had put more prominently at the beginning of his paper what he intended to lay down in the concluding paragraph, viz., all those points which prove mind. My idea of the design argument is that it should embrace all those things which prove mind as distinguished from mere action, law or order, or chance. I think the term "design" is exceedingly unfortunate, because it is so united in the public mind with the idea of utility that it has led to much confusion of thought. The adaptation of means to ends, as well as order and arrangement, prove the presence of mind, and yet they may not be strictly utilitarian. Take a point not elaborated in this paper—the presence of order. That, to my thinking, unquestionably proves the presence of mind, and yet it may not be an order of the kind which belongs to utility. Here is an illustration: Suppose I write a book, and come to that unpleasant part of the work which involves revision and the writing of much of it over again. I get angry and tear up the paper, and the room gets into confusion. I go out of that room for a time, and on going back again, find that the whole place has been rearranged, but not at all in conformity with my ideas of useful design. Yet I recognize the presence of order, from which I infer that a mind has been in that room during my absence, although some of its operations are not very agreeable to me, for I cannot make use of the order which I find there. It is an order, in fact, which is not my order. Now take an illustration of the difference between this and chance. Two or three years ago I wrote a paper for this Institute, when a storm occurred, and blew many of my papers out of the window. They were recovered in a sad condition,—several lacunæ occurred in the proof, which I was requested to fill in, and I found it very difficult to fit the words so as exactly to fill the empty spaces. This was the result of the action of blind law on unconscious matter, and it shows that mind had nothing to do in the operation. If, then, the presence of order is a proof to me of the presence of mind, although it may not be directly connected with the idea

of usefulness,—if I see that order in nature, I cannot see how people can dispute that there is the presence of mind also. In finding my room put to rights, I see the presence of mind simply because of the order and arrangement which I find there; and in the universe I think the same argument holds good, quite apart from the utilitarian processes of design, and therefore I infer the presence of Deity. I think it would have been better if Mr. Henslow had pointed out these distinctions at the beginning of his paper. The want of stating this point clearly, has led to much confusion in popular thought upon the subject, and has enabled people to offer objections founded upon the imperfections we see in nature against the existence of a Creator. There are two or three other points which I should like briefly to allude to, and the first of them relates to the rudimentary organs. It seems to me, as Dr. Rigg has said, that the only correct view is to suppose that there is an idea in the Creator's mind, and that He has determined to carry out creation on a definite plan, the separate parts of which we may not always be able to see the direct use of. Mr. Henslow has said that some of the rudimentary organs are of this description, and has especially instanced the case of the wings of certain kinds of birds. But the argument that adaptation proves the presence of mind is general, and does not rest for its validity on a particular instance. It is not the wing of the bird taken by itself which proves the adaptation, but in a vast number of things all concurring to effectuate a common end. It is not merely the wing of the bird which furnishes us with the idea of adaptation, but the atmospheric air, the power of gravitation, and a variety of things which are correlated to it, such as those mentioned by the Duke of Argyll in his *Reign of Law*. So we may run through many of the structures of nature; they are correlated one to another in a very remarkable manner, and from them we must infer the presence of mind, whether we call it design or not. We all know that the air is adapted to a vast variety of uses, and that it is wonderfully adapted to the present condition of man, and we reason wrongly in confining the idea of design simply to one particular thing, such as the bird's wing and its uses. The whole of its parts, the air in which it moves, and the law of gravitation, should be included in that idea. Mr. Henslow's observations on perfection are very valuable. It is a mistake to lay down the rigid rule that all the works of the Creator must be in themselves absolutely perfect, for if they were all absolutely perfect there would be no variation in creation at all. To speak of man as being created absolutely perfect seems to me to be a mistake, and I was never more sensible of it than on one occasion when I was present at a debate between Mr. Bradlaugh and an advocate of Christianity; and the use which Mr. Bradlaugh made of the theory of the absolute perfection of man as originally created was exceedingly damaging. We must view the Creator's work as having a relative perfection, and I think Mr. Henslow's remarks are very valuable on this point. With regard to the subject of chance, Mr. Henslow has overlooked one portion of it. Let me give one more illustration to show the "chance," as we call it,

which arises from the concurrence of two series of laws converging at one point—a very remarkable form of chance. As an example: Suppose a rock in the course of its decomposition, has a fissure: this was effected by one series of causes: then suppose that a bird passes by, and, by what we call chance, drops a seed into that fissure, and the seed becomes a tree; another series of causes has brought that about. A very important part of chance is found in what we call the concurrence of events. Mr. Henslow rather underrated the amount of that evil which exists in the physical creation. I know he fancies that pain is not so great an evil as others do—I cannot help thinking that it is a very serious one—but how it got there is quite another point. Then as to the term “law,” I cannot think that the term, as applied to averages, is strictly correct. It is used in an entirely different sense when it is applied to results emanating from will, from what it is when applied to mere physical antecedents and consequents. Averages do not obey a positive and certain law, but a fluctuating and uncertain one. Including man, they include not only the results of the action of law, but also the results of the action of will. Take the averages of marriage, where the human will comes in as a factor. I cannot help thinking that it is by nothing more than a mere analogy that we apply the term “law” to such a succession of averages, especially where the human will is brought in as an element.

Mr. J. ALLEN.—I cannot but express my regret, that in a society like this, formed to show that the Scriptures and science are not at variance, the plain statement of revelation as to the creation of man should apparently be passed over by the lecturer, and the vague theories of Dr. Darwin thought to be worthy of credence. I have listened attentively to Mr. Henslow’s able and eloquent paper, but could not find one fact mentioned which would support the doctrine of evolution, except that in reference to certain pigeons, by being placed under certain conditions, at length becoming a different kind. But I should like to know whether the offspring of such birds, if left in a natural condition, would not in a few generations relapse into the original state?

The CHAIRMAN.—This Society proposes to test every argument upon its own merits. Everything is capable of being so tested, and what we propose to do to-night is to test this question upon its own merits. This really is the first question for the meeting. Here we have a number of thoughts before us, and the question is, how far are these consistent with each other and with any general or Christian faith in God.

Rev. S. WAINWRIGHT, D.D.—I must say, Mr. Chairman, that you have expressed what every one has felt, and that is, the universal satisfaction with which we welcome those who go over a great breadth of the field of science with men who make it their boast that they are purely and simply scientific men, and who yet hold as reverently as we do to the old interpretation of the Bible. (Cheers.) On that account, I really have the greatest satisfaction in rising to express my concurrence with what you have so well said; and I hope Mr. Henslow will allow me to add that what I am now saying will not suffer abatement from what I am about to say against the doctrine of evolution. Now, while I differ from Mr. Henslow in certain passages

of this unusually able and specially admirable paper, I so far agree with the feeling of the last speaker, that I find myself thoroughly *en rapport* with him in his reverence for the Bible, when he seems to feel that Mr. Henslow's utterances impinge to some extent on his reverent regard for its authoritative teaching. But it cannot be denied that when we consider such subjects we should, by mutual agreement and consent, consider them apart on their own merits. Let authoritative teaching come in as paramount and authoritative in its own proper place ; but we are here to demonstrate the compatibility of what is really ascertained to be scientific truth, with what can be shown, and properly shown, to be the meaning of God's word, justly and reverently interpreted. Now, I hope to be regarded as a sort of bridge between the opposing speakers, but will endeavour to say as little as possible, so as not to detain you at undue length. In the first place, let me beg Mr. Henslow to believe that there is no abatement from the cordial terms in which I have spoken of the paper itself when I say that I differ from him as to the doctrine of evolution ; but here let me do him the most simple justice—for it would be an act of monstrous injustice to class him for an instant with such evolutionists as Professor Huxley and Dr. Darwin. (Cheers.) Mr. Henslow stands on a different footing altogether, and in this paper he has discarded principles which are maintained notably by Professor Huxley. I am glad, also, that Mr. Henslow has done Dr. Darwin so much justice as to show that he does not discard the idea of a personal God apart from nature. But I have to complain that Mr. Henslow has allowed his love for his pet theory of evolution to make that theory crop up very vigorously in several places where its presence hardly seems warranted by the connection in which it is placed. Look, for instance, at the third note on the 8th page of his paper, where he says, "Evolution is a great fact of nature." Surely that is a gratuitous assertion : it may be, or it may not be, "a great fact of nature." Now I, for one, am a great lover of the study of God in nature, and sure I am that "there lives and breathes a soul in all things." Still, if you can prove that statement about evolution, I will accept it ; but so far as the statement in this paper is concerned, I content myself by saying that evolution has not yet been proved to be "a great fact." Then, in p. 17 Mr. Henslow says :—

"If, therefore, evolution be true for the former [*i.e.* the animal kingdom], it must be true for man's body also."

There is much virtue in an "if." It may be a bold thing to say, but I maintain that the position taken up by Mr. Henslow is not proved. I do not deny it ; but, I say it is not proved, and the "therefore" is a *non sequitur*. Then, in the 20th page of his paper, Mr. Henslow says, speaking of "rudimentary, or useless structures" :—

"These, however, it will be remembered, had a significance which cannot be overrated, for they bear incontestable evidence to evolution."

But I will try to show that such incontestable evidence is not to be found *in rerum natura*. I know the facts which induce him to think the contrary, but

I complain of the use of the word "incontestable." I contest it, and demand a proof. Let me take another instance, in the 31st page, where Mr. Henslow speaks of

"The theory of evolution, which, though no doubt destined ultimately to hold sway, yet has been retarded in its progress," &c.

But I do doubt that it is "destined ultimately to hold sway." There is a very material doubt about it. Then, on p. 37, there is something worthy of all these antecedent sentences. Mr. Henslow says :—

"Now, admit the fact of indefinite variation in offspring; admit the possibility of a higher, but apparently untraceable, law, regulating the variation with an ultimate purpose, as Mr. Darwin does in the passage I have quoted, wherein he says: 'The birth of the species and of the individual are equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance,'—and you will find no difficulty in embracing the doctrine of evolution."

Let me say, Sir,—and I hope Mr. Henslow will put this down on the credit side of my controversy with him—that I hold most fully to every word I have read from that paragraph until you come to the dash. I hold all that Mr. Darwin says there. We cannot too strongly take his ground, and say that the human mind refuses to accept these events and their sequence as the result of blind chance; but there I stop, and I say that because I hold that view I have the greatest possible difficulty in accepting this doctrine of evolution. I will justify my assertion, from these pages; I will appeal from Mr. Henslow as the advocate of the theory to Mr. Henslow making admissions in relation to certain facts with regard to it. In the 36th page of his paper he says :—

"Some of those forces which produce variation in the offspring have been thought to be the exercise of muscular action, an inherent principle of progression; while food and external conditions acting upon the organs of reproduction is reservedly suggested by Mr. Darwin, though he prefers to state more emphatically that 'our ignorance of the laws of variation is profound.'"

Now, in that passage Mr. Darwin is quoted, and Mr. Henslow agrees with him. I should be glad if you would regard that word "ignorance" as printed in large capitals. (Hear.) It is these laws of variation, of which our ignorance is so profound, that form the subject of the next sentence, which Mr. Henslow commences with the words, "Now, as evolution hinges upon these so-called laws." Now, that is exactly my case. Evolution hinges upon these so-called laws, and our ignorance of these laws is profound; and yet we are asked to embrace the doctrine which hinges upon them. It has been with a feeling of reluctance amounting to pain that I have said so much; but I am sure, that though Mr. Henslow loves his theory, he loves truth more. He is a devout and reverent student of nature; and I thank God for the existence of men with such minds, and who make such use of their minds. But I must say with equal strength that we are not going to do what we are asked to do in this very essay. In page 23 Mr. Henslow says :—

"All that the modern theologian has to do, therefore, is to confess that his interpretation of the first chapter of Genesis was inadequate, and requires correction; and that he has to thank science for having pointed out his mistake."

Now, nothing there is said about evolution, but it is clearly implied that we are all mistaken in supposing that we had gained a right idea from the words, "God created man." When last here, I said that I, for one, was quite prepared to give up the old doctrine that God created man, and to accept the new one that the monads had developed him, upon good reason being shown; but the reason has not been shown, and until it is, I must hold that "no man having drunk old wine straightway desireth new; for he saith, the old is better." Mr. Henslow, in page 18, says it is nothing to him whether he is the descendant of an ape or not:—

"It neither prevents nor helps me to do this, to hear either that I was or was not descended from an ape, an ascidian, or an amoeba! If the probability be proved to outweigh the improbability, I am ready to accept it; and I care not so long as truth prevail."

Now, I do not believe that such is my descent; and I say, further, that if I were to hold this theory, the moral effect on me would be unspeakable when contrasted with the actual knowledge that my first father was made in the image of the Creator. I cannot take it as nothing that my first father was made in God's image, and that has a very different moral effect upon me from what is told here. Where is the evidence to support the evolutionists' view? They talk of the eye; but Darwin himself confesses the immense difficulty in accounting for the origin of the eye, even in its most rudimentary forms. Remember, we are dealing with what Professor Whewell calls "dead matter," and with the theory that life itself was produced from dead matter. The highest authorities maintain that there must have been a period of 30,000 years for the coral reefs of Florida to have been raised; but what is Dr. Carpenter's testimony as to the foraminifera there? He tells us that there is no evidence of an advance in type, and that what we do see is that variations concur to attest this fact, that the foraminifera, however much they vary, never turn into anything else, but must always remain what they were. But I do not dwell upon such facts as that the Silurian fuci and algae, and the plants in the coal-measures would disprove the progressive developments, nor upon the fact that the development for which Darwin contends is not continuous; and yet if not continuous it is discontinuous, for it is not development unless you can bring all the links together. But I come to such a fact as this, that Darwin himself admits: "I cannot account for the rudiment of an eye." I do not wonder at it, because you have to get it out of something as unlikely to form an eye as this pencil—you have to get it out of the inorganic. No doubt Mr. Henslow says, "I contend for a vitalized organism," but I am speaking of the theory as it is propounded by others who will not accept it with his limitations. The author of the *Vestiges of Creation* says that the first step in the

appearance of life on this planet was the formation of a small germinal vesicle by a chemico-electrical operation. There was an attempt made at one time to show the creation of an acarus by the operation of a galvanic battery, but it failed altogether. I maintain that human parents were the progenitors of human children, and that it is a mere gratuitous assertion to say that the law of propagation is based upon evolution, and that each type gives rise to that next above it, and so on up to the very highest, everything being the result of a series of successive developments. Come down to the very bottom, and what does the theory rest on? Like the Hindoo cosmogony, on a tortoise, or a serpent, which, in its turn, rests on an imaginary *tertium quid*, which rests—on nothing. If you say you have no connecting links, and can only trust to further geological discoveries to furnish them, that is asking us to accept nescience in the name of science. When you are asked, "How do you know that all these things went on progressively?" the answer can only be that in all the varieties which we see, like gives birth to like. And yet we are asked to accept the dogma that like gives birth to unlike, without one solitary fact being adduced to prove it. (Cheers.)

Rev. JOHN JAMES.—I arise to a point of order. I wish to know whether it would be competent to substitute the word "newly-propounded" for the word "newly-established" in the fifth page of this paper. It seems to me that it is hardly right to use this word in speaking of a theory only lately advocated, and very much contested, and improper to assume that such theory is an established doctrine.

The CHAIRMAN.—All these papers rest on the responsibility of those who write them. If the Council had undertaken to correct everything that was open to correction in the last paper that was read here, we should certainly have undertaken a very troublesome responsibility indeed.

Mr. JAMES.—I have listened with very great satisfaction to the paper which has been read; and I also sympathize in the remarks of the last speaker. It does so happen that one of my intimate friends—a Christian man, very earnest and religious, and of large spiritual experience and sympathies—is a believer in the doctrine of evolution. How he reconciles the two I cannot say; but I merely mention this to explain how it is that I can sympathize with Christian gentlemen who hold these views. As for myself, I do not see how it is easy to reconcile the doctrine that man in his physical integrity is himself the last and the highest result of development, and that other doctrine, that mind and moral responsibility are the things which differentiate man from all the lower creatures. I believe Mr. Henslow when he says he does not care from what he may be physically descended; but at the same time he must bear in mind the vastly superior dignity and responsibility of the mental and moral powers and capacities of man. To my thinking, the theory of gradual evolution, if taken in reference to man when he is physically considered, must also, by those who advocate its claims to the exclusion of divine interposition, be taken in reference to him when he is mentally and morally considered. But I have a great feeling

of revulsion from this last conclusion. At the same time, though it is an unquestionable fact that there is more than one gap that has never yet been bridged over,* it does not follow that we can say there is no truth whatever in this doctrine of evolution. Nor do I conceive that this doctrine or theory, if ever established as physically true, would at all derogate from the idea of the Creator's power or prescience. With regard to Mr. Lewes's views, I could have wished that Mr. Henslow had dealt with them more at length. Mr. Lewes holds that type is the result of certain concurrent conditions. But I should like to ask him, what are those conditions. They must be something or nothing. If they are nothing, how can there be any result of them? On the other hand, if they are anything, they must come more or less within the realm of law; and I am perfectly clear that if we believe in law at all, it must take us back to antecedent mind, and to the old-fashioned argument from design. (Cheers.)

Mr. HENSLow.—In replying upon this discussion, first let me thank those members who have addressed us, and who have spoken so kindly of my paper. I came here to-night, as is common to all of us who have papers to read, fully prepared to be well beaten and thrashed; but I do not think I have got so much of it as I might have expected. In the first remarks that were made to-night upon my paper, Dr. Rigg alluded to the gap existing between the inorganic and the organic world. But I have not touched upon that subject at all. I have gone upon the assumption that the theory of evolution was simply concerned with living creatures. I have not touched upon other evidence at all; for I said at once, "We have no evidence whatever to show how life came into the world, and it is preposterous to make any such attempt." Professor Huxley has utterly exploded the idea of the settlings of hay and other things giving rise to independent life; that has completely dropped out of the scientific mind of the present day, and we go back now to complete ignorance. Dr. Darwin simply assumes that we have life, and we have had it; but as to how it came into existence, the study of nature does not afford one shadow of a solution: consequently I left that subject out of the paper altogether, and simply say now, in reference thereto, that I do not know anything about it, except that God created it; and I do not see anything opening out to guide us to the discovery from nature alone, of what is the nature and what was the origin of life. With regard to the idea which runs through structure and indicates design in the

* Up to the present, the investigations which have been carried on by Professor Huxley and others have failed to prove any connecting link between man and the rest of the animal creation; and to use the words, so far as I can remember them, recently addressed to me by one of the most learned and indefatigable members of the Microscopic Society,—“We can, and have, classified the whole of the animal kingdom that we are acquainted with. We have put all the different animals into their respective places, and have constantly got hold of man to put him into his place, but he would not fit in anywhere—there is such an immeasurable gulf between him, with all his attributes, and the rest of the animal creation.”—ED.

eye, that is one which we can all realize and admire; but there are so many natural theologians who want the material to be as good as the idea, and that is the point I protest against. I do not protest against the idea which underlies the structure. Mr. Row has given me some valuable hints on this point. At the end of my paper I say that order, method, law, and plan, are but expressions of mind, and I am quite aware that this point might have been worked out much more fully; but it did not occur to me to dwell more especially upon order, though if I had the paper to write again, I should do so, because it gives us an incontestable proof of mind. As to pain as a physical evil, that is a mere question of opinion. You may culminate in death the extreme of physical evil. Pain may be very slight or very intense; you do not know where to draw the line to show where it begins to be a physical evil. It is a mere matter of opinion. We know that the means whereby we receive pain are the same means whereby we receive pleasure—our nervous system serves for both, and we must grasp them both together. We must take not only the good parts, but, so to speak, all the bad parts together as forming one grand scheme in the will of God; and all pain, from the least finger-ache to the greatest amount of agony, may be grouped together as what I call a state of probation for us ordained by God. I do not attempt to draw the line between what may be a physical evil and what may be nothing at all. With regard to the law of averages, perhaps I was wrong upon that point. Now I come to some remarks made by Mr. Allen, who said that the Bible was apparently passed over as to Genesis. I do not undertake to show any harmony between Genesis and nature; my paper was studied objectively, and the deductions made in that paper are solely from nature. If it had been my purpose to reconcile Genesis with geology, I should have treated the matter very differently; but that was not my object, and I should be out of order now were I to attempt to give any further reply upon that point. I will only call Mr. Allen's attention to the following note, which is appended to the 18th page of my paper:—

“In this essay I do not profess to deal with metaphysical subjects. I have therefore made no mention of the *soul* of man. I will only repeat words which I have elsewhere said (*Geology and Genesis: a Plea for the Doctrine of Evolution. A Sermon*):—‘Admit that man's bodily structure agrees closely with that of apes; admit that his mental powers are of a *like kind* to those of the lower animals; deduct as much as there is of agreement between them from man, and what is left? An enormous amount of intellectual power; a morality which they do not possess at all, as well as the power to appreciate and love an abstraction or an idea; and I say there is no species, no genus, no family in nature that has ever existed or does exist, which affords us any ground for conceiving such an enormous impulse, as man has obtained somewhere, to have come to ‘him by natural laws alone.’”

Of course I could add a good deal more to that if I were to attempt an elaborate argument. Then there is the question as to the pigeon: does it relapse into its original condition? The reply is, no. That question was

raised and tested when evolution was first started, and it was found, especially in the vegetable kingdom, that when developed varieties are left to themselves they do not revert to their original state, but simply become dwindled specimens of those varieties. Apples, for instance, of a particular sort simply turn to a crabbed condition of that particular sort; they do not revert to the common crab-apple. Now I come to what Dr. Wainwright has said, and this is not the first time that we have had a pleasant contest on this subject. He has alluded to the gap which exists between the inorganic and the organic, but I have already referred to that as being beside the question. He also spoke of the foraminifera as never having evolved anything higher than themselves; but he should turn to what I have said about the retention of types, and to my argument that no doctrine of evolution can be upheld which does not hold the retention of types. This is all that I have to say upon the point. Mr. Wainwright then alluded to Professor Huxley as denying the fact that the palæontological forms supported evolution; he must have been referring to Professor Huxley's address in 1862, which he himself said afterwards was a Brutus-like attack on the doctrine. It is well to understand clearly what it is that geology does give us. If you go beyond the tertiary period, the evolutionist is on very unsafe ground. Put palæontology entirely out of the pale—it is an old outpost, and the enemy may have it as soon as they please. But read Professor Huxley's address of last year, and the tables are completely turned. Discoveries have gone on in the tertiary beds, and you find there, not only an abundance of links, but, as Professor Huxley says, a moral conviction and an ascending series, not in one group but in several. I refer you to Gaudry's book on the mammals found in Southern Africa. In the other beds the destruction has been so great and the geological results are so small and slight, that nothing can be said either for or against. Perhaps something might be said for, but I do not press it, because the evidence of evolution is not based on the mezzozoic or the palæontological forms.

Dr. WAINWRIGHT.—Do you mean to admit that the evidence from those strata does tell against evolution?

Mr. HENSLOW.—Quite as much as for it. The last time we were here Dr. Wainwright spoke of Hugh Miller. I think that it is scarcely fair to bring up his opinions: he was strongly opposed to evolution, but he unfortunately committed suicide, and his mind was not in a state at that time to be capable of forming a sound opinion: he has been dead many years, and drew his facts from the palæological forms, on which our theory is not based at all, long before these later discoveries were known. We look upon them as having long gone by. They stand out as isolated spots with the links gone, and we assume that the links were there, but that they have been washed away and have disappeared. No one knows what Hugh Miller would have thought if he had lived until now. As to Professor Sedgwick, I think he is nearer a hundred years old than he is to the allotted term of life, and it would be almost a miracle if he were to change his opinions now. Take Bentham the botanist, and Lyell the geologist—both old men, but

young compared with Professor Sedgwick, and they have [changed their opinions. To bring forward Miller and Sedgwick is not fair: bring forward others, and you will find that scientific men are giving in their adhesion one after another.

Dr. J. A. FRAZER.—Is Agassiz?

Mr. HENSLow.—I do not know.

The CHAIRMAN.—All that this means is that these scientific men believe that a power which they call evolution has an enormous scope and sway, but that it does not cover the whole field. Your own argument as to the retention of types indicates that.

Mr. HENSLow.—Certainly. The thing is deduced from nature, and it is a marvel to me that Dr. Wainwright, who knows so much of science, should be so steadily opposed to it. Take the case of Mr. Bentham. I have heard him oppose evolution in the Linnæan Society for a long time, but during the last few years he has been examining the genus *Cassia*, better known as *Senna*, which has 350 species, and from his careful study of all those forms, and seeing how they graduate into one another, so that he has great difficulty in separating the species, he has given in his adhesion to the doctrine. You must work at the thing yourself, not get it up from books. Take a group of animals or plants, and then you will find how the dovetailing goes on in every direction: the mind gradually absorbs the theory, and you cannot get rid of it. Dr. Wainwright quotes my phrase that "evolution is a great fact in nature," and argues that it is opposed to a God in nature. But I unite the two, and say that it is simply a method of God's working. Dr. Wainwright said a great deal about that passage of mine in the 36th page of the paper, and about the theory of evolution as based upon it. All that I meant by that passage is this: As a matter of fact, offspring do vary from their parents. You must admit the variations, but how they arise and what causes them no one knows, nor does any one know what will appear. All breeders of cattle are aware of that. If they want a new kind of sheep, they must be satisfied with whatever nature gives them in the variations, and must take them to their advantage, but they cannot foretell the peculiar variation that will ensue; they cannot force the variation to be in a certain direction. That is all that is meant by the statement as to our ignorance of these laws being profound. There are laws, because they are regular things, but man is totally ignorant of how they arise, and that is all that Mr. Darwin means. But they do arise, and on that fact evolution is based. Then I am called in question for speaking too positively about evolution. I qualified one expression by saying, "at least among scientific men." Another passage I do not seem to have qualified, perhaps from my conviction that the doctrine will be accepted. You will say, "That is no proof," and I admit it; but it is a question of time. As to the evolution theory cropping up all through the paper, I cannot help that; my paper was in fact upon it. I think I have now referred to most of the points that have been brought forward, and have only to thank you again for the kind remarks, many of them most valuable, that have been made upon the paper. (Cheers.)

Captain F. PETRIE (Hon. Secretary).—Before the meeting adjourns, I am anxious to say a few words. The remark has sometimes been made to me in connection with our meetings, “Why do we hear any one speak in favour of Darwinism here? Are we not a society to oppose, and not to support, such views?” I look at our objects, and find that this Institute was founded to “investigate fully and impartially the most important questions of philosophy and science.” That sentence may be called the basis of the Society. Hence it is needful, if we want to carry out our objects, and arrive at any real conclusions upon philosophical or scientific questions, that we should investigate them without partiality. Now, we cannot do that without hearing both sides. This evening we have not Mr. Bradlaugh here, but we have one whom we all recognize as being quite as good a Christian as any one in this room, and he has brought forward the theory of evolution, or, as some call it, the theory of variation. I will not give my own opinion thereon, but must say that it is a very happy thing that we can have so valuable a paper laid before us. There may be, and, of course are, many persons who differ from Mr. Henslow. I am now finishing the editing of the fifth volume of our Transactions; and among the best papers in that volume are those by Dr. Robinson Thornton, Mr. Gosse, and the Rev. H. Moule, each taking different and even opposite views as regards the subject upon which they are written, but with this result, that the truth of Revelation has been made plainer than ever, to the discomfiture of those who are really outside this Institute altogether—the school of Dr. Colenso. Probably before we finish the next session, we shall have other papers on evolution, taking different views from those expressed by Mr. Henslow, but all assisting us in elucidating the truth as to this very important subject. (Cheers.)

The meeting was then adjourned.

REMARKS ON THE REV. G. HENSLow'S PAPER. By CHARLES BROOKE, M.A., F.R.S., P.R.M.S., &c., Vice-President.

THE writer cannot agree with several of the statements of this paper, more especially the following. At page 36 the author says :—

“At last a being may be produced so far different from the original parents that it would (if its history were unknown) be classed by a naturalist as a different genus altogether. This, it will be remembered, has actually been done in the case of pigeons.”

It is probable that no naturalist would ever think of classifying any modified pigeon as a separate *genus*, and the writer is not aware that any one has so classified it. A naturalist might make it a separate *species* for the sake of giving his name to it ; but we all know that the groundless multiplication of species has been the bane of natural history. All such modifications are properly described as *varieties*, but not as new *species* ; *à fortiori*, not as new *genera*.

At page 36, line 2 from bottom, the author says :—

“Some opponents of his [Darwin's] views have maintained that the power of variation is limited ; if so, the *onus probandi* rests with them, and no proof has ever yet been given. Whereas the possibility of the other view has been proved, and the probability of its truth elsewhere derived amounts to a moral conviction.”

If so, it must be admitted that “moral convictions” may rest on very slender bases. As regards the statement that “no proof has ever been given,” it must be remarked that there is no known instance of a cross-breed between animals of different genera ; and between different species of the same genus, the offspring is invariably *infertile* ; for example, the mule. It thus appears that hybrid animals are not capable of *reproducing* their own mixed characteristics. This may be assumed to be a provision specially ordained to *maintain the uniformity of species*, and as such, an argument against indefinite variation.

Again, at page 37, the author says :—

“Now admit the *fact* of indefinite variation in offspring, &c.

It is necessary to join issue here ; for indefinite variation of offspring is not a *fact*, but an *hypothesis*, on the validity of which the whole question rests.

Three lines further on Mr. Darwin is quoted as saying :—

“The birth of the species and of the individual are equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance.”

But a full and free admission of the truth of this remark does not involve a belief in the doctrine of natural selection.

INTERMEDIATE MEETING, FEBRUARY 19, 1872.

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 :—

MEMBERS :—William Wilberforce Baynes, Esq., 48, Moorgate-street, E.C. ; Owen Edwards, Esq., Camden Wood, Chislehurst, S.E. ; James Falshaw, Esq., 26, Castle-street, Edinburgh ; Rev. Algernon S. Grenfell, M.A. (Balliol Coll., Oxon), Parkgate, Chester ; John T. Matthews, Esq., The Rookery, Shooter's Hill, Kent ; W. Foster Newton, Esq., Bingham House, Richmond, Surrey ; Thomas Seaber, Esq., 26, Martin's-lane, E.C. ; G. Shann, Esq., M.D. (Cantab), F.R.C.P., Petergate, York ; Rev. J. R. Wood, M.A., (Principal of) Trinity College, Eastbourne.

The Rev. J. Robbins, D.D., then read the following paper, which is inserted here in accordance with a special resolution passed by the Council.

ON FATALISM, by the REV. J. ROBBINS, D.D., &c.

I SUPPOSE no one acquainted with the direction of popular opinion in the present day would deny the enormous influence of the Doctrine of Fatalism or necessity. There is a widely-spreading philosophy which, getting rid of the idea of a living God, or at all events of His intervention in the affairs of the world, tends to explain everything by the action of necessity ; and as it denies liberty in God, so does it also deny it in man. In the various manifestations of the human soul it sees only an effect of temperament and race. Thus it explains all religions : one small people, for instance, one only in the ancient world, believed in a God, maintained His essential unity, His moral sovereignty. It is a question of race, say the Fatalists ; the race was semitic, and the desert wherein they so long wandered was pregnant with monotheistic teaching.—Again, on a certain day in the world's history a handful of men left Jerusalem to carry forth to the world the good news of the universal love and favour of God, Quite so, say they ; that was only the effect of the fusion of Jewish

and Greek faiths, which by a natural process has produced the religion of the modern world.—Again: a Pharisee, one Saul of Tarsus, on the road to Damascus is prostrated by some power to him invisible, and from being Christ's persecutor he becomes His apostle.—Natural reaction, say they,—common enough with ardent temperaments like his. Again: in the 16th century, a monk groaning and weeping in a German convent, one day comes forth from his seclusion and proclaims to an astonished world the inaugural words of the Reformation,—“The just shall live by faith.” Oh! say they, Luther only obeyed the instinct of the Germanic races, which ever sought a spiritualistic religion, and revolted against the pretensions of Rome.

In the present day a soul renounces the world, and tearing itself from a life of dissipation and vanity, dedicates itself to the service of God in love. They can only see in this the abnormal working of a natural law to which physiology shall one day give its correct nomenclature. Here, say they, is the only philosophy of history possible, beyond these explanations there can only be the arbitrary, the unforeseen, and science ignores utterly the one and the other. I am not exaggerating; this is the predominant feeling in philosophical essays, scientific works, and treatises, the way with which men pretend to unlock the new science of the 19th century,—the critical history of religions. And since religion cannot be separated from morals, they apply the same method to both; morality also, according to them, becomes an affair of race and temperament, its only rule is nature and physical law, and on a more exact science of nature they would base what they call the true independent morality which is to be the characteristic of the future. We have hitherto believed that the true basis of morality was responsibility, so that in shaking this, morality itself was disturbed. Mistake, say they,—the feeling of responsibility is only an illusion, which must disappear with that of moral liberty, the other illusion of a being subjected to unyielding laws; and starting from this principle they see in evil only a mistake, a disease rather than a transgression, criminals are victims rather than guilty men; here again temperament explains all. The asylum must replace the prison, compassion take the place of justice. For these self-styled superior minds, moral aberrations have a singular attraction, and leaving sonorous denunciations to magistrates and preachers, they curiously study each variation of nature, they seek the fatal law that governs it, and flatter themselves they shall one day be able to enunciate it in a proposition. All this is what we are told to-day with scientific serenity, which disdains declamation. Yet look at these new

masters of morals who pretend to found on Fatalism the morality of the future; see them when they are victims of injustice, wounded in their self-interest or their pride, what do they do? Why! they are indignant, they are angry. Oh! strange simplicity—angry? with an irresponsible Being? Accuse a senseless machine because it crushes a human existence beneath its wheels? Denounce the instincts of the beast which devours because it is carnivorous? The Fatalists, when with extreme inconsistency they rise in protest against injustice of which they are victims, give the lie emphatically to their own system; they show involuntary respect to human nature, for to protest against crime is to honour man.

I am not conjuring up vain phantoms, these ideas are rapidly becoming popular, although we may not happen to have come across them; our sons may some day give expression to them in the language of the schools, and the very handicraftsman who works for you may be reading them greedily, presented to him, as they are, in the most agreeable form. But, even if we do not accept the system, we may be accepting its results. How sweet to rid ourselves of the burden of responsibility! How sweet when enslaved by a passion we do not care to fly, to lay the blame on a peculiar state of circumstances or on nature! It is so convenient thus to escape the importunity of conscience to say that *we* do not do it, but it is the result of irresistible influences. In this way Fatalism will always be tacitly popular. The dogma was born on the day when the first sinner laid the blame of his act on God, and it always will remain the philosophy of sin, for it alone can give it the semblance of law.

Faith in Providence may be said to have entered the world with the advent of Christianity; up to that time men did not believe in it. Paganism admitted certain tutelary deities of the country, or the family, but above them, nay, above Jupiter himself, they placed the cold, motionless, impassible figure of destiny or fate; although the belief in a supreme God may be pretty clearly traced in the writings of Plato and Aristotle. Philosophers cannot be said to have admitted that the world was guided by a beneficent Will to an end mysterious, but definite. Never were the now widely-spread ideas of progress, Divine training, providential plan, even once enunciated during the ages of human existence. The most careful search into the literature of antiquity will not bring to light a page or a line which, however remotely, indicates such a belief.

No Pagan ever heard the beatings of the universal Father's heart in his own, or in the world's history never did it occur to his mind to seek from this Father strength under trial; and when overwhelmed by misfortune his sole consolation lay in

saying that, after all, he only endured a lot like other men, which no efforts on his part could alter or mitigate, and which it was the part of a man to bear with equanimity.

Thus with the ancient world ; but need we go back so far ? Is nothing similar to be seen to-day ? Let us not revel in illusions ; we are forced to admit that, despite Christianity, belief in Fatality, which was the dominant principle of all Pagan nations, is still the creed of a vast number of our contemporaries,—does it not lie enshrined in the heart especially of the suffering classes ?

It finds expression in sadness or violence in all their greatest movements, but the most striking thing is that this creed is definitely expressed and openly avowed by thinkers and writers who hold a high place in the world's esteem ; who declare that, neither in their own existence nor in that of humanity, can they recognize any other action than that of natural laws ; they reject the intervention of Providence as a dream of man's childhood.

When such views are so openly held and advocated, it is a proof that they have made progress, and we may not lightly pass them by unnoticed. There is hardly one of us who has not at some time or other, however firm his faith, been tormented by such thoughts ; not one but has sometimes doubted whether his life was guided by a loving Will ; doubted if his prayers were heard. Temptation all the more terrible, for that it does not present itself under a definite shape, but glides into our hearts to chill all impulses of love and confidence in the loving Fatherhood of God. It is this awful phantom, Fatality, that I wish to combat in this paper ; and will it not be a victory worth gaining, if, instead of the invisible and ghostly enemy who harassed and oppressed us, we may see, however dimly, watching over our life with loving care, the shinings of the radiant countenance of the God whose name is Love ?

The first thing which hides from our eyes Providence, and leads us to belief in Fatality, is the inflexibility of the laws of Nature to which we are necessarily subjected. If we could see Nature in some sort sympathize with our emotions, saddened by our griefs, smiling at our joys, we should easily recognize the manifestation of a Father's love. It is thus children do think in their simplicity ; for them the rolling thunder is the menacing voice of God, the earth with its lovely flowers is the garden of the Lord, each bright and shining day is a festival, God makes them, to fill their hearts with joy, everything testifies to them of the presence and action of God. But now-a-days scientific examination tends to substitute for Divine action the workings of great natural laws which govern the world, and it is the

especial character of these laws to be rigid and inflexible,—to be, and to remain, always and everywhere the same. In the heavens, *e. g.*, instead of the glorious canticle in which the harmony of the worlds mounts to the ears of God, science can only see, and study, what she calls the celestial mechanism; and a French school-book but lately contained this expression: “The heavens no longer declare the glory of God, they declare the glory of Newton and Laplace.” Even of those who believe in God, how many only see in Him the first cause which put all in motion, and who then leaves all to obey unvarying laws. God gave the first impulse, or as Pascal with fine irony has said, gave the first push, and the vast machinery started in motion; everything works in a fixed and prescribed order. The worlds in eternal and majestic silence pursue their stately march through the realms of space, and our little globe, lost as a grain of sand, is but an atom in all this vast immensity. On earth’s surface, without a moment’s cessation, are the same laws in operation, laws of life and laws of death. There is a law which ordains that a given number of beings die and disappear and be replaced by others; that at each second, *e. g.*, a man should die and a man be born. All that takes place, all that must take place, and as all is Fated as statistics show, what use, says the sceptic, is there in our prayers, our groans, the simplicity of our faith? Especially, how can we think God intervenes in each particular existence, and that there is a special will, and a providential end, in all these inevitable and necessary griefs and sorrows?

But let us not deceive ourselves, these are not questions that the man of science only puts to himself: the most ignorant is met by them, and they chill his heart. He is met by them in affliction, when suffering and death come, and with, rude and often seeming traitorous hand, strike down those he loves the best, his children or his wife. He meets them when he sees Nature hold on her course, peaceful and serene, when his own heart is sad as death; he meets them when he sees the sun which shone so brightly on his path, when he trod it by the side of some dearly-loved object, shine more brightly on her tomb. Oh! there is in Nature a fearful silence; hers is a book on many of whose fairest pages are inscribed the cruel teachings of “Fatalism.” Here lies our temptation, doubtless a great one, but one against which the Christian has a refuge. He believes in a God, as Nature’s Master, a creating God. Creation is the first word of the Bible; how necessary an article is it of our creed! We open it and we see, “In the beginning God created.” Thus above the laws which govern the world, we see a Lawgiver greater still, who has made, and who can as easily

unmake. And thus by faith in God, I escape the vicious circle of Fatality, and I leave it to take refuge in a Sovereign Will, from which all has proceeded.

Hence we maintain faith in miracles, and that first of all miracles, "The Creation." We do not do so to satisfy a coarse, vulgar love of the marvellous, the common tendency of ordinary minds. Christ ever refused to gratify such a curiosity as this. He condemned it in strong and emphatic terms. But I do not wish to deal with this now. The question before us is, whether Nature has a Master, or whether she has not. We must choose between Fatalism and Faith in a living God. Miracles are a most important guide for breaking the connection of seeming natural causes; they attest Divine intervention. Remove miracles, and with them you remove all faith in a personal God; you have no other master than a blind necessity. You may, if you will, call this necessity God; but to such a God you can offer neither worship nor prayer, nor can you ever expect an answer from Him. Miracles, then, are needed to enable us to escape from fatal laws; *e. g.*, Christians believe that 1,800 years ago a sepulchre gave up its dead. Is this fact without its importance? Was it only a prodigy to astonish a gaping crowd? No; for since this grave opened many have believed in life eternal: the fatal chain of life was snapped for ever; and yet nothing less than this was required to make men believe in immortality. Sceptics are willing to concede that there is in nature a vast and majestic harmony which indicates design, but they deny that man is its especial object. We are told that we are yielding to an illusion of pride when we affirm that man is under the peculiar care of God; we are told that our opinion was conceivable enough when men believed the earth was the centre of the universe; but now that we know that it and its sun, and all its system, are positively lost amid myriads of baser systems, that float through the realms of space as thick motes in a sunbeam, how can we fondly imagine that humanity plays the part assigned to it by the Bible, or that man has so vast an importance in the designs of God? This objection sometimes takes another form in the mouths of men who are willing to acknowledge that there is a God who governs the world by general laws, and who may be introduced in the greater events of history; but that any of earth's inhabitants should assume, or invoke His intervention in the common details of daily life, and think himself the object of His loving care, a person professing such a belief would be derided by them. They are willing, perhaps, to allow that His name may be used in the solemnities of worship, but object to connecting it with our petty sorrows and trifling joys, in which He can take no interest.

Thus do these modern Epicureans reason, and the language I have quoted is not that of professed atheists, but of many honest people who are proud of the name of Christians. In fact, there are but few of us who have not occasionally been troubled by such thoughts as these. Which of us has not at some time or other asked himself, "Is it possible the attention of the Most High can be directed to me? What is man that Thou art mindful of him?" How often has not the magnificent spectacle of the world inspired us with a vague feeling of terror, when we contrast its infinite grandeur with our own nothingness?

Can it be true, we say, that in this immensity of creation, in which our globe is as a speck of dust, that in this little ant-hill we call our world, among these millions who each minute are born and die, each has its mission, its part to play, its account to give? Is it true that our race has the importance we ourselves attribute to it, and that God can condescend to notice the innumerable incidents which chequer our little life with light and shade? Is my prayer heard,—are my wants known of God?

Another thing which effaces from the minds of many the idea of God's intervention in the world's affairs is its present condition, to which Christians say it has been reduced by sin, and from which we believe it will finally emerge by the destruction of sin.

How difficult is it to discover any trace of a Providential plan in history?

How can we see any design amid the dark confusion of events? How can we find the key to the moral problems they raise? What mean so many miserable failures; what was the purpose served by so many vanished civilizations?

It is no doubt easy enough for a man of optimist temperament to explain all these things superficially, and write a philosophy of history in a few chapters, and declare he sees clearly through that which to others is a darkness that may be felt; but all cannot thus easily console themselves,—all cannot hail as rising day-stars the *ignes fatui* of imagination. For them the history of humanity, with its gigantic crimes, the ceaseless sufferings of millions of beings who, far beyond our bounded ken, pursue their mysterious destiny,—all this is a dark problem which troubles them, and often makes their heart to bleed. It may be said all these troubles belong only to cultivated minds. I do not think so. I believe that beneath another form they harass and perplex the most ignorant and rude. Can we not epitomise in each existence the questions which torment us in the history of nations? Triumphant injustice! successful fraud! seemingly useless suffering! unforeseen strokes of death! are these not questions which, in the dark and solemn hour of our

pain and anguish, ask for a solution from all? From the patriot who thinks he sees the cause of justice fall for ever when his own blood-stained banner is trampled in the dust, to the workman who, in the bitterness of his heart, says, "If there is a God he is the God of the rich man," is there any situation in which from time to time we are not tempted to ask, what is the action of God on the world and on our own life? If, as I said, Fatalism was the prevalent belief of antiquity, it is in a scarcely less practical sense the faith of our own times. Some adore it blindly, others curse it in useless revolt; but over all, whether openly avowed or secretly felt, it exercises a sinister and baneful influence. Even when under the sharp stroke of sorrow or the acute sense of injustice, man bends the knee to it, and foolishly repeats the words of Asaph, "How doth God know? is there knowledge in the Most High?" Now to deal with these objections in succession, first as to the sceptic's arguments in favour of necessity to be inferred from the inflexibility of Nature's laws. The Christian escapes the difficulty by belief in a living God who is above the laws he has made. True, we see no more miracles; the physical world in which we live is governed by fixed and unyielding natural laws, which, if we resist, crush us beneath their awful power.

Why should it not be so? God is a God of order. He has attested more than once that He is Nature's master. But can He be expected to change the mighty order of His works, to interrupt the marvellous concatenation of cause and effect to satisfy wishes, that, if so easily gratified, would too soon degenerate into caprices? He could, no doubt, grant each prayer, intervene in every event of life, to punish or to bless. But what result would follow? All would serve him by self-interest or fear; for punishment or reward would immediately follow each action. There would, in such a dispensation, be no place for love, and God would neither be served by mercenaries nor slaves; He wills that man, as a moral agent, should walk by faith, not by sight. He hides Himself from sight, to reveal Himself to faith. Sight shows us those general laws according to which His sun rises on just and on unjust alike, the laws by which Nature pursues her changeless course; but faith unveils to us, amid this general connection of cause and effect, the delicate operation of His all-watchful care in the existence of each individual, by which He knows all our thoughts, and by which no sigh of ours is hid from Him. Judging by sight, all is fated and predestined, or the result of chance,—the same accidents, the same griefs happen to all alike; but judging by faith, there is in each existence a plan, by virtue of which all that seems accidental and fortuitous, irremediably fixed, serves

a providential end of God; so that, if our sight were clear enough, we should be able to discern that all Nature's forces, though governed by fixed laws, serve, in connection with humanity, an end superior to the physical aspect of Nature, even the realization of an order, moral, spiritual, divine.

To turn to the second objection to an overruling Providence on the ground of the unworthiness of the idea that God could interest himself in the concerns of a being so insignificant as man. The objection may be drawn from Revelation itself, "What is man that Thou art mindful of him?" No doubt Scripture does speak of the grandeur of God, and the littleness of man, with unparalleled energy of language, but it never draws an inference favourable to Fatalism.

Listen to the language of a prophet spoken more than 3,000 years ago, in a passage so beautiful that it cannot fail to strike even the coldest imagination. "Who hath measured the waters in the hollow of His hand, meted out the heavens with a span, and comprehended the dust of the earth in a measure, weighed the mountains in scales, and the hills in a balance? Who hath directed the spirit of the Lord? Who, being His counsellor, hath taught Him anything? Behold! the nations before Him are as a drop in the bucket." Thus did the prophet express himself, and this is the feeling that naturally prevails in man. Can any picture be more striking of our weakness compared to the grandeur of God? But what is the consequence? Isaiah draws from it: "Sayest thou, O Jacob, and speakest thou, O Israel, my way is hid from the Lord, and my judgment passed over from my God? Knowest thou not the Lord, the everlasting God, hath created heaven and earth; He fainteth not, neither is weary; He shall feed his flock like a shepherd; He shall gather the lambs with His arm, and carry them in His bosom." God is great, therefore he is unmindful of us. Such is the human syllogism.

God is great, therefore He hath respect unto the lowly: such is the logic of God. Which is the most reasonable we leave our adversaries to judge.

But it is asserted as a reproach that we thus make the lowest of His creatures the objects of His care. Is it, then, to be admitted that it is a mark of true grandeur not to occupy itself with that which is small?

Should we call a poet great who, absorbed in the plan of his epic, neglected harmony of rhythm and propriety of diction on the ground that they were below his attention? Should we call a general great who, in the arrangement of a campaign, thought he might safely neglect the details as unimportant? Do we not, on the contrary, see evident signs of true genius to

embrace in a glance, at once far-reaching and minute, the whole and the details,—to see at once the two ends of the chain? That which excites our admiration with men of genius is not only their gigantic project, but the powerful grasp with which they seize both the plan and the details of its execution. It is this kind of what we may call intellectual omnipresence which made Michael Angelo at once the most gifted artist and the most accurate mathematician; which enabled Napoleon, while tracing the plan of a distant campaign, to calculate accurately the rations of his soldiers and arrange the minutest details of each camp; by which a great writer, when carried aloft on the wings of a soaring imagination, selects the most felicitous expressions and uses the most suitable epithets.

Now, multiply and raise this gift of genius to its highest power, ascend to its primal source, and we have God embosomed in the most imposing grandeur, exercising the most watchful providence, the sovereign Being that nothing can limit, but that nothing can escape, not even the sparrow that on a winter's night falls dead on the icy ground. We cannot, then, get rid of the idea of a superintending Providence by means of contemplating His grandeur, for the very grandeur itself furnishes a strong argument against Fatalism. But the questions I have alluded to are terrible even for the Christian, and we may not dare to attempt lightly to pass them by. Faith does not so completely illumine the darkness that surrounds us, that no mystery remains in the spectacle of the world. Yes, indeed, in history the apparent share of fate or destiny is immense, and this is the third objection. Look at the hereditary transmission of evil and suffering, the influence of matter on spirit, the inborn disposition of races and characters. Here are problems which baffle us, and again, and again, contradict our experience. Indeed, we are forced to confess that in human history there are pages after pages whose sense is hidden to us. The ways of God are ever obscure to us: He maketh dark water and thick clouds his pavilion, the walls of which our feeble sight seek in vain to penetrate. But despite the darkness, we can fix our eyes on the expression, "God is love," and this conviction we can oppose to all we see and all we hear. Nay, to the thoughts of our brain, and the sorrows of our hearts, "He is love," and thus in all His works there must be a harmony complete and supreme. Looked at from this point of view, the history of our race is no longer a vain conflict of opposing passions, instincts, and chances. Above, amid all this restless agitation, all these clashing wills, all these seeming accidents, there is, though we cannot trace it, a divine plan which leaves no place for fatality. It is true the design is

hidden, but we know it exists, and the thought is a firm support for our faith. Besides, though we cannot see the object, and, when asked to explain it, we are compelled to avow our ignorance, we must remember that it is but natural with a being limited, fallible, who can see in his brief passage over the surface of the earth but a small part of God's design. How can we—mere creatures of a day—presume to complain, because we are unable to comprehend the designs of a Being who is infinite and eternal? It was once said by an old dramatist of the sixteenth century to a sceptic who denied providential action,—“Would you pronounce judgment on the plot of a drama of which you had only seen one act? And because in that act the innocent is punished, would you accuse the author of having forgotten justice? Wait a little and see the next act. When the criminal is overtaken by the punishment he has deserved, you will say that the apparent discord is turned into harmony. Do you not see that we are but children? Who could pronounce judgment on the drama of the ages from a single scene?”

The old playwright said truly; God plays a drama the acts of which are centuries. He in whose eyes a thousand years are as one day is patient because He is eternal.

Or, to take another illustration, would you ask a soldier whose place was amid the thickest of the fight, to explain his general's plan? What need for him to understand it? He sees but the thundering charge, the flashing arms, the clouds of smoke and dust; he hears but the shouts, and cries, mingled with the deafening roar of musketry and the deep boom of cannon. For him all seems disorder and confusion, but on a neighbouring height, an eye is following the progress of the action, a watchful brain is directing the movements of each battalion. And is there not a battle going on amid the centuries—that of truth, love, and justice, against error, egotism, and iniquity? and it is not for us obscure private soldiers in the *mêlée*, to presume to explain the plan of the action: enough that God is directing it. We have to remain at the post He assigns to us, and to struggle firmly to the end. There is a scene recorded in the Old Testament which may illustrate the divine plan as carried out amid the confusion of history.

When Solomon built the Temple on the hill of Zion, we were told that all the materials for the construction of this enormous edifice were prepared far from Jerusalem, that the sound of the workmen's tools might not break the silence of the sacred city; and thus for a long period, scattered in Judæan valleys, or on the heights of Lebanon, the woodcutter felled the trees, the workman carved the stone, none knew the plan of the great Architect, each had the order to complete his own task, till the

day came when, in its majestic beauty, the Temple of God arose complete.

Here we have a striking image of the destiny of humanity. God, the sovereign Architect, constructs throughout the ages a vast and glorious edifice, whose plan we have never seen, but which will be the Temple in which we all shall one day worship. Far, far from heaven, far from the holy Zion, far from the abode of peace and glory, here in the land of our exile, the materials are being prepared; for the noise of suffering and trial must not penetrate the sky; each of us must finish at his post the work entrusted to him, renouncing all idea of comprehending the place it shall occupy in the universal harmony; for how can we, workmen of a day, presume to understand or realize the designs of an eternal God?

Enough for us to know that our work, however humble it may be, is known to the universal Master; that He has willed it, and that He will accept it if honestly done. Enough for us to believe that a day will come when the materials dispersed in a seeming confusion, which is of course to us incomprehensible now, shall be united in an order which shall ravish our delighted intelligence; then all human pain, sacrifice, and anguish shall no longer seem to have been useless; then shall be recovered from oblivion all the noble deeds of heroism and hidden virtue now seen by God alone; nothing shall then seem to have been the work of chance, or fate, in human history, or in our own individual existence. Chance shall rule no longer, and the edifice that Divine wisdom by an earthly work has prepared, shall rise in beauty, sovereign and sublime as the eternal sanctuary of infinite love. Yet there is something wanting still; doubtless it is an incomparable consolation to know that all concurs in the universal plan of God, that nothing is useless, nothing lost in any human life; but what is there to assure us it is anything more than a lovely and taking theory? How can we know that love is indeed the centre and the end of all the Divine dispensation. Too many clouds hide it for me to believe in it? Oh! if I could only for a moment hear the beatings of my Father's heart, how would I say with Jacob, "Tell me Thy name!" or with Job, "Oh, that I could find him!" or with Isaiah, "Oh, that he would rend the heavens and come down!" Yes, between the hidden God and myself the distance is too great to believe in His love. I must see Him, and contemplate His glorious beauty face to face. Well, to this desire of the soul God has responded. The Incarnation! here is the best proof of God's providence. On our earth we have seen appear and shine forth a holy love, the like of which humanity never before beheld. His love is the very foundation of the character of Jesus, the principle of all

His acts and all His life, and Jesus who shows it to the world declares, with the authority of a sovereign, that He is the Incarnation of God, and that he who sees Him sees the Father; and thus souls come to Him, drawn by an attraction irresistible. Ask them why the words of Jesus are of such sovereign authority. Why His cross, above all, the supreme exhibition of His love, sheds a light unparalleled on their own, or the world's history. They could not perhaps tell you, but they feel it is because on this cross God had written His name, and has revealed by it the secret of His ways. Listen to what God says by it. "You ask My name. I am Justice, I am Holiness, I am Love. Oh! human conscience, thou hast felt me without knowing me. Thou hast sought me, each time thou didst love the good, the just, the beautiful, and the true. I am Holiness, and Justice, and I could have reigned by crushing all resistance, for Mine is the power, and the sovereign dominion over ages, and ages; but because I am Love, I would not have such a reign as this; I would draw hearts to me by a free attachment, and ask of them a voluntary obedience. And thus My Son came to earth humbled, abased, but by this cross to which the world nailed Him, I draw, and will draw, all men to Myself. Thus shall come my reign,—not the reign of terror and of force, for, as in the desert of Horeb I taught my servant Elijah, I am neither in the devastating storm, nor in the devouring fire, nor in the heaving earthquake. No! My voice is persuasive and sweet. I say, 'Come to Me; I neither break the bruised reed nor quench the smoking torch while yet a spark remains.' I call all men to Me, to this tend all the plans of My providence. This is the secret of history, the explanation of all my designs."

Is not this the language and teaching of the Cross, though the world does not understand it. I know it often repels it; but, in spite of it, some ray of light Divine penetrates the darkness, and enlightens it. And we see this especially in one particular. Progress, the great law of our race, was not believed in, nor thought of till the Advent of Christianity. Now, what is progress in its highest sense? (I do not mean refinement of luxury, enjoyment, and comfort, which attest the decline quite as much as the civilization of nations.) What is progress if not the realization of a Providential plan in history? It is a striking fact that people never believed in progress till the Cross. A Divine plan has only been believed in since God told us His name by writing it on Calvary. General faith in progress, which, while Pagan or Mahometan nations are stationary or reactionary, gives a future to Christian nations, and makes men try to win the world to their belief; this faith is a fruit of the Gospel. The world at large only believed

in Providence from the day of the Incarnation up to that time, as I have pointed out; its religion was Fatalism. Even among the Jews it was only by force of miracles that people could be made to believe in the intervention of God. But, from the day when men have felt the heart of God beat in His Son, when they beheld Him, who is the revelation of the Father, men believed that God loved, and would not abandon them to a fatal destiny. Now, just see what a change in our views takes place the moment the stupendous fact of the Incarnation casts light on our deep darkness. We say to ourselves, on first contemplating our little earth lost in the vast universe, "Can it be possible the eye of God can see it?" And, now that I know that among so many thousands of worlds, it has been the object of the love of the Most High, the abode of His Son, the theatre on which His highest love has been displayed, can we now say, that any number of worlds are worth that on which have fallen the tears and the blood of His Son? How willingly can we now say, in sympathy with the Prophet, "O little Earth, smallest star-planet, lost amid the immensity of the universe, yet thou art the most glorious of worlds, for out of thee came the Saviour, the Son of the Highest! Yes, in thy celestial journey across the realms of boundless space, angels salute thee, for in the whole universe they see no spot surpassing thee in brightness. Let them wander through the star-spangled heaven, whose splendours announce the glory of God; let them pursue their course through His wide domain, and contemplate the magnificence of His handiwork. They will never find anything more grand than Divine love, which immolates itself; and the light of all suns will pale before the ray which shines from the Cross. O Earth! blessed art thou, for from thee has come forth the Saviour." We seemed to say, what is the secret of the Divine will? and what is the meaning of these extraordinary dispensations which blind and confound us? But now God has answered us, we have seen the Cross triumphant. We know across all that bewilders and troubles us the Kingdom of God advances, and will finally subdue the earth. But not only are the destinies of humanity at large illumined by the Cross, but the individual history of each one of us. The Cross tells us the value of a human soul in God's eyes, by showing at what a price God has redeemed it. And when we believe in that love, and when we know the value of our soul, how can we doubt the goodness of Providence? Is not this precisely the energetic reasoning of St. Paul? "God, who spared not His own Son, but delivered Him up for us all, shall He not with Him freely give us all things?"

After so striking a proof of His love, may we not expect a

Father's most devoted care and tenderness? Why should we doubt the merciful intention with which all Divine acts are guided, even those which confound our intelligence, and break our hearts? What affliction is there whose darkness the cross cannot illumine, and whose bitterness it cannot soften? So reasons the Christian, and remember that what I have said of nations applies as strongly, though perhaps still less visibly, to individuals. We only believe firmly in Providence, when we accept the cross.

Apart from the faith of Jesus Christ, you may meet with bursts of sincere piety, a touching submission to the will of God, a trust more or less in His love; but when you see a man who believes firmly in the intervention of God in his life, a man who declares that all his grief has divine education for its end, a man who can give thanks amid severe affliction, you will never be mistaken in calling that man a Christian. But here the spirit of doubt I am dealing with takes a new form, and wields another weapon. We are told it is a wild delusion to suppose the Church can be the centre of all the Divine plans, and that humanity can have ever been the object of such a miracle of love as the Incarnation. Christians who believe the heavens were shaken to effect their salvation, and that all things work together to realize their hopes, the glory of their God, are accused of pride. Why! what pride can there be in believing God in placing us on the earth had an evident object, that object being His service? What pride can there be in believing the free obedience of one loving heart is more acceptable to God than the enforced submission of *all* creatures who serve Him through necessity? What pride in believing that in order to obtain this obedience His love recoiled at nothing, not even the most unheard-of humiliation, not even before the sacrifice of the cross? Thus we are called proud when we wish to make our life depend immediately on Him from whom we have received all, when we trust the voice of conscience on Divine holiness. We are accused of pride when we believe nothing is indifferent to God in our life, and that He is grieved and hurt by our selfishness and sin. We are called proud when we think that His mercy exceeds His justice, and when we suppose it great enough to reach even to the gift of Himself. Proud when we believe that His Father-like tenderness is vast enough to comprehend all in its wide embrace, and to know, and count the sorrows, and sufferings, even of the humblest of His creatures. Proud, indeed! in our inmost confidence that in all His ways towards us nothing is chance, all is love. Proud! but those who reproach us with pride, have they ever seen how much is covered by their pretended humility?

But it has been said by some, if God foresees all, and directs everything to an end, which, though not pre-ordained, is yet over-ruled, and controlled to a certain extent independently of us,—what is the use of prayer?

It is a grand instinct, however, which prompts a feeble, finite being to draw near to the Author of its own and the world's existence. We are ready to admire the silent law of gravitation, which draws every atom of matter to its appointed place,—the hidden force which enables us to flash our wishes (in a few minutes) half across the globe,—and can we not admire the soul's effort to return to the fount of life, and to enter again into spiritual communion with its Creator?

One cause that has tended to throw discredit upon prayer, and bring it into disrepute, is the numberless perversions of which it has been the subject, at the hands of Buddhists, Thibetans, and others, who even in Europe have imagined its force lay in repetitions mechanically performed, and valuable only from their frequency,—forgetting that no human father would require such a homage, and that God asks the heart, and that prayer, to be worth anything, must be an act of the soul. What then is its use? Most men, however sceptical, admit its action, but on whom is it exercised? Is it confined to ourselves, or does it extend to God? They tell us it is wrong to expect to modify the course of nature, and that the great use of prayer is to teach us resignation to the actual state of things.

But if prayer is valuable only by virtue of its reflex action, why, in times of danger either to ourselves or others, should we offer up prayer? Let us appeal to mankind not when spoiled by sophistry, but when they pray from the first outpouring impulse of the heart. Is it only to raise himself nearer to God, and learn resignation, that the shipwrecked mariner lifts his anguished eye to heaven, and calls for mercy in imploring tones?—that the mother, watching by her dear one's couch, makes her agonized appeal to God to spare that loved one's life?—that the starving father prays for his craving little ones?—or that the sinner wrestling with a strong temptation prays that help may be sent down to him? Do none of these expect to influence the Divine Will? Do all believe that there is none that can answer, nor any able to save? No one can say so,—the veriest unbeliever in prayer, can only say,—such are the victims of illusion. It is strange, however, that the illusion should be universal, and that no education or influence can eradicate it; and that in the various crises of the history of each individual it ever re-appears.

We argue then, that the feeling must have been implanted by God! and God could never have created a hunger He never

meant to satisfy, or a thirst He never intended to assuage; nor could He say to His creature, "Thou shalt ever ask, but I will never answer." We may safely believe, then, that God will and does reply to desires of His own implanting.

Christ has revealed to us the true love of God, in re-opening access to Him. Christ has taught us, in noble and elevated language, all we know. He banished for ever all gross, mercenary, and superstitious ideas; it cannot be said He ever encouraged spiritual presumption. What then is His idea of prayer? Does He consider it merely an elevating of the soul?—a spiritual exercise? Rather, does He not ever assume that prayer modifies events, and that success depends on the intensity of our faith? Look at the bold images He employs—the unjust judge; the selfish friend. And besides Christ's direct teaching, look at the general inference from Scripture: Abraham's prayer for Sodom; Jacob's struggle with the Angel; Christ and the Canaanitish woman;—in all these cases prayer is shown to us a sovereign act, influencing first ourselves, then others; and so proceeding onward to outward events, and the course of the world.

Let us take the objections: Prayer, they say, cannot be efficacious, because, if it were, it would change the course of Nature. As before observed, all the researches of science tend to establish the permanence of natural law; why should we pray for fine weather, or rain, when we know that both depend upon meteorological laws? why pray for the preservation of human life, when statistical returns show for every given period an unvarying proportion of births and deaths?

We are asked to leave prayer to children, who think each fine spring day made for their own especial gratification; and under this objection, they look upon our faith as crushed. But if it be true that the laws of nature are incapable of modification, why should men who reason thus take any action? why seek food? why sow? build? or plant? Each act is in flagrant contradiction with their system. You cannot modify the course of Nature, says the sceptic; nevertheless it is done every time a stone is lifted, or a house built; for the time, the laws of gravitation are suspended and varied; the same is done every time a tree is grafted, or new life introduced to a diseased member of the body.

Man is ever transforming into forces of life the crude powers of Nature, which would otherwise have spread devastation and death. Man does the same when he extracts healing remedies from poisonous plants. Man does all this—nay, more; he often, by his own unruly will, resists the will of God, and delays material and spiritual progress till the dawn of the per-

fect day; and yet, when we would pray, there are some who would stop the impulse by alleging the inflexibility of Nature. What! my intelligence can direct the hidden forces of Nature to work an end subservient to purposes of usefulness; and shall my soul alone be powerless? The fact that we can control the powers of Nature is beyond dispute, and yet, if this be admitted, fatalism falls to the ground.

Sceptics may reply that man's power to modify the course of Nature is visible and appreciable, and that there is no relation between this and the doctrine of the influence of prayer, which is and must remain wholly invisible. But that is not the question—which is, Can man modify the course of Nature, or can he not? The invisible mode of the action of prayer is beside the argument; for how few operations which we know take place can we comprehend? How does spirit act on matter? How, or why, does the movement of my hand obey the volition of my intelligence? Here is a question which baffles learned and simple alike. When the farmer casts his seed into the ground, does he understand the germinative process? Of course he does not, neither can the most learned man of science explain it to him; yet he trusts his grain to the ground confidently.

Neither do we know how prayer acts; but we may safely leave the result to God, certain that each spiritual seed will find its own furrow, and bear an appropriate and abundant harvest.

And, after all, who are the unbelievers in the efficacy of prayer?—who are its opponents? The Sceptic and the Atheist—the very persons who never pray, and, consequently, are utterly unable to testify as to the results of prayer. Indifference or lukewarmness in the act, coupled with a want of reverence to the Dispenser of all Gifts, must ever of themselves be fatal to the realization of the petitions of prayer. We must pray and not faint, pray in faith, nothing doubting.

The very essence of prayer consists in an implicit belief that the person addressed, whether human or Divine, has the power to grant its petition; and, indeed, how do we know that, beyond the laws that human ingenuity and science have discovered, there may not exist occult laws framed to meet and govern every conceivable variety of circumstance, and which laws are only called into operative action by spiritual and submissive faith, belief in God's love, and humble acknowledgment of His Omnipotence?

It may be one of God's laws that a petition for spiritual advancement (in contradistinction to one of mere personal aggrandisement), if presented in humble faith and dependence upon God's love, may be accorded, which, without that prayer

would have been withheld. We must ask to receive: God has commanded it as a duty, and appointed it as an act of homage to His divinity.

A familiar instance of the effect or action of prayer is seen in the relationship of parent and child. How often does the child importune its parent for some gift or gratification that it has set its heart upon, but which the parent knows would be immediately or prospectively injurious! How does that child interpret the refusal or intentional silence of its parent? Undoubtedly, at first, with annoyance and displeasure, perhaps mingled with doubt as to the genuineness of the parental feeling; but when of age to appreciate such caution and watchful care, it sees an overruling protection, a benevolent guardianship, a jealous love in the apparent unkindness of the act.

In fact, there does not exist a more graphic, concise, and illustrative definition of our views of the nature and effect of prayer than is found in our Lord's parable of the Publican and Sinner, with which I shall conclude my observations on the subject.

"Two men went up into the temple to pray; the one a Pharisee, and the other a publican. The Pharisee stood and prayed thus with himself,—God, I thank Thee that I am not as other men are, extortioners, unjust, adulterers, or even as this publican. I fast twice in the week, I give tithes of all that I possess.

"And the publican, standing afar off, would not lift up so much as his eyes unto heaven, but smote upon his breast, saying, God be merciful to me a sinner.

"I tell you," says Christ, "this man went down to his house *justified* rather than the other."

A discussion ensued, in which the Rev. C. A. Row, Rev. G. Henslow, E. Haughton, Esq., M.D., Kazi Shehbuddeen, the Rev. T. M. Gorman, and the Chairman took part. The Rev. Dr. Robbins having replied, the meeting was adjourned.

NOTE.—The paper read and discussed at the Meeting of the 4th March, 1872, is inserted in Vol. VI., because it took up some arguments in Sir John Lubbock's recent work, which had not been dealt with in another paper in that volume (see Vol. VI. p. 1).

INTERMEDIATE MEETING, MARCH 18, 1872.

THE REV. J. B. OWEN, M.A., IN THE CHAIR.

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

LIFE MEMBER :—Lewis Biden, Esq., 9, Victoria Chambers, Westminster.

MEMBER :—Major-General C. J. Cooke, 49, Eastbourne Terrace.

ASSOCIATE :—A. Hall, Esq., Haxted House, Bromley, Kent.

The following paper, inserted here in accordance with a special resolution passed by the Council, was then read by the Author :—

*DARWINISM TESTED BY RECENT RESEARCHES
IN LANGUAGE.* By FREDERIC BATEMAN, Esq., M.D.,
Physician to the Norfolk and Norwich Hospital, &c. &c.

PERHAPS no works in modern times have been so largely read and so freely criticised, and have exercised so great an influence for good or for evil, as the “Origin of Species” and the “Descent of Man.” The subject of which they treat is one of such absorbing personal interest, as tending to gratify the ardent desire for knowledge of the “*where and the whither*” of the human race, that these books have been received and perused with avidity, not only by professed naturalists, theologians, and men of science, but by a far wider circle of general readers.

It has been said of Luther that he was the monk that shook the world. It may with equal propriety be said that Mr. Darwin is the naturalist, who, by a hypothesis so strangely at variance with our traditions, has shaken the foundations of the religious world.

As the avowed object of the Victoria Institute is to investigate apparent discrepancies between Christianity and Science, and to deal with some of the modern forms of supposed antagonism between Science and Scripture, and as in my opinion the Darwinian hypothesis of the origin of man is directly opposed to the teaching of revealed religion, it seems to me that this is a

proper arena for discussing the value of this most strange and startling theory.

I need not, I am sure, in an audience like the present, define the peculiar scientific views which we understand by the term Darwinism. In his work on the "Origin of Species by Natural Selection," Mr. Darwin promulgated the theory, which had been previously put forth by Lamarck, that all species, instead of having been independently created, and possessing an independent existence, had been gradually developed out of other forms. In this work he merely hinted at the application of his hypothesis to man, but in his recently published work he does not hesitate to assert that man, the wonder and glory of the universe, has descended from the stem of old world monkeys, that he must be classed with the quadrumana, the most immediate ancestor from which this descent can be traced, being an anthropomorphous Ape!

This theory abolishes the idea of creation, in the ordinary sense of the term. It, at most, concedes to Nature the faculty of causing one species to spring from another, and it consequently excludes all direct, personal, and miraculous intervention of a creating power.

Here I wish to observe, that, although a decided and most uncompromising opponent of Darwinism, I have no *à priori* objection to raise against the theory, and I trust I shall say nothing to-night to justify my being classed amongst those whom Mr. Darwin describes as "curiously illustrating the blindness of preconceived opinion," or amongst those whom Professor Huxley describes as "contenting themselves with smothering the investigating spirit under the feather-bed of respected and respectable tradition." Deprecating all idea of stirring up the *odium theologicum*, I consider the doctrine of evolution as a legitimate subject for scientific inquiry. I acknowledge, moreover, the fairness and perfect honesty with which its author has handled the subject, and I recognize also the deep knowledge of natural history which the "Descent of Man" displays; and from its charm of style and elegance of diction, I am not surprised that it has become equally popular in the drawing-room of the votary of fashion, as in the study of the naturalist and the theologian.

I should not reject the Darwinian view of the origin of man, from any fancied notion that its adoption was derogatory to our dignity and inconsistent with man's position in the order of Nature, a notion which was evidently held by the poor deluded creature whose suicide was lately recorded in the public papers, and upon whose person was found a document, stating that his existence was no longer to be tolerated, since Mr. Darwin's

discovery that he was descended from a monkey. Instead of sympathizing with the views of this unhappy victim of prejudice and folly, I fully echo the sentiment of the naturalist who said that he would prefer being descended from a good honest monkey, to being obliged to avow himself the offspring of certain fanatical enemies of scientific knowledge and progress.

Besides, I can console myself with the thought that whatever may have been the remote origin of man, for ages he possesses a history of his own; he has filled the world with monuments of his ambition and of his genius; he is the sole actor in a drama where other animal beings play only an accessory part. The embalmed records of three thousand years, the figures of animals and birds engraved upon the ancient Egyptian monuments, show that there has been no *beginning* of a transition of species during the long period of thirty centuries. Throw in, if you will, a few hundreds of millions of years, and snatch from us our titles of nobility, and claim the possibility of our descent from an anthropoid ape, and I even then maintain that man's dignity is not *necessarily* lowered, his position in the scale of creation is not altered; I should still cheer myself with the eloquent language of Sedgwick: "Man stands by himself, the despotic lord of the living world; not so great in organic strength as many of the despots that went before him on Nature's chronicle, but raised far above them all by a higher development of brain; by a frame-work that fits him for the operations of mechanical skill; by superadded reason; by a special instinct for combination; by a prescience that tells him to act prospectively; by a conscience that makes him amenable to law; by conceptions that transcend the narrow limits of reason; by hopes that have no full fruition here; by inborn capacity of rising from individual facts to the apprehension of general laws; by a conception of a cause for all the phenomena of sense; and by a consequent belief in a God of Nature."

I see nothing in the doctrine of evolution, as applied to the origin of man, that is inconsistent with *Natural* Religion. We know that in intra-uterine life we pass through a preparatory stage which we can but imperfectly realize and understand, and therefore we can readily admit that the Creator, if He had chosen, could have endowed us with a previous existence in the form of a less perfect animal than man; I say, the Darwinian hypothesis of the origin of man is not inconsistent with *Natural* Religion, but it is directly opposed to *Revealed* Religion, which tells us that "God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and man became a living soul." I regard, with Archdeacon Pratt, "the six days of the creation as exhibiting a series of creative acts, which terminated in the

appearance of the human race upon the scene; the animals and plants then created were the progenitors of those which now, possibly with others since created, tenant the earth."

The novelty of Mr. Darwin's views has had something to do with the ready reception of them by the rising generation, who in this age of electric telegraphy and underground railroads, are always seeking the sensational and the marvellous, the tendency of whose mind is to consider those who differ from them as standing upon a lower intellectual platform than themselves.

My intention is not to attempt to enter into a general criticism of the value of the arguments for or against the Darwinian theory; this would lead me far beyond the limits within which I propose to confine this paper; moreover, this has been done over and over again by far abler hands than mine. Nor do I intend to trespass upon your time, beyond a mere allusion to the controversy which has for some years been going on in respect to the structural differences between man and animals; and I shall consider it equally foreign to my purpose to inquire into man's zoological position, considering it, as I do, of comparatively little importance whether he be considered as belonging to a species, order, class, or sub-class of the animal kingdom. I propose to test Darwinism solely and simply in reference to its bearings upon the faculty of Articulate Language.

Those who have read the "Descent of Man," will remember that the author begins by saying that he who wishes to decide whether man is the modified descendant of some pre-existing form, would probably first inquire whether man varies, however slightly, in bodily structure, and in mental faculties; and if so, whether the variations are transmitted to his offspring in accordance with the laws which prevail with the lower animals. He then proceeds to compare the bodily structure of man and that of the lower animals, remarking that all the bones in his skeleton can be compared with the corresponding bones in the monkey, bat, or seal; that it is the same with his muscles, nerves, blood-vessels, and viscera,—in fact, he shows that there is a remarkable correspondence between man and the higher mammals, especially the ape, in the structure of the brain and other parts of the body. He then calls attention to the fact that man is liable to receive from the lower animals, and to communicate to them, certain diseases, as hydrophobia, small-pox, the glanders, &c., a fact which he says proves the close similarity of their tissues and blood, both in minute structure and composition, far more plainly than does their comparison under the best microscope, or by the aid of the best chemical analysis.

He then goes on to point out that man and other animals are liable to be infected with parasites of the same genera or families; that there is the greatest similarity in the law of periodicity regulating several of their functions; and that the same remarkable resemblance occurs in their embryonic development, observing that the human embryo, at a very early period, can hardly be distinguished from that of other members of the vertebrate kingdom.

Having cited various authorities to prove the truth of the above statements, he observes that "the homological construction of the whole frame in the members of the same class is intelligible, if we admit their descent from a common progenitor, and that it is only our natural prejudice, and that arrogance which made our forefathers declare that they were descended from demigods, which leads us to demur to this conclusion;" and he finishes this, his introductory chapter, by saying that time will before long come, when it will be thought wonderful that naturalists, who were well acquainted with the comparative structure of man and other mammals, should have believed that each was the work of a separate act of creation. Having shown that there is no essential difference between man and the higher mammals in their corporeal organization, he then passes on to the consideration of the mental qualities, where, of course, a much wider gulf would be expected to exist; and even here, he points out that the germs of all our intellectual characteristics, and some of our moral, are to be found among the lower animals.

He argues that man and the higher animals, especially the primates, have the same senses, intuitions, and sensations; similar passions, affections, and emotions; that they feel wonder and curiosity; that they possess the same faculties of imitation, attention, memory, love, imagination, and even reason, though in different degrees. Having admitted that this difference is enormous, even if we compare the mind of one of the lowest savages, who has no words to express any number higher than four, and who uses no abstract terms for the commonest objects or affections, with that of the most highly organized ape, he insists, nevertheless, that the difference in mind between man and the higher animals, great as it is, is certainly one of *degree and not of kind*.

Having been engaged for some years past in studying the question of the localization of the Faculty of Speech, and believing that my published researches furnish a powerful and original argument against the doctrine of evolution, I trust I may, without presumption, be allowed to indulge the hope that I can furnish an additional and original argument against this dan-

gerous heresy, by showing that the possession of Articulate Language establishes a difference between man and animals, a difference not of degree only, but of kind.

I wish here to make a brief comment upon a most able notice of the "Descent of Man," which appeared in the *British Quarterly Review* for October, 1871. Agreeing as I do with the general tenor of the writer's remarks, I most entirely differ from him in one essential point. After disputing the truth of Mr. Darwin's assumed similarity between the minute structure of man and animals, he goes on to say, "If it could be shown that in their minute anatomy the tissues of an ape so closely resembled those of a dog on the one hand, and of a man on the other, as that they could not be distinguished by the microscope, the fact would be of the highest importance, and would add enormously to the evidence already adduced by Mr. Darwin." I cannot agree with the inference here drawn by the able reviewer, who seems to imply that Mr. Darwin's theory is unassailable if he can prove his assertion as to the close similarity in the minute structure of man and animals. I am ready to admit this similarity; I will even strengthen Mr. Darwin's position by remarking that we are unable by means of the microscope to distinguish human blood from that of other mammals; and further, that there is a remarkable correspondence in the vital properties of the blood of man and animals, as shown by the fact that in the case of apparent death in man from loss of blood, resuscitation has taken place in consequence of the transfusion into the system of the blood of an animal, as the sheep, or the calf. It is idle to attempt to shirk the import of these physiological results. I admit the force of them. But supposing it is proved to a mathematical demonstration that man is like an ape, bone for bone, muscle for muscle, nerve for nerve, what then? What does this prove, if it can be shown that man possesses a *distinctive attribute*, of which not a trace can be found in the ape, an attribute of such a nature as to create an immeasurable gulf between the two? This attribute I assert to be the faculty of Articulate Language, which I maintain to be a difference, *not only of degree, but of kind*.

I now propose very briefly to explain what I understand by the term faculty of language. I shall then inquire how far this faculty is shared by animals, and having shown that they do not possess it even in an elementary form, I shall then glance at the much-disputed question of the seat of language—the localization of the faculty of speech,—as I need not say, if it could be shown that language had a habitat in any particular part of the brain, the Darwinian could plead the structural analogy

between the brain of man and that of the ape, as a proof that the latter possessed the rudiments of speech in an undeveloped form.

Of all the branches of knowledge, there are none more interesting than the study of language. Man shares with animals the power of emitting sounds by means of an apparatus especially adapted for that purpose; sound being described as a particular movement of ponderable matter capable of affecting the organ of hearing. Man alone, however, possesses the power of regulating and systematizing these sounds, so as to transmit to others the impressions of his mind in the form of a language, which has been described as a sensible phenomenon by which thought becomes materialized. In fact, speech or language consists of a series of conventional sounds, which represent a meaning which the mind has previously attached to their expression. There are two distinct features in speech,—an act of the intelligence, and a sonorous mechanism. These have been termed *cognitive* and *executive*,—thought-speech and spoken-speech; the internal and external speech of M. Bouillaud. Here I would remark that it is important not to confound the faculty of *articulate* language with the *general* faculty of language, and Professor Broca's remarks on this subject are so lucid and terse that I cannot do better than transcribe them:—"There are several kinds of language; every system of signs which permits the expression of ideas in a manner more or less intelligible, more or less complete, or more or less rapid, is a language in the general sense of the word: thus speech, mimicry, dactylogy, writing both hieroglyphic and phonetic, are so many kinds of language. There is a general faculty of language which presides over all these modes of expression of thought, and which may be defined, the faculty of establishing a constant relation between an idea and a sign, be this sign a sound, a gesture, a figure, or a drawing of any kind."

Here we must inquire whether language is the exclusive prerogative of man? Some would answer this question in the negative, and M. Lemoine, in a highly philosophical treatise, entitled "*La Physiognomie et la Parole*," devotes a chapter to *Le Langage des Bêtes*, and a celebrated French anthropologist, M. Coudereau, maintains that man is not alone in possessing a language; that all species of animals possess one, varied, but sufficient to express their ideas. He further says that "man acquires the faculty of speech by his memory, labour, and imitation,—the parrot does no more. From a linguistic standpoint, this faculty is in its nature identical in man and animals;

man can articulate sounds, other animals can imitate sounds as well as he can. He presents simply, in this respect, a greater development of a faculty common to all social animals."

Mr. Darwin, whilst admitting that language has justly been considered as one of the chief distinctions between man and the lower animals, quoting Archbishop Whately, says: "Man is not the only animal that can make use of language to express what is passing in his mind, and that can understand more or less what is expressed by another." Mr. Darwin says man uses, in common with the lower animals, inarticulate cries to express his meaning, aided by gestures and the movement of the muscles of the face, and he doubts not "that language owes its origin to the imitation and modification, aided by signs and gestures, of various natural sounds, the voices of other animals, and man's instinctive cries." He suggests the probability that "primæval man, or rather some early progenitor of man, used his voice largely, as does one of the gibbon apes at the present day, in producing true musical cadences—that is, singing;" and it does not appear to him altogether incredible, that "some unusually wise ape-like animal should have thought of imitating the growl of a beast of prey, so as to indicate to his fellow-monkeys the nature of the expected danger; and this would have been a first step in the formation of a language"! A writer in the *Edinburgh Review*, commenting upon the above passage, asks for the evidence that at the present day some unusually wise ape has ever been known to imitate the cry of a wild beast, so as to indicate its presence to its fellows. Further, Mr. Darwin says that the sounds uttered by birds offer in several respects the nearest analogy to language, and he lays great stress upon the fact that parrots can talk. Now, I maintain that the so-called talking of the parrot is not articulate language, it is merely the result of a remarkable power of imitation possessed by that bird, which faculty of imitation can exist in the human subject after the power of language has ceased. The following case observed by myself will illustrate my meaning:—During a recent visit to La Salpêtrière, an institution in Paris for the reception of female patients for the most part afflicted with some mental disorder, the physician, Dr. Auguste Voisin, knowing I was interested in the question of language, called my attention to the case of an old woman in whom the faculty of speech was completely suspended, but who, although she never spoke, repeated like a parrot all that was said before her. For instance, Dr. Voisin addressed her thus:—"Voulez-vous manger aujourd'hui?" She said instantly, "Voulez-vous manger aujourd'hui?" I then said to her, "Quel âge avez-vous?"

She replied, "Quel âge avez-vous?" I then said to her in English, "You are a bad woman." She instantly replied, "You are a bad woman." I said, "Sprechen sie Deutsch?" She retorted, "Sprechen sie Deutsch?" In the words that she thus echoed, her articulation was distinct, although the foreign phrases were not repeated by her in quite so intelligible a manner as the French. Not only did this woman echo all that was said, but she imitated every gesture of those around her. One of the pupils made a grimace; she instantly distorted her facial lineaments in precisely the same manner. Another pupil made the peculiar defiant action, common in schoolboys, of putting the thumb to the nose and extending all the fingers, called in French, *pied de nez*. The patient instantly imitated this elegant performance. Just as we were leaving her bedside, a patient in an adjoining bed coughed; the cough was instantly imitated by this human parrot! In fact, this singular old woman repeated everything that was said to her, whether in an interrogative form or not; and she imitated every act that was done before her, and that with the most extraordinary exactitude and precision.

I have mentioned this case to show that the faculty of imitation seems to be independent of that of speech. The parrot may be taught automatically to do, in an imperfect degree, what this old woman did, but that does not imply the possession of language.

I would ask of those gentlemen who attach so much importance to pantomimic expression, and to the power of imitation possessed by certain animals, why it is that, under the influence of domestication, no monkey or parrot has ever evolved for itself an articulate language? The parrot and the monkey probably possessed the same power of imitation 3,000 years ago, and yet we see no probability of its gradual development into a more decided form of expression. I believe with Max Müller, that "speech is the one great barrier between the brute and man, and that no process of natural selection will ever distil significant words out of the notes of birds or the cries of beasts. Language is our Rubicon, and no brute will dare to pass it."

THE SEAT OF SPEECH.

Having defined what is meant by the faculty of language, I now proceed to review very briefly the various theories which have been from time to time promulgated as to the seat of Articulate Language; but before doing this, it is imperative that I should trouble you with a few anatomical details, for the better understanding of my subject, as I am justified in

assuming that a portion at least of my audience may be but imperfectly acquainted with the main divisions of the brain.

The encephalon is a collective term, which signifies those parts of the nervous system which are contained in the cranium ; viz., the cerebrum, or brain proper, the cerebellum, and the medulla oblongata. The cerebrum is by far the largest portion of the encephalon, and consists of two lateral halves called *hemispheres*, each hemisphere being subdivided into three *lobes*,—anterior, middle, and posterior. The hemispheres present upon their surface numerous smooth and tortuous eminences called convolutions, which have received special names, those only which concern my subject being the frontal convolutions, which are known as first, second, and third frontal. Of the cerebellum I need say nothing,—it has no reference to the subject of my remarks. The medulla oblongata is that part of the encephalon which is placed immediately above the spinal cord, forming the bond of union between it and the brain. It is divided into two lateral columns, which are themselves subdivided into three smaller cords, called the pyramidal, olivary, and restiform bodies.

The ancients seem to have possessed the most crude notions of the functions of the brain, as evidenced by Hippocrates' assigning the seat of the mind to the left ventricle, and by Aristotle also placing the sensorium commune in the heart. In later times the brain has been universally considered to be the organ of thought and intelligence ; but opinions have been, and are still, divided as to whether it is to be regarded as a single organ, or as consisting of a series of distinct organs, each endowed with a special and independent function ; whether, in fact, the phenomena of intelligence are due to an action of the brain as a whole, or whether the different psychological elements which constitute them are connected with isolated and circumscribed parts of the encephalon. Out of this last theory has arisen the principle of the localization of the cerebral faculties, which was, in the early part of the 19th century, announced in a definite form by Gall, who divided the brain into organs endowed with primordial faculties, distinct the one from the other. Gall was the first to attempt to connect the seat of language with any definite portion of the cerebro-spinal centre, by asserting that there was a special organ for language, which, according to him, was placed in those convolutions of the anterior lobes of the brain, which rest upon the posterior part of the supra-orbital plates, or, in other words, upon the roof of the orbit.

This is not the time or place to make more than a passing

allusion to Gall's views, as they have not met with anything like general acceptance; but although his conclusions must be considered in many instances arbitrary and hypothetical, still I would say, "Let not the spark be lost in the flame it has served to kindle," for, in spite of all that has been said against Gall and all that has been written in depreciation of his labours, beyond all doubt his researches gave an impulse to the cerebral localization of our faculties, the effect of which is especially visible in our own days; and I look upon his work as an imperishable monument to the genius and industry of one of the greatest philosophers of the present age.

Gall's labours would undoubtedly have met with a more hearty recognition from his contemporaries, had not the Austrian priesthood raised the cry of "*materialism*" as applied to his doctrines. The great German psychologist had no such heterodox notions as his adversaries maliciously attributed to him, for, as Hufeland philosophically observes, "he was employed in analyzing the dust of the earth of which man is formed, not the breath of life which was breathed into his nostrils."

As in Gall's days so in ours, this very indefinite and unmeaning word "*materialism*" is used as a kind of psychological scarecrow, to frighten all those who are endeavouring to trace the connection between matter and mind. Surely there is nothing contrary to sound theology in assigning certain attributes or functions of an intellectual order to certain parts of our nervous centre; the cerebral localization of our divers faculties, and the plurality of our cerebral organs, strike no blow at the great principle of the moral unity of man. The same power that caused the earth, "like a spark from the incandescent mass of unformed matter, hammered from the anvil of Omnipotence, to be smitten off into space," this same power, surely, could just as well ordain that a multiplicity of organs should be necessary to the full development of man's mental faculties, as that the manifestation of them should depend upon the integrity of one single organ.

Although not the next theory in chronological order, it is convenient here to make a passing allusion to the views of a Dutch physiologist, Professor Schröder Van Der Kolk, who placed the seat of speech in the olivary bodies. Besides citing numerous cases in illustration of his hypothesis, he gives an *à priori* reason for his theory in the fact, that the olivary bodies occur only in mammalia; that, on comparing these organs as occurring in mammals themselves, they are most developed in man, and that in the higher mammalia, as the ape, they are most like those in man. This hypothesis, which has never met with

much support, has been rejected by most physiologists of the present day.*

I now arrive at the consideration of certain theories which will demand a much more minute examination, as having a more direct reference to the objects of this Institute,—I mean those which locate speech in the anterior lobes of the brain, or in some particular fold of these lobes.

As far back as 1825, Professor Bouillaud placed the faculty of articulation in the anterior lobes of the brain, which he considered to be the organs of the formation of words and of memory; and he stated that the exercise of thought demanded the integrity of these lobes. He supported his position by reference to 114 cases in which loss or impairment of speech coincided with disease of the anterior lobes. Such was M. Bouillaud's confidence in his theory, that he offered a prize of 500 francs for any well-authenticated case in which the two anterior lobes were destroyed, or more or less seriously injured, without speech being affected. This challenge remained unaccepted for many years, till the occurrence of a celebrated discussion on the seat of language, at the Academy of Medicine of Paris, when M. Velpeau said he should claim the prize on the faith of the following case observed by himself.

In the month of March, 1843, a barber, sixty years of age, came under M. Velpeau's care for disease of the prostate gland. With the exception of his prostatic disorder, he seemed to be in excellent health, was very lively, cheerful, full of repartee, and evidently in possession of all his faculties; one remarkable symptom in his case being his *intolerable loquacity*. A *greater chatterer never existed*, and on more than one occasion complaints were made by the other patients of this talkative neighbour, who allowed them rest neither night nor day. A few days after admission this man died suddenly, and a careful autopsy was made. On opening the cranium, a cancerous tumour was found, which had taken the place of the two anterior lobes! Here then was a man, who, up to the time of his death, presented no symptom whatever of cerebral disease, who, far from having any lesion of the faculty of speech, was *unusually loquacious*, and who, for a long period prior to his decease, must have had a most grave disease of the brain, which had destroyed a great part of the anterior lobes.

Surely this case alone, recorded by such a high authority as M. Velpeau, ought to be sufficient utterly to subvert the theory

* The comparative value of this and the various other theories as to the Seat of Speech, are fully discussed in the author's work "On Aphasia, or Loss of Speech, and the Localization of the Faculty of Articulate Language." Churchill & Sons, 1870.

of the localization of speech in the anterior lobes; but I have still further evidence to adduce. M. Peter has recorded the case of a man who fractured his skull by a fall from a horse. After recovery from the initial stupor there succeeded a *remarkable loquacity*, although after death it was found that the two frontal lobes of the brain were reduced to a pulp (*réduits en bouillie*). Again, Professor Trousseau relates that in the year 1825, two officers quartered at Tours quarrelled, and satisfied their honour by a duel, as a result of which, one of them received a ball which entered at one temple and made its exit at the other. The patient survived six months without any sign of lesion of articulation, nor was there the least hesitation in the expression of his thoughts till the supervention of inflammation of the central substance, which occurred shortly before his death, when it was ascertained that the ball had traversed the two anterior lobes at their centre.

Here are three cases in which the two anterior lobes, the presumed seat of speech, according to Bouillaud, were both destroyed or very extensively injured. What does a conscientious analysis of them teach us? In M. Peter's case we have seen that speech was preserved, although both frontal lobes were reduced to a jelly; in Professor Trousseau's case, a ball had traversed the two anterior lobes at their centre, entering at one temple, and making its exit at the other, and speech was also unaffected; whilst in the third case, that of M. Velpeau, although a tumour had actually taken the place of the two anterior lobes, instead of being speechless, the man was remarkably loquacious.

These three cases, to which I could add others, seem to me to upset M. Bouillaud's theory, by showing that a profound lesion may exist in both anterior lobes without impairment of articulate language.

The next theory for brief consideration is that of M. Dax, who placed the seat of speech in the left hemisphere, to the exclusion of the right. The brain, as a whole, has hitherto been considered as a symmetrical organ, even by those who regarded it as an assemblage of lesser organs arranged in pairs with corresponding functions. M. Dax, however, assigns a function to the left hemisphere, which, according to him, is not shared by the right. Without entering into any details, I will just mention three cases, which prove the untenability of M. Dax's views, these cases being recorded by French physicians of great eminence. It will be observed that I have drawn most largely upon French literature, for our Gallic neighbours have been most indefatigable workers in the field of observation with

which we are just now interested. M. Maximin Legrand has related the history of a man who was shot in the head during the revolution of 1848, and whose speech was not in the least affected, although after death it was ascertained that the left anterior lobe had been shattered by the discharge of a gun. M. Béclard has published a case of a patient whose speech remained unaffected to the last, although it was found that all the left hemisphere was reduced to a pulp. Lastly, M. Lelut, one of the most uncompromising opponents of cerebral localization, has recorded the case of an epileptic, who retained his speech in its integrity to the last moment, although his entire left hemisphere was completely disorganized.

There is also another class of observations which seems to me to be irreconcilable with M. Dax's unilateral theory, for there exists a certain number of carefully recorded cases in which loss of language occurred, although the disease was limited to the right hemisphere. It will strike you, perhaps, that it is somewhat supererogatory to adduce evidence to show that language is not located in the *left* anterior lobe, for it must be apparent that the instances previously mentioned of destruction of *both* anterior lobes, with preservation of the power of speech, apply equally to the unilateral theory I am now discussing. My sketch, however, of the various theories about the seat of language would be incomplete without a reference to that of M. Dax.

Having disposed of the theories which locate the faculty of language in one or both anterior lobes, I arrived at the consideration of the views of Professor Broca, the perpetual secretary of the Anthropological Society of Paris, whose researches lead him to confine the seat of speech to a very narrow limit, a particular fold of the left anterior lobe, called the *third left frontal convolution*. Of all the theories that have been advanced, this least of all will stand the test of an impartial scrutiny, and evidence is daily accumulating of such a nature as to undermine M. Broca's position at every point. In my published work I have discussed the value of this theory at considerable length; I will simply state here that I have myself met with cases of loss or impairment of language in which this particular fold was found quite healthy; furthermore, one case has been observed by M. Moreau, of Tours, in which this convolution was *congenitally absent*, and yet the patient showed no symptom of loss of language. Now, I need not dwell further on this hypothesis, for it must be apparent to everybody that the cases I have quoted of destruction of the anterior lobes apply equally, or I may say *à fortiori*, to this theory; for, what proves the greater proves the less; and it is not conceivable that M. Broca's pet fold can have escaped

injury amid the general destruction caused by the lesions described. I cannot dismiss this hypothesis without calling attention to the confirmation that would be given to Mr. Darwin's views if M. Broca's theory were correct, and this particular fold could be shown to be the seat of speech in man. And here I must call attention to the comparison which Carl Vogt makes between our quadrumanous cousins and ourselves. According to this distinguished naturalist, the apes have an extremely imperfect development of the third frontal convolution, and the same condition exists in the microcephali; therefore, he says, as neither apes nor microcephali can speak, Comparative Anatomy gives a subsidiary support to the theory which places speech in this convolution.

I have been in communication with Professor Vogt in reference to this subject, and he has kindly favoured me with his views, which I consider so extremely pertinent to our subject, that I shall give them in his own words, as contained in an autograph letter to myself.

The brain of man and that of apes, especially of the anthropoid apes (orang, chimpanzee, gorilla), are constructed absolutely upon the same type—a type by itself, and which is characterized, amongst other things, by the fissure of Sylvius, and by the manner in which the island of Reil is formed and covered; thus in man, the third frontal convolution is extraordinarily developed, and covers partly the insula, whilst the transverse central convolutions are of much less importance. In the ape, on the other hand, the third frontal convolution is but slightly developed, whilst the central transverse convolutions are very large.

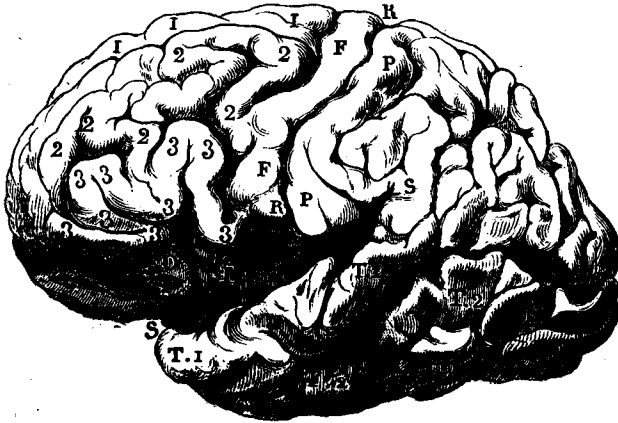
To show the bearing all this has upon the seat of speech, I would refer to the microcephali, who do not speak; they learn to repeat certain words like parrots, but they have no articulate language. Now, the microcephali have the same conformation of the third frontal convolution as apes; they are apes as far as the anterior portion of their brain is concerned. Thus, man speaks; apes and microcephali do not speak. Certain observations have been recorded which seem to place language in the part which is developed in man, and contracted in the microcephali and the ape; Comparative Anatomy, therefore, comes in aid of M. Broca's doctrine.

I have reason to believe that these views of Professor Vogt are not very generally known in this country; and I need hardly allude to the extremely important bearing they have upon the question at issue; for if Professor Broca's theory could be proved to be correct,—that this third frontal convolution is the seat of human speech,—a strong argument could be adduced in favour of Darwinism. It might be said the ape possessed the rudiments of speech in an undeveloped form, and that in subse-

quent generations, by the process of evolution, this fold would become more developed, and the ape would speak; in fact, would become a man! As, however, this fold has *not* been proved to be the seat of speech in man, the Darwinian argument from analogy of structure falls to the ground, and speech remains a barrier the brute is not destined to pass.

ENGRAVING OF THE CONVEX SURFACE OF THE LEFT HEMISPHERE.

Showing the Disposition and Arrangement of the Cerebral Convolutions.



The above engraving is the same as that used to illustrate the author's work on Aphasia. It is from a cast kindly sent to Dr. Bateman by his friend, Professor Broca, of Paris.

The anterior lobe is that portion of the hemisphere which is bounded behind by R R, the fissure of Rolando, and below by S S, the fissure of Sylvius.

F F, transverse frontal convolution.

P P, transverse parietal convolution.

O O, the orbital convolutions, where Gall placed the organ of language.

1, 2, 3, first, second, and third frontal convolutions. The third frontal is the convolution alluded to by Carl Vogt as being very slightly developed in the ape and in the microcephali, and it is in the posterior part of this fold that Professor Broca has located the faculty of speech.

T. 1, T. 2.—First and second temporo-sphenoidal convolutions.

I, Island of Reil (the superior and inferior marginal convolutions are represented as being drawn asunder so as to expose it).

The object of my paper to-night has been to test Darwinism by recent researches in reference to the faculty of *Articulate Language*.

My first point has been to show, and I must leave it to you to judge how far I have succeeded in showing, that animals do not possess a trace of *articulate* language, and therefore that this faculty establishes a difference not of *degree* but of *kind* between them and man, and I need not remind you how much stress Mr. Darwin lays upon the difference of *kind* in contradistinction to that of *degree*.

I have then thought it imperative to enter fully into the much-vexed question of the Localization of Speech; for as the remarkable similarity between the brain of man and that of the ape cannot be disputed, if the seat of human speech could be positively traced to any particular part of the brain, the Darwinian could say that although the ape could not speak, he possessed the *germ* of that faculty, and that in subsequent generations, by the process of evolution, the "*speech centre*" would become more developed, and the ape would then speak.

I have endeavoured, however imperfectly, to show that none of the various theories as to the seat of language will stand the test of an impartial scrutiny. I have shown, and that upon the most indisputable authority, that persons could talk when the *presumed* seat of speech was invaded by an enormous tumour, completely disorganized by disease, or destroyed by a pistol-shot!

With these facts before me, I am tempted to ask whether speech, like the soul, may not be an attribute, the comprehension of which is beyond the limits of our finite minds?

When we talk about the faculty of speech, have we any clear and definite notions as to what we mean? Does the loss of it necessarily imply organic lesion of structure—*material damage*?* If it were so, how can we account for the cases recorded in which restoration of the power of speech was due to the effect of a severe mental shock?

We are all familiar with the story in Herodotus of the son of Cræsus, who had never been known to speak, but who, at the siege of Sardis, being overcome with astonishment and terror at seeing the king, his father, in danger of being killed by a Persian soldier, exclaimed aloud, "Ἀνθρώπε, μὴ κτεῖνε Κροῖσον"—Oh man! do not kill Cræsus. This was the first time he had ever articulated, but he retained the faculty of speech from this event as long as he lived. Herodotus is universally admitted to be a trustworthy historian; but if it be thought far-

* For a more complete answer to this question, the author refers to his published work "On Aphasia," page 173.

fetched to illustrate a subject by allusion to a work written 500 years before the Christian era, I may add that such cases have been met with by modern observers. My friend Mr. Dunn has recorded a similar one, and I myself was recently requested to see a man who had suddenly become speechless. The suspension of the power of speech was unaccompanied by any symptom of paralysis, and the loss of the faculty of articulate language continued for six days, when, being asleep on his couch, he suddenly started up, and was heard to say three times, "A man in the river!" From this moment speech was restored, and when I saw him an hour afterwards, he told me that he had dreamed that a man was falling into the river. The mental shock produced by this dream was salutary, for it resuscitated the previously dormant faculty of articulate language.

Surely we cannot, for one moment, assume that in these cases there can have been any structural lesion of the brain, any *material* damage.

But I may be told,—granted the truth of your statements, surely you must admit that man speaks by and through his brain. Most assuredly I do. I admit that a certain normal and healthy state of cerebral tissue is necessary for the exterior manifestation of the faculty of speech, but that is a very different thing from saying that speech is located in this or that particular portion of the brain. Permit me to illustrate what I mean by an allusion to a passage in Plato's celebrated dialogue on the Immortality of the Soul, where a disputant with Socrates inquires if the soul is not like the harmony of a lyre, more beautiful, more divine than the lyre itself, but yet is nothing without the lyre, vanishing when this instrument is broken. For the word *soul*, substitute *speech*, and for *lyre*, substitute *brain*. The instrument, *i. e.* the brain, may be damaged, and speech may become impossible, but that does not constitute the brain the *seat* of speech, although it is undoubtedly the instrument by which this attribute becomes externally manifested.

In conclusion, I desire it to be distinctly understood that I deprecate all idea of dogmatically urging my views upon this Society. I wish also to repeat that I entertain no preconceived hostility, no prejudice whatever, against Mr. Darwin, and I most certainly decline to be classed among those who would reject the doctrine of evolution simply from any fancied notion that its adoption is derogatory to man's position in the scheme of nature. Nor should I reject it on the ground of any antagonism between it and the power of the Deity, for the same Power that planned the glorious temple of Nature, which has "the earth for its emerald floor; its roof the sapphire

firmament; the sun and stars its pendent lamps; its music the murmur of streams, the pealing thunder, and the everlasting roar of ocean;"—I say this same Power could easily have caused us to pass through the probationary stages of ascidian, fish, reptile, monkey, and on to man, *if it had so willed it*; but as science has failed to show that it is so, I pin my faith to the story in the grand old book, which tells us that man was created in the divine image, and I accept the tradition that Man sprang *as Man* direct from the hands of his God.

Physiologists of every clime have for years been trying to connect the faculty of speech with some definite portion of the brain, with what result my preceding remarks will have shown. If the scalpel of the anatomist has failed to discover a *material locus habitandi* for man's proud prerogative,—the faculty of *Articulate Language*; if science has failed to trace speech to a "*material centre*," has failed thus to connect matter with mind, I submit that speech is the barrier between man and animals, establishing between them a difference not only of *degree* but of *kind*; the Darwinian analogy between the brain of man and that of his reputed ancestor, the ape, loses all its force, whilst the common belief in the Mosaic account of the origin of man is strengthened.

A discussion ensued, in which the Rev. J. W. Buckley, Mr. R. Dunn, the Revs. Dr. Barkley, J. H. Titcomb, J. Hill, D.D., V. Edwards, and R. B. Girdlestone; Mr. E. Haughton, M.D., Mr. J. A. Fraser, M.D., Mr. Hayward, and Capt. F. Petrie took part. Dr. Bateman having replied, the Meeting was then adjourned.

APPENDIX.

A LONG public controversy upon the foregoing paper having arisen outside the Victoria Institute, I venture to ask permission to refer to the main arguments of those who have taken up views opposite to my own, and to say a few words in reply. It has appeared strange that several who have taken part in that controversy should seemingly, and without sufficient warrant, claim for man a descent from the anthropoid ape, and with an ardour reminding one of those who, in former days, strove with so much anxiety to trace their ancestry to some on the roll of Battle Abbey. Whilst acknowledging the earnestness of my opponents, I cannot see that they have in the smallest degree weakened the position taken up in my paper, which was, that in language we possessed a difference of *kind* between Man and the Ape, which Mr. Darwin asserts his inability to find.

My first opponent enters the list with the assertion that language is not an attribute *universally* belonging to the human race, and that there are tribes of savages who have "*nothing of the kind*," adding, that if such be the case, "Dr. Bateman's argument falls to the ground." Of course it does, and I stake my anti-Darwinian position upon the point thus raised. Let us see what he advances in favour of his theory. He refers me to a well-known book of travel, the "*Voyage in the Beagle*," where it is stated that the Fuegian savages can only *cluck* like a hen. Now, I have referred to the passage to which my attention is called, and I find that this description of the Fuegian savages is by Mr. Darwin himself, who was the naturalist to the expedition in which the *Beagle* was engaged. From Mr. Darwin's account of this singular race, it is evident that they *did* possess articulate speech, for although they gave no evidence of conversational powers, Mr. Darwin says, "They could repeat with perfect correctness each word in the sentence addressed to them, and they remembered such words for some time." Hence it is evident that they possessed the faculty of language, although in an imperfectly developed form. Now these Fuegians are described in "*The Descent of Man*," as ranking amongst the lowest barbarians; the lowest barbarians, therefore, not only possess the power of speech, but are capable of even learning a foreign tongue, for those brought over to England in the *Beagle* are actually described as being able to talk a little English.* The acquisition of articulate language is, in a great measure, the result of imita-

* "*Narrative of the Surveying Voyages of the Adventure and Beagle*," vol. ii. pp. 2, 121, and 189.

tion. Bring a Fuegian to England, and give him time, and he will talk. Put a monkey under training for any number of years, and he will never evince the slightest capacity for the acquisition of language.

In a short reply to this opponent, I pointed out the palpable error as to his statement about the Fuegians. In a subsequent letter he alluded to "the immense amount of evidence we possess which proves that many tribes of savages do exist who do not possess articulate speech;" and supported this statement by a reference to the Veddahs of Ceylon, described in Tylor's "Early History of Mankind." Now, on referring to page 77 of this interesting book, I find the paragraph which has misled my opponent, who evidently quotes only as far as suits his purpose, for if he had turned over another leaf, at page 78, he would then have found that Mr. Tylor totally denies the accuracy of the statement that the Veddahs have no language, and does this by combating the very paragraph which my opponent quoted, as will be seen by the following extract :—

"Mr. Mercer seems to have adopted the common view of foreigners about the Veddahs, but it has happened here, as in many other accounts of savage tribes, that closer acquaintance has shown them to have been wrongly accused. Mr. Bailey, who has had good opportunities of studying them, contradicts their supposed deficiency in language, with the remark that he never knew one of them at a loss for words sufficiently intelligible to convey his meaning, not to his fellows only, but to the Singhalese of the neighbourhood, who are all more or less acquainted with the Veddah patois."

This question as to whether language is an attribute universally possessed by the human race, is such an important one, as far as the present controversy is concerned, that I wished to corroborate my views by an appeal to the distinguished African traveller, the Rev. Dr. Moffatt, whose long residence amongst savage tribes renders his testimony peculiarly valuable, and his opinion is so decided in reference to the particular point we are now discussing, that I think it well to insert his letter.

"Brixton, June 13th, 1872.

"DEAR DR. BATEMAN,—With regard to speech being the dividing point between man and the brute, I perfectly agree with you. This barrier has never been, nor ever can be overleaped, and it appears to me extraordinary that any one can think otherwise. I have had much intercourse with the bushmen in the interior of South Africa, and they may be set down as the lowest grade of humanity in that country. In some respects their language has a resemblance to the clicking language of the Hottentots. When taken into service they readily learn to speak fluently the languages of English, Dutch, and Sechuana. They are certainly the most degraded race to be found in the interior. Villages, folds, or flock, they have none, but move about in search of game, roots, wild honey, and are emphatically children of the desert.

"Of all the reports I ever heard respecting interior tribes, I never found that the idea was ever entertained that human beings existed that did not possess a language.

"By-and-by, when Dr. Livingstone shall arrive among us, he will no doubt tell us strange things; but nothing, I believe, that can possibly sanction Darwinism.—I am, my dear Sir, yours, &c.,

"ROBERT MOFFATT."

My next opponent asks me "to believe that language is in itself nothing save the expression of some thought?" Who denies this, and how does this discovery affect the question at issue? Further on he says, "the difference in *kind* between a man and a brute is not the *mode* of expression, but the thing

expressed—it is mind, not sound." Now, if it would afford him any gratification, I should be quite willing to make a concession to him, and to substitute the *indefinite* for the *definite* article, and to call language *a*, not *the*, difference of kind between man and animals. The fact that other differences of kind may exist does not in the least affect my position. But, in order to prove that mind is a difference of kind between man and the brute, he must prove that the latter has no trace whatever of mind. The elephant, who mortally crushes the boy, who, an hour before had pricked his trunk with a pin, connects a definite idea with a definite act; and the punishment he inflicts on the boy is evidently the result of a mental process. I maintain, therefore, that animals possess a *minimum* amount of mind, although in a state so rudimentary that all comparison with that of man is impossible. However much, therefore, I differ from Mr. Darwin's main theory, I am by no means prepared to dispute his statement that the difference in *mind* between man and the higher animals, great as it is, is certainly one of degree only, and not of kind.*

The question of the "*Missing Link*" was next introduced by a well-known geologist at Norwich (Mr. Harmer), who attempted to answer a great objection to the doctrine of evolution, which is "that none of the intermediate forms between man and his supposed progenitors are known to us, either in a living state or in a fossil condition." As this feature of the controversy is foreign to the object of my paper, I will not allude to it further than to say that Mr. Harmer's position was attacked, and his arguments successfully answered by the Rev. W. P. Lyon, the Rev. J. W. Buckley, and Captain F. Petrie.

One of the Norwich evolutionists complains that I use Scripture to refute Darwinism. I beg to say I do nothing of the kind, and there is nothing in my paper to justify such a construction. I use Science to show that language is the difference of *kind* between man and animals, which Mr. Darwin seems to stand in need of; and having, however imperfectly, combated his views from a linguistic point of view, I *incidentally* call attention to the fact that Science corroborates Holy Writ, just as Bishop Colenso and others contend that it controverts it. This is a very different thing from the illogical process imputed to me of bolstering up scientific views by appealing to the authority of Scripture.

In one or more of their letters, the evolutionists seem to deprecate any attempt to reconcile Science and Scripture. They willingly concede to the free-thinkers of the day the right to use Science for the purpose of subverting religion, but they look with a jealous eye upon those who seek to point out the analogy between the two. May I ask them what value they would attach to any work on the early history of our island, that contained no allusion to "Cæsar's Commentaries"; and, surely, it would be equally monstrous to consider any theory as to the origin of Man without, at least, a reference to the Book of Genesis,—the first, if not the only book, which professes to enlighten the human race as to its origin.

I doubt not that many of those who have differed from me are serious, thoughtful men, who would not knowingly propagate a dangerous doctrine; but I must think they cannot have realized the ultimate consequences of their proposal to ignore the Book of Genesis in any search after truth, simply because, in such a search, the aid of Science may also be required.

* If further evidence is required upon this point, I refer the reader to the *Transactions of the Victoria Institute*, vol. v. page 309, where he will find several facts recorded corroborative of my views that animals possess a minimum amount of Mind.

I am aware that it may be urged that the great truths of Scripture cannot be seriously affected by the evolution theory, since many sound theologians no longer contend for the literal and verbal inspiration of the Bible. Now, this is not a question of mere *verbal* accuracy. Darwinism is not merely inconsistent with this or that particular line or passage, but is incompatible with the whole spirit of the Bible, where at almost every page, the idea of a personal Creator is implied ; whereas the evolution theory abolishes all idea of creation in the ordinary sense of the term.

Did I not desire to avoid trespassing too much upon the space which has been so kindly accorded to me, I could strengthen my argument by quotations from Lord Chancellor Hatherley's last work, "The Continuity of Scripture," which book I recommend to the careful perusal of all those who are interested in this important subject.

ORDINARY MEETING, APRIL 1, 1872.

THE REV. C. A. ROW, M.A., IN THE CHAIR.

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

ASSOCIATES :—Rev. John George Francis Henry Knapp, A.C.K., Vicar of St. John's, Portsea ; William John Sheppard, Esq., 7, Addison Gardens, South Kensington, W. ; Mrs. Thomas Geldart, Bowdon, near Manchester.

Also, the presentation of the following works to the Library :—

“Proceedings of the Royal Society.” Part 132. *From the Society.*

Baird's “Cyclopædia of the Natural Sciences.”

From E. Haughton, Esq., M.D.

The following paper was then read by the Author :—

FORCE AND ITS MANIFESTATIONS. By the Rev. J. M'CANN, D.D., F.R.S.L., F.G.S., *Mem. Vict. Inst., &c.*

THE subject of the following paper may be thought, at first sight, not to harmonize with the objects for which this Institute has been established. It may be asked,—“What bearing has Force and its manifestations on the great truths revealed in Holy Scripture?” “How can a subject so exclusively physical be made to contribute its quota towards the defence of Christianity?” It might be replied that all truths are so connected together, that it is impossible to distort any one, without, in some measure, distorting the remainder. There are no parallel lines in the world of thought, all intersect somewhere; and, although the point of intersection may not immediately be discoverable, that it exists we may be well assured. Our Society has, therefore, wisely made it one object “to promote the real advancement of true science” by getting rid of “contradictions and conflicting hypotheses.” One aim of the present paper is to assist in this work by exposing the unscientific assumptions, the contradictory language, the illogical reasoning

and conflicting hypotheses, that some scientific men have been guilty of, in reference to Force, Energy, and Motion. This alone, if satisfactorily accomplished, were worth an effort; still that consideration only would not have induced me to enter the lists against such men as Tyndall, Thompson, Tait, &c., while other, and more apparently practical matters were demanding my immediate attention. The hypotheses of "the Conservation of Energy," and "the Perpetuity of Motion," are, however, not mere abstract reasonings, devoid of interest to the moralist or the theologian; but reasonings, if such they may be called, that would land him where he by no means wishes to go. In Biology they lead to Evolution, in Theology to Pantheism, in Philosophy to Materialism, and in Morals to Necessitarianism. A very few quotations will at once make it evident that these are the views and purposes of those also who teach these hypotheses, that they are not blind to the ultimate issue of their own teachings, but rather, perhaps, this foreseen issue may be one cause of their earnestness. Be this as it may, we must not blame them if we remain blind to the character of the abyss in which they would plunge us, for their statements are distinct enough. Mr. Herbert Spencer writes,— "If it can be shown that the persistence of Force is not a datum of consciousness; or if it can be shown that the several laws of Force above specified are not corollaries from it; then, indeed, it will be shown that the theory of Evolution has not the certainty here claimed for it. But nothing short of this can invalidate the general conclusions arrived at."* Again, on page 246 he writes,— "The continuity of Motion, like the indestructibility of Matter, is clearly an axiom underlying the very possibility of a rational theory of Evolution. That kind of change in the arrangement of parts, which we have found to constitute Evolution, could not be deductively explained were it possible for motion either to appear or disappear." He elsewhere carries out the hypothesis to its legitimate issue, and maintains that thought is nothing more than converted heat, or chemical affinity; a mere mode of motion. On page 280 of the "Principles" we read, "Various classes of facts thus unite to prove that the law of metamorphosis, which holds among the physical forces, holds equally between them and the mental forces. Those modes of the Unknowable which we call motion, heat, light, chemical affinity, &c., are alike transformable into each other, and into those modes of the Unknowable which we distinguish as sensation, emotion, thought: these, in their turns, being directly or indirectly re-

* "First Principles," p. 488.

transformable into the original shapes." In complete harmony with the foregoing, we find Mr. C. Bray stating that "the airs that man has given himself, and his assumption of superiority over all his brethren of the sentient creation, are a little ridiculous, viewed in this light of the persistence of force."* If the following be not Pantheism, we are at a loss to know what Pantheism can mean:—"We find, then, but one thing in the world—Force; and what is that? Force and Power are the same, and Power we cannot separate from that source of all Power,—from God,—Power is God. We say 'the Power of God,' as if it could be separated from Him, or delegated; but this is entirely inconceivable. The only one thing we find anywhere is God." The following can scarcely be classed under any of the heterodox isms with which we are familiar,—it sounds startling in the extreme; still, if energy persists, and motion never begins nor ends, it is a logical consequence, and fair statement of a universal fact. "Heat and electricity are constantly passing off from the body; *so is mind*. We influence every one and every *thing* about us, and are influenced by them. *We photograph our mental states on all the rooms we inhabit.*" If this be true, the walls of some rooms must have strange pictures latent on their surfaces,—the photographs on our own, for example, must be of a very conflicting character, seeing how diverse are the mental states occasionally found here. It is not, however, our purpose here to expose what we think are fallacies in the above specimens of that which we cannot believe to be sound philosophy, but only to justify the introduction of this subject to the Society, and to show how it is that we can quote the words of Dr. Bence Jones as expressing our own sentiments when he says, "I hold that the clearness and breadth or dimness and narrowness of our ideas regarding matter and force must constitute a good or a bad foundation of all the knowledge we possess, not only in medicine, but in every other science."

2. Physical science is at present in so chaotic a state in reference to the nature of Force and its manifestations, and the utterances of physicists are so contradictory and confused, that it is difficult, if not impossible, to arrive at any well-defined statement of the general hypotheses they desire to enforce. The only possible course, therefore, is to examine their separate utterances regarding Force, Energy, and Motion; expose their errors as we proceed; contrast these with our own belief; and finally criticise the assumptions in which they mostly agree. This course may

* "On Force and its Mental Correlates," p. 38.

entail a certain amount of repetition, but the complexity of the subject seems to render it almost inevitable.*

3. The vagueness in the use of the term "force" is acknowledged by Dr. Tyndall in these words:—"But ambiguity in the use of the term 'force' has been for some time more and more creeping upon us. We called the attraction of gravity a force without any reference to motion. We applied the term 'force' also to that molecular attraction which we called 'chemical affinity.' When, however, we spoke of the conservation of force in the case of elastic collision, we meant neither a pull nor a push, which, as just indicated, might be exerted upon inert matter, but we meant the *moving force*, if I may use the term, of the colliding masses." Force is here, consequently, applied in two wholly different senses, so that the reasoning applicable to it in the former sense would not be applicable to it in the latter. His general usage of the word, however, indicates that he considers it as energy, or working power; he is at liberty to use it as equivalent to energy, if he wishes; but not at the same time to use it without any reference to motion whatever.

4. Mr. Justice Grove is more satisfactory when he states that "the term Force, although used in very different senses by different authors, in its limited sense may be defined as that which produces or resists Motion." Again he says, "I therefore use the term Force, as meaning that active principle inseparable from matter which is supposed to induce its various changes." He here distinctly allows that matter invariably possesses a power of producing or resisting motion, which power he names Force. If this power be "inseparable" from matter, it cannot be transferred from one atom of matter to another; motion may be transferred, but not the power to produce the motion; that must remain invariably an attribute of all matter, according to his own acknowledgment. Yet we find him writing in a previous paragraph that it is an "irresistible inference from observed phenomena that a force cannot originate otherwise than by devolution from some pre-existing force or forces." If he mean by this that material powers are not self-originated, but are the result of volitional power or powers, he is consistent with himself, and states what we believe to be a fact; but if he mean that material powers in exercise are, necessarily in all cases, the devolution of pre-existing material powers, he is contradictory, because if matter can devolve this power to other matter, it is

* This subject has been treated in the *London Quarterly Review* for July, 1871, by the Rev. J. Moore, with his usual well-known ability, in an article on "The Heresies of Science," which ought to be earnestly studied by all who value Logic more than "Imagination" in Science.

separable from it, which he denies. True, he does not here use the word "power," in speaking of Force, but says "that which produces:" still he must mean power, because he does not believe matter or mind to be Force; but these are they that produce motion, and as they are not force, he can only mean that they possess the power to produce motion, which power is named Force. This is confirmed by another sentence, in which he says, "the term has a *potential* meaning, to depart from which would be to render language unintelligible."

5. Nevertheless, after having asserted that Force is a power, that it produces motion, is inseparable from matter, is an active principle, &c., he actually says that it is only an "abstract or generalized expression." These are wholly incompatible; a generalization cannot produce motion, and is not only separable from matter, but has no relation to it, being the product of mind alone. To call force a mere useful generalization, is to deprive it of all *potential* meaning, "and therefore to render his own language unintelligible;" he must consequently be understood as indicating by it "an active principle inseparable from matter."

6. Many writers agree with Mr. Grove in his statement that force is a generalized expression; that antecedence and consequence are all that can be predicated of phenomena, we adding nothing to our knowledge by the affirmation of power, or by saying that these phenomena are produced by something. Not to dwell on the fact that all their reasonings about the persistence of force, &c., are wholly inconsistent with this hypothesis, we feel at once its discordance with the utterances of consciousness. We are conscious of power in ourselves, the power to originate our own volitions. We cause, we produce, we call into existence that which but for our agency would not have existed. We are conscious that our volitions are not uncaused successive happenings in our mental history, but the immediate results of our own mental power. Power, therefore, is predicated of a conscious personal agent only. Hence it is that our first judgments of causation relate to ourselves originating our volitions. We are causes, our volitions are effects. All other effects produced by us are produced not immediately, as are our volitions, but mediately or instrumentally. Hence it is that our first judgment of secondary causation must refer to the relation between volition and some of its constituted sequents. Having gained the notion of power, in the consciousness of our self-personality, we then, in perfect accordance with a well-known law of thought, transfer this notion, first to our volitions, and ultimately to material realities. For example, before us is lying a quantity of gunpowder. Is not the con-

viction forced upon our minds that this substance possesses, by virtue of its constitution, power to produce certain effects?

7. But when power is predicated of anything but a person, we must never think that the power originates the effect or change, in the sense in which an intelligent agent originates his volition. We are, however, compelled to think that the volitions of agents supply the necessary *conditions* of the action of all secondary powers; and consequently all material changes, or exercises of power, must be referred back to the volition of an intelligent agent. We therefore define Force to be the power of originating or causing motion. Faraday seems to be, at first sight, in harmony with this when he says: "What I mean by the word 'force' is the source or sources of all possible actions of the particles or materials of the universe; being often called the powers of nature, when spoken of in respect of the different manners in which these effects are shown." This is capable of a great variety of meaning, accordingly as we understand the word "source." If by sources we mean volitions, in the sense just explained, he is correct; but if he mean, as we believe he does, pre-existing action only, he is not in accord with consciousness; for he would himself acknowledge that the will of God is the primary source of all possible actions; and, in accordance with that will, our volitions are sources also. He however says, "Force cannot act, then cease to act, then act, then cease to act, without being otherwise disposed of." Now, it is evident that force, according to his own definition, may act and then cease to act; for we can think the source of action either as producing action or as quiescent. We can think power either as exerted or as unexerted. We are therefore justified in affirming that motion may at any time be produced by matter, the necessary conditions being supplied; that the power to do this, called Force, has a real existence, and is not a fancy of the imagination, as Professor Tyndall would tell us, when he says that without imagination the "soul of force would be dislodged from our universe." If force be the soul of the material universe, it was not our imagination that placed it there, nor would it die though our imagination ceased to exist. Imagination may combine old experiences into new groupings; may from the quarry of memory draw the materials for a new building, but has no power to create both stone and structure. "The scientific use of the imagination" seems, however, to lead to very contradictory results, enough to sadly puzzle any student of physics, till he discover that they are only imaginary—the products of an imagination unscientifically misused. Dr. Tyndall, for example, teaches, as we have seen, that force is only an ideal thing—the product of a scientific use of 'he

imagination alone; while Faraday and others teach that the only actual existence is Force; matter, substance, and all the rest being the ideals. Professor Huxley crowns the whole, in the highest imaginative flight, by fancying that matter is not matter, and force is not force, but only "names for certain forms of consciousness" !

8. Some naturalists are never weary of sneering at philosophers and theologians, about the haziness of their theories, and the unscientific character of their teachings, and pointing to their own labours as the acme of perfection; but what have we here to induce us to forsake the old paths, and follow their guidance? One set asking us to believe that there is only matter, another that there is only force, and a third that there is neither matter nor force, but only consciousness. We beg to decline all their separate invitations for the reasons now to be assigned. After what has been said about Dr. Tyndall's hypothesis, we may pass on to the next, that Force is the only Existence. On this subject Faraday writes, "We know nothing about matter but its forces—nothing in the creation but the effect of these forces; further our sensations and perceptions are not fitted to carry us; all the rest, which we may conceive we know, is only imagination." He taught, also, that the ultimate atoms are only centres of force; or, in other words, that matter and force are one and the same. We must, however, be pardoned for saying that he seems exceedingly confused about the whole subject, because elsewhere he speaks of the "actions of particles." Now, it is an utter confusion of all language to speak of particles as immaterial: if we believe in particles we must believe in matter, for particles are particles of something; but to say that the something is force, would be a contradiction of terms. But even the very passage I have quoted overturns his own hypothesis; for if we grant, which we do not, that we know nothing of matter but its forces, still this allows that we do know the forces of *matter*, and so know matter by its forces. But we know matter by its qualities, as well as by its powers, especially by that of extension, which cannot be called a power. As Dr. Mayo wrote to Faraday, "The objection that silver must vanish if its forces are abstracted, may prove the necessity of forces to our conception of silver, but does not disprove the necessity of silver to our conception of its forces." To this we may add, that after the distinctive forces were abstracted, it might cease to exist as *silver*, but it would still exist as *matter*, possessing the quality of extension. Mr. Wallace takes up the strain, and strikes a higher note, affirming that "*matter* is essentially force, and nothing but force; is, in fact, philosophically inconceivable; and that force is will, and

nothing but will, and that the will of perhaps one Supreme Intelligence." He says, "It does not seem an improbable conclusion that all force may be will-force; and thus that the whole universe is not merely dependent on, but actually *is*, the will of higher intelligences, or of one Supreme Intelligence." We at once grant that the universe is the manifestation of the will of God, but is not that will itself, else it were God. He acknowledges that when we touch matter, we experience sensations of resistance, implying repulsive force; but what resists and what repels? According to him it is the will of God only: there is neither matter to resist, nor force to repel; there is nothing to touch, for God cannot be touched, and consequently there can be neither touch, repulsion, nor resistance; for God is a spirit, and these cannot be predicated of spirit. All material and all mental substances, in all their modes, are, according to Mr. Wallace, states of the Divine consciousness or will. Therefore no action can be wrong, for Divinity must be always right; no theory can be false, for Divinity must be always true. It matters not whether we believe in matter only, or in force only, or in will only; whether we be atheistic or theistic; whether we be followers of Moses or of Darwin, of Huxley or of his vehement partisans: we are all believing that which is absolutely true, for we are all the will of God; we are all one of God's states of existence. If this be not a fair inference, or rather unavoidable deduction, from Mr. Wallace's words, we will gladly retract when shown to be in error.

9. Very much in accordance with this is the teaching of Mr. C. Bray, who in his work on "Force and its Mental Correlates," says (p. 47), "Our faculties make us acquainted with qualities or attributes without ourselves, and we assume that these must be the qualities or attributes of *something*, and we have called it Matter; we have feelings and ideas, and we equally assume that they also must belong to something, and we call it Mind; but there is in reality nothing to which these mental and physical attributes belong,—they exist *per se* as force and its correlates. *There is nothing underlying phenomena—phenomena are correlates of force, and force is all.* When we speak of qualities, we indicate only how we are affected by force external." It does seem a very natural assumption that a quality is the quality of something. Mr. Bray acknowledges that we know qualities and attributes, but denies that they belong to anything; or, in other words, denies that they are qualities or attributes,—asserts, in fact, that we are acquainted with the non-existent. For to say that there is a quality, but nothing to possess a quality, is to deny the existence of the quality, as such. Again, he says, "We have feelings;" but there is no one to whom

the feelings belong. Who, then, are *we*? How can we "have," if we do not exist?—and Mr. Bray says we do not, for force is all. Had he said we *are* feelings, and feelings are force, and force is all, he would have been consistent; but, as it is, his language is meaningless. "Force is all;" that is the assumption; consequently, we are not we, for force is not personal—feelings are not feelings, for force is not conscious—ideas are not ideas, for force is not reflective—mental attributes are not mental attributes, for force has no mind; and so on with almost any quality or attribute that could be named. And this is the vaunted science of the nineteenth century, before which Moses must hide his diminished head!

10. Again he writes,—“We find, then, but one thing in the world—Force; and what is that? Force and Power are the same, and Power we cannot separate from that source of all power—from God; Power is God. We say ‘the power of God,’ as if it could be separated from him, or delegated; but this is clearly inconceivable. The one only thing we find anywhere is God.” It does not in the least follow that because we speak of the power of God, power can therefore be separated from God; we mean that it is an attribute of God, but is not itself God. When we speak of the thought of a man, we do not thereby imply that the thought may be separated from the man, even while he communicates it to others; and still less do we mean that the thought is the man.

11. According, however, to Mr. Bray, “Force is all,” and God is all. Consequently, Force and God are convertible terms. Force might be substituted for God in all worship, and all religions. His language, however, is so confused and contradictory, that it would be impossible to construct any consistent system from it, or rather it might be quoted in support of any conceivable system. In one place, he says that force is all; and then on the next page he speaks of “every atom pulling at every other atom.” In one place he says there is nothing underlying phenomena, and yet again speaks of an intelligent substance, which substance is atomic, which atoms are force. Such writing, while it does not need refutation, does need exposure.

12. The utterances of Professor Huxley on this point are not much more satisfactory, although they do cut away all the ground from Materialism, properly so called. In his lecture on Descartes, he says,—“When the Materialists stray beyond the borders of their path, and begin to talk about there being nothing else in the universe but matter and force, and necessary laws, and all the rest of their ‘grenadiers,’ I decline to follow them. I remind you that we have already seen clearly and distinctly,

and in a manner which admits of no doubt, that all our knowledge is a knowledge of our states of consciousness. 'Matter' and 'Force' are, so far as we can know, mere names for certain forms of consciousness. . . . Thus it is an indisputable truth that what we call the material world is only known to us under the forms of the ideal world; and, as Descartes tells us, our knowledge of the soul is more intimate and certain than our knowledge of the body. If I say that impenetrability is a property of matter, all that I can really mean is that the consciousness I call extension, and the consciousness I call resistance, constantly accompany one another. Why and how they are thus related is a mystery. And if I say that thought is a property of matter, all that I can mean is that, actually or possibly, the consciousness of extension, and that of resistance accompany all other sorts of consciousness. But, as in the former case, why they are thus associated is an insoluble mystery."

13. The Professor, in the first place, here confuses knowledge and consciousness. As Mr. Moore expresses it,—“When the conscious certainty which accompanies a given thought is determined by the constituted laws of intelligence, that thought is a knowledge.” We know matter, force, extension, and resistance as externals to self, but we are not conscious of them. We are conscious 'only of thoughts, feelings, and volitions. It does not follow that our knowledge of soul is more intimate than our knowledge of body, because we are conscious of self, but not of matter; or because the material world is only known to us under the forms of the ideal world. Our knowledge of matter, with its powers and qualities, is as certain as our consciousness of self, because both are equally determined by the constituted laws of intelligence. I have as much right to deny the existence of self possessing the power of willing, as I have to deny the substantial existence of matter possessing the power called Force; that is, I have no logical right to deny either.

14. Professor Huxley's reasoning would land us in the purest idealism, absorbing matter, force, and even God himself; but a true philosophy of consciousness will save us from this most unscientific and undesirable result.

15. There may be some excuse for all this haziness of thought if Mr. Spencer's supposition be true,—that force, as the “ultimate of ultimates,” is especially inscrutable. No doubt, force in its ultimate nature is inscrutable, but not more so than any other power in existence. The only explanation we can give is, that they are all the result of the will of an Almighty Creator. But Mr. Spencer, like Professor Huxley, seems to confuse the facts of consciousness with the affirmations of our neces-

sary judgment, when he says,—"All other modes of consciousness are derivable from experiences of force; but experiences of force are not derivable from anything else." So far from this being the fact, experiences of force are not modes of consciousness at all: consciousness of power is one of its modes; but this precedes judgments in reference to "space, time, matter, and motion," and is not derived from them. He is nearer the mark when he says that "Force, as we know it, can be regarded only as a certain conditioned effect of the unconditioned cause." As a power of matter it is conditioned by the laws of matter; that is, by the rule of action of a voluntarily conditioned, but absolutely unconditioned lawgiver, or first cause. When these conditions are supplied, the power is exerted; when they are withheld, the power remains unexerted.

16. The next fallacy we meet with in this investigation is that force and motion are the same,—that the terms may be used indiscriminately. Light, heat, electricity, &c., are called physical forces; but they are also called modes of motion. This is too evidently the general teaching of the present day to need either proof or illustration. But it is fallacious; because, although force is a condition of motion, it cannot be resolved into motion. Force and motion are equally conditional. The original condition of force is volition; the condition of motion is force; but the conditions of a phenomenon must not be confounded with the phenomenon itself. This, however, is one of the commonest errors of our present physicists. For example, Mr. Grove says that "Sound is motion;" but, as Mr. Moore well points out, "Sound is not motion, but sound. A logical definition of sound is impossible. Mr. Grove forgets that each thing is itself, and not something else. We allow that the vibration of a sounding-board is a constituted condition of the existence of sound. We also admit that the undulations of the atmosphere, or of some other medium, are necessary to our perception of sound." But we are as fully justified in asserting that the form of the undulation is sound as that the motion is. Motion is motion, and not force, although it is the result of force.

17. Mr. Grove further observes that "we now so readily resolve sound into motion that to those who are familiar with acoustics the phenomena of sound immediately present to the mind the idea of motion,—*i. e.*, motion of ordinary matter." The latter portion of this is quite correct: knowing the conditions of sound, when we hear any, there arises to the mind, by the ordinary laws of association, the idea of motion; but that is not by any means resolving sound into motion. When I eat an

orange, if not wholly absorbed by the delicacy of its fragrance, I may think of a ship; because in an island where they do not grow, a ship is a necessary condition to the presence of an orange; but would any one ever dream therefore of saying that an orange was a ship, or a ship was an orange? In both cases there is equally a confounding of things that differ.

18. He also says that motion is the most obvious of all the affections of matter; but force, as force, is not obvious at all. Again, he says, "Visible motion, or relative change of position in space, is a phenomenon so obvious to simple apprehension, that to attempt to define it would be to render it more obscure." Yet he does define it as "relative change of position;" but what is it that is changed in position? We cannot predicate change of position of force alone. If there be motion, it must be motion of something; but force is not a thing. If we say that motion visibly manifests the exercise of force, all is clear; but when we confound force with motion, we are lost in a chaos of words.

19. Mr. Spencer attempts to overturn our definition of Force by stating that motion, so far from being distinctly conceivable, as Mr. Grove says, is altogether incomprehensible, and adduces a very peculiar illustration to prove his point:—

20. "A body impelled by the hand is clearly perceived to move, and to move in a definite direction; there seems at first sight no possibility of doubting that its motion is real, or that it is towards a given point. Yet it is quite easy to show that we not only may be, but usually are, quite wrong in both these judgments. Here, for instance, is a ship which, for simplicity's sake, we will suppose to be anchored at the equator with her head to the west. When the captain walked from stem to stern, in what direction does he move? East is the obvious answer; an answer which for the moment may pass without criticism. But now the anchor is heaved, and the vessel sails to the west with a velocity equal to that at which the captain walks. In what direction does he now move when he goes from stem to stern? You cannot say east, for the vessel is carrying him as fast towards the west as he walks to the east; and you cannot say west for the converse reason. In respect to surrounding space he is stationary; though to all on board the ship he seems to be moving. But, now, are we quite sure of this conclusion? Is he really stationary? When we take into account the earth's motion round its axis, we find that instead of being stationary he is travelling at the rate of 1,000 miles per hour to the east; so that neither the perception of one who looks at him, nor the inference of one who allows for the ship's motion, is anything like the truth. Nor, indeed, on further consideration shall we find this revised conclusion to be

much better. For we have forgotten to allow for the earth's motion in its orbit. This being some 68,000 miles per hour, it follows that, assuming that time to be midday, he is moving, not at the rate of 1,000 miles per hour to the east, but at the rate of 67,000 miles per hour to the west. Nay, not even now have we discovered the true rate and the true direction of his movement. With the earth's progress in its orbit, we have to join that of the whole solar system towards the constellation Hercules; and when we do this, we perceive that he is moving neither east nor west, but in a line inclined to the plane of the ecliptic, and at a velocity greater or less (according to the time of the year) than that above named. To which let us add, that were the dynamic arrangements of our sidereal system fully known to us, we should probably discover the direction and rate of his actual movement to differ considerably even from these. How illusive are our ideas of motion, is thus made sufficiently manifest. That which seems moving proves to be stationary; that which seems stationary proves to be moving; while that which we conclude to be going rapidly in one direction, turns out to be going much more rapidly in the opposite direction. And so we are taught that what we are conscious of is not the real motion of any object, either in its rate or direction; but merely its motion as measured from an assigned position,—either the position we ourselves occupy or some other. Yet in this very process of concluding that the motions we perceive are not the real motions, we tacitly assume that there are real motions.”*

21. I affirm that all the motions mentioned here are real motions, and not mere illusions, or apparent motions. They are, doubtless, motions in different directions, but not the less real on that account. It might be difficult to determine at any given moment the absolute positions of the ship, captain, and earth, in reference to some particular far-off world; but that difficulty is the result of their each moving at the same time. The captain, while walking the deck, may keep the same position relatively to an object on shore; but had he not been moving on the ship at the same time the ship was moving, on a moving earth, that relative position would have been at once altered. Mr. Spencer in his illustration makes very clear how difficult it would be to ascertain the rate at which any one of the objects moved, or the actual direction; but the fact of a real motion in some direction and at some rate is beyond all controversy. It is, no doubt, impossible to understand why a

* “First Principles,” p. 54.

body moves, if we ignore the will of God in the matter; but it is equally impossible, for me, at least, to understand, how any one can deny the fact.

22. Another term which may be briefly noticed before passing on is "Energy." This is sometimes spoken of as Force, at others as Motion, and again as Working Power. It is made to mean any or all of these; but usually it implies motion or working power; and in this sense we shall always refer to it. Whatever may be the views of most of our modern physicists on these minor points, they are generally united in upholding the great doctrine of the Conservation of Energy,—a doctrine which has been called one of the greatest discoveries of the nineteenth century,—a doctrine which has a very pretentious appearance at first sight, but which, when touched by the spear of sound logic and careful science, dwindles into a bundle of vague and unwarranted assumptions. The doctrine stated in its simplest form is, "that the sum of actual and potential energy in the world is constant."

23. The first assumption is that, motion, or energy, never begins. Thus Mr. Grove writes (p. 26), "With the perceptible phenomena of motion the mental conception has been invariably associated, to which I have before alluded, and to which the term force is given, the which conception, when we analyze it, refers us to some antecedent motion." Now, the mental conception of force does not refer to any antecedent motion, but to the power of originating motion. The statement here, however, is,—no motion without previous motion. Tyndall teaches the same, regarding it as a self-evident truth that "the cause of motion must itself be motion." He also asserts that "we can make no movement which is not accounted for by the contemporaneous extinction of some other movement." Yet, in opposition to this, he speaks of necessary as distinct from spontaneous action; the transformation as distinct from the creation of force. Dr. Bence Jones writes ("Croonian Lectures," p. 37), "According to modern ideas, the different forms (of energy) are so related to one another that none can be lost, and none can be produced except by passing into or out of some other form of energy." And Mr. Spencer, in still stronger terms, writes, "To think of motion as either being created or annihilated,—to think of nothing becoming something, or something becoming nothing,—is to establish in consciousness a relation between two terms, of which one is absent from consciousness, which is impossible. The very nature of intelligence negatives the supposition that motion can be conceived (much less known) to either commence or cease."

24. In reply to all this, we would ask why motion must be the

only cause of motion? I cannot imagine a reply; it seems a mere assumption, being unsupported by observation, as we shall see. What is the previous action in a case of "spontaneous action," or what the pre-existent force in a case of the "creation of force"? If Professor Tyndall confine his statement to necessary motion, we agree with him that we must seek for *some* cause antecedent to the motion, but not that the cause must be itself motion. We must, in a word, seek for an ultimate cause that is not motion,—for a power that can spontaneously move the not-self, itself remaining at rest; that is, we only explain motion when we refer it back to the will of God, or a sentient creature, who originated it. Mr. Spencer might also write as he does if motion were a substantial existence. He then, indeed, could say that to think of motion beginning would be to think of nothing becoming something; but when motion is only change of place of substance, to speak in this way is to misuse language. It seems strange that a scientific man should do so, for any one may, with the greatest ease, conceive motion both as commencing and ceasing. But not only is it a conceivable thought, it is also an observed fact, that motion begins. There is, for example, lying before me a heavy book, nicely balanced on the edge of the table; the slightest touch of my finger causes it to fall to the ground; and, striking other things as it descends, they also all fall with it. Before I touched the book, it and all the others were at rest, so far as the surrounding objects were concerned. I, in causing the fall, did not expend any appreciable muscular power, for contact was almost sufficient, and yet in the fall what motions were manifested? Where were they before the ponderous literature came crashing to the ground? Or take the well-known illustration of the ignition of gunpowder. There is a mine ready for explosion; a train is lying beneath my hand; I lower my finger and thumb half an inch, bring a spark into contact with the train; presently a terrific upheaval, and a mountain rolls like water into the valley beneath. How little was the motion that caused all this—the lowering of a finger half an inch; how great the motion thus produced, and yet we are to be told that the commencement of motion is inconceivable and untrue.

25. "Ah, yes," say our friends, "that is true, but you are not taking into account the potential energy stored up in the gunpowder before the spark was applied, the potential energy was great in amount, the kinetic or actual energy but little, but after the explosion the kinetic increased in the same proportion as the potential, or latent, decreased." This sounds plausible while we use the mystic word energy, but as it is motion with

which we are at present concerned, we shall use that word instead. The explanation then is this, that the amount of latent and actual motion before the explosion, was exactly equal to the amount after. That if we express the amount of latent motion before, by 9, and the actual by 1, we must, after the change, express the latent by 1, and the actual by 9. The phrase "latent motion" may appear so strange as to cause it to be doubted whether we are at liberty to use it. We must remember, however, that motion, energy, and working power are understood as interchangeable terms by most of the writers of whom I am speaking. Professor Tyndall, while calling heat a mode of motion, speaks of latent heat, that is a latent mode of motion. Latent motion, therefore, is motion at rest, remaining motion still. The apprehension of this is somewhat difficult, if not impossible. Power in exercise and power latent are perfectly comprehensible, but motion that is motionless is quite a different conception, if it may indeed be called a conception. Mr. Grove, in controverting the hypothesis of latent matter, in the material theory of heat, rightly asks, "Is not 'invisible light' a contradiction in terms? Has not light ever been regarded as that agent which affects our visual organs? Invisible light, then, is darkness; and if it exist, then is darkness light." In like manner I ask, is not motionless motion a contradiction in terms? Is it not rest? And if it exist, then is rest, motion? If rest and motion be one and the same; if matter always possess latent motion, when it has not actual, then, indeed, the explanation is sound,—the origination of motion is an absurdity. But if latent motion be not motion, but rest, then the explanation is the absurdity, and motion has a commencement. The statement that "throughout the universe the sum of these two energies is constant," has been shown by Sir John Herschel to be a mere truism, "whether expressed in so many words, or by saying that the potential together with the actual energy of the system is invariable; or, again, in other words, that when certain changes have taken place in the relative situations of the parts of the system, what it has lost in actual it has gained in potential energy." This must be evident to all; for if we are at liberty to say that the energy which has disappeared as actual still exists as potential; and that which comes into manifestation as actual, previously existed as potential, it follows as a matter of course, that the sum of the two must be always the same.

26. Putting aside this fiction of the hypothetical measurement of the unknown by the elimination of the known, the conservation of energy, motion, working power, is at once seen to have no existence. As Sir John Herschel says,—“No such conservation in the sense of an identity of total amount of energy

at all times and in all circumstances, in fact, exists." Having once assumed that motion never commences, another assumption naturally follows, *i.e.*, that motion never ceases. It may be lost to perception or measurement, may wholly change its modes, pass away from the earth altogether, but through space it will act for ever. Mr. Grove, in reference to this subject says,—"The term 'perpetual motion,' which I have not unfrequently employed in these pages, is itself equivocal. If the doctrines here advanced be well-founded, all motion is, in one sense, perpetual. In masses whose motion is stopped by mutual concussion, heat or motion of the particles is generated; and thus the motion continues, so that if we could venture to extend such thoughts to the universe, we should assume the same amount of motion affecting the same amount of matter for ever." There is no evidence possible that will justify us in extending such thoughts to the universe, and the assumption might be at once discarded. Perpetual motion we believe to be as baseless in a cosmical, as it is in a mechanical sense. The reason, however, why it is so tenaciously maintained is clearly stated by Mr. Spencer, and is seen to be not for the sake of the hypothesis in itself, but because it helps to support the theory of evolution. His words are,—“The continuity of motion, like the indestructibility of matter, is clearly an axiom underlying the very possibility of a rational theory of evolution. That kind of change in the arrangement of parts, which we have found to constitute evolution, could not be deductively explained, were it possible for motion either to appear or to disappear.” It has already been shown that it is possible for motion to appear; we have now also to show that it is possible for it to disappear. Allowing for the moment that it cannot disappear, or rather cannot cease to be, on earth, can it pass beyond earth's limits and exist in space? This is possible, if space be occupied by matter, but it is not possible if space be a void. It is not needful for our present purpose to enter into any metaphysical subtleties regarding the nature of space, but only to ascertain as far as possible whether it be filled with matter, in however attenuated a form, or not.

27. That it is so occupied is asserted in the plainest terms by Professor Tyndall, and the properties of the universal substance stated. Of it he says, with, apparently, every confidence that he is describing something having a real, and not merely an assumed existence, “The luminiferous ether fills stellar space; it makes the universe a whole, and renders the intercommunication of light and energy between star and star possible. But the subtle substance penetrates farther: it surrounds the very atoms of solid and liquid substances.” All

bodies can receive, according to the Professor's notion, motion from this ether, and communicate motion to it. Ether, therefore, he affirms to be a material substance, less dense than that with which we are usually familiar, and capable of assuming the modes of motion called heat, light, electricity, and magnetism. All this sounds as dogmatic and assured as though it were a well-ascertained fact, instead of being an effort of the scientific imagination, to add a necessary supplement to a favourite theory.

28. We find Mr. Grove decidedly dissenting from it, because he believes it an inadequate explanation of the phenomena it was invented to explain. He thinks light, for instance, "results from a vibration or motion of the molecules of matter itself, rather than from a specific ether pervading it." And as regards heat, he says,—“That the phenomena presented by heat, viewed according to the dynamic theory, cannot be explained by the motion of an imponderable ether” (p. 167). Again, he writes (p. 168), “An objection that immediately occurs to the mind in reference to the ethereal hypothesis of light is, that the most porous bodies are opaque; cork, charcoal, pumice-stone, all very porous and very light, are all opaque.” The natural objection to Mr. Grove's theory is, that if these forces be the result of molecular action, the space between the sun and earth must be a plenum, filled with matter. This he supposes it to be, the matter consisting of the atmospheres of the planets, very much attenuated, but sufficiently dense to transmit these molecular movements. But even this he acknowledges to be an assumption, in more modest and philosophic words than those used by Professor Tyndall. He says,—“At the utmost, our *assumption*, on the one hand, is, that wherever light, heat, &c., exist, ordinary matter exists, though it may be so attenuated that we cannot recognize it by the tests of other forces, such as gravitation; and that to expansibility of matter no limit can be assigned. On the other hand, a specific matter without weight must be assumed, *of the existence of which there is no evidence*, but in the phenomena, for the explanation of which its existence is supposed. To account for the phenomena, the ether is assumed; and, to prove the existence of the ether, the phenomena are cited. For these reasons, and others above given, I think that the assumption of the universality of ordinary matter is the least gratuitous.” Each is, therefore, an assumption, and a gratuitous one, but that of the ether the most so; and on this most gratuitous assumption the notion of the continuity of motion and the persistence of energy is based.

29. But Mr. Grove is not by any means alone in his objec-

tions to these assumptions. Mr. Spencer argues very strongly against both, and arrives at the conclusion "that matter acts upon matter through absolutely vacant space" (p. 60). And in opposition to it, Dr. C. F. Winslow writes in stronger terms still. He says,—“There was probably never a grosser error introduced into physical science than the ethereal theory, and its influence in retarding solid progress . . . has been greater than at first appears.” “All opinions upon the conditions of infinite space are the merest hypotheses; and in the midst of conjectures, that would be the most probably correct which presumed space to be a perfect vacuum.”*

30. The fact that a man of Dr. Tyndall's very high character and culture can permit himself to affirm so positively what are merely shadowy conjectures, should teach all to weigh very accurately every scientific hypothesis, and would amply justify us in saying that we are not called upon to discuss the persistence of energy, while so important an element in the discussion is so confused and undecided. Prove a universal plenum, and even then the continuity of motion is only rendered possible; but till that is done, we are warranted in asserting its impossibility, and that this grand discovery of the nineteenth century is not a discovery at all, or even a fact.

31. It may be objected by some that the decrease in the periodic time of Encke's comet almost demonstrates the existence of such an ethereal medium. Undoubtedly the decrease of the time is a fact; but the explanation was only a suggestion by Encke, who was not aware of any other force that could act in the interplanetary spaces. M. Faye has, however, shown that this hypothesis is, if not wholly untenable, at least very improbable. He attributes the decrease to solar repulsion; and we think he proves his point very satisfactorily. It is not necessary to give here all the steps of his reasoning; it will suffice to state the general conclusions at which he arrives, showing, as they do, that even Encke's comet does not overturn our former objections to this medium. “This theory,” he states, “puts in action only known forces: the attraction of the sun, — that which the comet exercises on its own particles, the heat of the sun, and the repulsion due to this heat.” Again, “My last work had for its object to remove all doubts on this subject in showing that the resisting medium could not exist, but on condition of circulating round the sun according to the laws of Kepler . . . and that its action was not constantly resistant, as M. Encke supposed.” He also states most truly, “That it

* “Force and Nature,” pp. 36, 37.

is right not to accept, in the system of the world, any but known forces, or forces susceptible of being verified experimentally when in the supposed mode of action.”*

32. There is, however, no actual necessity for carrying our investigations to the extreme limit of the terrestrial atmosphere, for on the earth's surface motion ceases, if not wholly, at least partially, which is sufficient for our purpose. To show this I need only quote the authority of Sir John Herschel, who says, “In the collision of inelastic bodies, *vis viva* is necessarily and invariably destroyed. The destruction may be total, or may fall short of totality in any proportion, according to the directness of the impact and the proportion of the moving masses; but whenever contact occurs between such bodies, *vis viva* disappears, and, once lost, is gone for ever.”† In the face of such statements and facts as the foregoing, to talk of the conservation or persistence of energy is a mere waste of words.

33. I must not, however, forget that Dr. Tyndall denies this position of Sir John, and says, “It was formerly universally supposed that by the collision of unelastic bodies force was destroyed. Men saw, for example, when two spheres of clay, or painter's putty, or lead, were urged together, that the motion possessed by the masses prior to impact was more or less annihilated. They believed in an absolute destruction of the force of impact. Until recent times, indeed, no difficulty was experienced in believing this, whereas at present the ideas of force and its destruction refuse to be united in ordinary philosophic minds.”‡ No new experiments, it will be observed, have been made to render the former belief untenable. All the known facts are as they were, but the exigencies of a system require denial, and therefore the annihilation must be denied. No word has been uttered to shake Sir John's position, except to exclude his mind from association with those philosophic ones that think with Dr. Tyndall. But even at the risk of being classed amongst the readers to whom his “Fragments” have been given, *i.e.*, the “Unscientific People,” we would remind

* “Ainsi cette théorie ne met en action que des forces connues, l'attraction du soleil, celle que la comète exerce sur ses propres particules, la chaleur du soleil et la répulsion due à cette chaleur.” (p. 353.)

† “Mon dernier travail avait pour but de lever tous les doutes à ce sujet ne montrant que le milieu résistant ne pouvant exister qu'à la condition de circuler autour du soleil suivant les lois de Kepler, et que son action n'était pas constamment résistante, comme le supposait M. Encke.” (p. 354.)

‡ “5°. Il convient de n'accepter, dans le système du monde, que des forces connues, ou des forces susceptibles d'être vérifiées expérimentalement jusque dans le mode d'action supposé.” (p. 704.)—“*Comptes Rendus*,” 1860, vol. i.

† “Familiar Lectures,” p. 465.

‡ “Fragments of Science,” p. 12.

him that we do not wish to unite the ideas of force and its destruction, but of motion and its cessation, which, in our unphilosophic minds, are very closely united.*

34. We must do Mr. Spencer the justice of saying that he uses in one place the phrase "persistence of force" with a meaning differing widely from the continuity of motion or energy, but with a meaning shared, I will venture to say, by no other writer on the subject. "Thus by the persistence of force," he says, "we really mean the persistence of some power which transcends our knowledge and conception. The manifestations, as occurring either in ourselves or outside of us, do not persist; but that which persists is the unknown cause of these manifestations. In other words, asserting the persistence of force is but another mode of asserting an unconditioned reality, without beginning or end." As the only reality answering to this description is God, Mr. Spencer asserts, and in this we are at one, that amid all changes, all beginnings, and all endings, there is one great Reality, the same yesterday, to-day, and for ever, the "I AM." But to call God's unchanging existence the persistence of force is not the ordinary usage of language. It would be well, however, if all students of nature remembered the great fact, that the one force of the universe is the will of God, and that though heaven and earth may pass away, one jot or tittle of that will can never pass till all be fulfilled.

35. From what has been already advanced, it will be at once evident that the Conversion of Forces is an important element in the hypothesis we are combating. It is very clear that motion ceases to exist as light, heat, or sound; but, if it still exist as motion, it must be in some other mode. One mode called by one name,—as heat, for example,—becomes another mode, we are told, called by another name, such as light. We must understand clearly that it is conversion, and not condition, which is insisted on, at least by Dr. Tyndall and others. One force being the condition of the existence of another force, is a very different thing from one force becoming another force. The former we readily assent to; but about the latter we are in very considerable doubt. It may be true; but we think it still needs further proof. We are, however, in this safe position in

* While we are compelled to differ from Dr. Tyndall on these theoretic points, we would express our unqualified admiration of his great abilities as an experimenter, and our sincere gratitude to him for making known the results of his investigations, in language so beautiful, clear, and precise as to captivate while he instructs; and win students to the study of nature, who, but for him, might have gone to the grave caring nothing for God, and less for His works.

regard to it, that, while the doctrine of the conservation of energy demands the doctrine of conversion, the doctrine of conversion does not necessarily entail that of conservation. The justly-celebrated experiments of Dr. Joule on the "Mechanical Equivalent of Heat" are usually quoted as demonstrating this conversion in the clearest manner. They are recorded in *Philosophical Transactions* for 1850. It is manifestly impossible for me to detail here the experiments there described; but he feels himself justified in stating the following conclusions:— "1st. That the quantity of heat produced by the friction of bodies, whether solid or liquid, is always proportional to the quantity of force expended; and 2nd. That the quantity of heat capable of increasing the temperature of a pound of water (weighed in vacuo and taken at between 55° and 60°) by 1° Fahr., requires for its evolution the expenditure of a mechanical force represented by the force of 772 lb., through the space of 1 foot." The experiments, from a scientific point of view, are very beautiful; but the inferences, from a philosophical point of view, are not so conclusive. I cannot, however, state my own conceptions better than Mr. Moore has done for me in his own words:—

36. "*The question how much mechanical work can be done by a given quantity of heat is far from settled.* Now, to the physicist the downward motion of the weight is so much 'mechanical energy,' the heat produced so much 'work done.' To the philosopher, on the other hand, the *motion* of the weight is not energy or force at all, but simply an *effect* determined by the earth's force of gravity, while the action of the heat is another effect. The whole series of effects, beginning with the descent of the weight, and terminating with the heat generated, the philosopher refers to a specific action of the force of gravity. This force he views as distributed, each effect expending a portion of the force. The physicist regards the heat produced as transformed mechanical energy or motion, while the philosopher sees in this not the conversion, but the correlation of two physical forces, the action of gravity supplying the condition of the action of the heat previously existent, though latent, in the water. To the physicist the descent of the weight viewed in relation to the heat is a *cause*. To the philosopher this motion, viewed in the same relation, is not a cause, but a *condition*."

37. Mr. Grove, in his well-known work on the "Correlation of Physical Forces," seems somewhat contradictory in his utterances, and appears to confuse correlation with conversion. His definition of correlation is sound; he says it is "a necessary mutual or reciprocal dependence of two ideas, inseparable even in mental conception; thus, the idea of height cannot exist

without involving the idea of its correlate, depth; the idea of parent cannot exist without involving the idea of offspring." But, notwithstanding this, he almost immediately after says it is "a necessary reciprocal production." It is manifest that the idea of parent cannot exist without the idea of child, and that consequently they are correlates; but it is equally manifest that they are not reciprocally productive, for while the parent produces the child, it would be difficult for the child "in its turn" to produce the parent: it may become a parent to another child, but it cannot produce the parent from whom itself has descended. According to Mr. Grove's own definition, the imponderables may be, in certain cases, the condition of each other's existence; but they may not become each other. He again confounds production and conversion when he says, speaking of heat, light, &c., "that either may produce, or be convertible into, any of the others." Production is not conversion; the parent produces the child, but surely he is not converted into the child. A seed of corn produces a full head of corn, but it is not converted into it. But his language on this point is so confused, he at one time making distinctions without differences, and at others confounding things that differ, that it is impossible to arrive at any distinct conception of the nature of his own belief. It seems, however, to partake more of the nature of conversion than of correlation; but in spite of that, we have sufficient grounds to justify the assertion that while the physical forces no doubt, in certain cases, condition the existence of each other, there is not sufficient evidence to enable us to say that they are convertible into each other.

38. The theory of the Dissipation of Energy is held by Mr. Moore to be inconsistent with that of its Conservation. But here I am reluctantly forced to differ from him. The theory is, that while one mode of motion produces certain other modes, such as electricity, electricity can reproduce motion, but not the exact amount of the original motion. Some has been rendered incapable of reconversion, because it has become heat, and been radiated by earth into space, and thus lost for all practical purposes, or, as it is called, dissipated. Still the theory of conservation is theoretically consistent, inasmuch as, although allowing the departure of the motion from the earth, it asserts its continuance in the ethereal medium filling space. While, however, allowing all this, we are hereby taught that "conservation of energy" in reference to the earth, really means nothing more than that energy is conserved, till it is finally lost; for Professors Tait and Thomson tell us that, in consequence of the energy of all the planets eventually losing its kinetic form, they must creep in age by age towards the sun to a fiery end. But

even the sun must grow feeble and old in time, spend all his kinetic energy, and die, as his planets have died before him. While differing completely from Sir William as to the mode in which the final renovation of all things is to be accomplished, we are rejoiced to find that in the belief as to the fact of "new heavens and a new earth," we are agreed. "Thus," he states, "we have the sober scientific certainty that heavens and earth shall 'wax old as doth a garment,' and that this slow progress must gradually, by natural agencies which we see going on under fixed laws, bring about circumstances in which 'the elements shall melt with fervent heat.' With such views forced upon us by the contemplation of dynamical energy and its laws of transformation of dead matter, dark indeed would be the prospects of the human race if unilluminated by that light which reveals 'new heavens and a new earth.'"*

39. The next assumption, and the last to be noticed, is assuredly the most startling of all,—that physical force may be converted into, or may persist as, mental force; that motion may become thought or feeling. The other conversions may be understood, whether assented to or not, because there is some congruity between them: heat into light, electricity, or magnetism is plausible, even if not actual; but this other is a conversion, at which the veriest revivalist must stand aghast. That the thoughts of a Paul, Plato, or Newton should be, after all, only modes of motion; only the force that roasts a herring, doing a somewhat different work, is slightly humiliating. But this matters not: if it be true, we must gulp down, as best we can, our vanity, and swallow the unpalatable fact. But can a man be found who states it as a fact? Yes, the Rev. Baring-Gould, although, we believe, a somewhat high Churchman, says it is a fact in his able work on the "Origin and Development of *Religious Belief*." About the last book in the world where we would have anticipated such a doctrine. He defines force as "that which produces or resists motion;" but this definition he never adheres to,—evidently confounding force and motion, he blends Grove and Tyndall together so as to confuse both. He immediately adds, "In physics, light, colour, heat, &c., are modes of force;" but he clearly means modes of motion. This is confirmed by what follows, where motion only is referred to. "Light is," he says, "a modification of force. According to the theory now universally accepted, it consists of a vibratory motion of the particles of a luminous body propagated in waves which flow in at the pupil of the eye, and, breaking

* *Good Words*, 1862, p. 606.

upon the retina at the back, transmit their motion along the optic nerve to the brain, when they announce themselves as consciousness of light by resolution into an idea" (p. 21). It seems somewhat difficult to resolve this into an idea. Waves of light announce themselves as consciousness of light: that is, the waves are conscious of themselves, and announce themselves,—as what? Not as conscious waves, but as consciousness, or not as waves at all; in other words, they do not speak the truth. This savours more of darkness than of light, but let that pass. The next question is, to whom do they announce themselves? As we are not told, we may presume it is to the other arrivals from the sun or stars, or perchance even to the conscious moonshine that may have accompanied them. The mode of the announcement is by resolving themselves into an idea! How this will achieve their object we are dull enough not to see: if there is to be an idea, it must be a noisy one, that all may be made aware of the new arrival. And so, what was a wave before it entered the brain, becomes, the moment it enters that wizard's home, at once consciousness and an idea!

40. What juvenile has not longed for the time of pantomimes, that he may revel in all the glories of the transformation scene; but these are nothing compared with the transformations of perpetual occurrence in the theatre of the brain. Hear Mr. Baring-Gould once more:—"Sound is the undulation of the air (?). The force applied by the finger to a harp-string flings the air into agitation, and the ripples sweep in at the ear, vibrate on the tympanum, and are thrilled to the auditory ganglion, *where they transform themselves into a musical idea*" (p. 22). As sound leaves the harp-string it is only an aerial ripple, but within the brain it, the ripple, is transformed into a musical idea. No, I beg its pardon, it is not transformed; the act is a voluntary one, it transforms itself. I most sincerely wish these ripples could be reasoned with, that I might persuade them to transform themselves into some other ideas, for at the present moment the musical ones are excessively irritative, coming as they do from a German band, and not one of the ripples seems certain in what musical idea it ought to rest. Professor Stokes, of Cambridge, recently spoke of scientific conjecture as being very different from true science, and if Mr. Baring-Gould has not supplied us with the former, we must despair of finding it. It is, however, we are glad to say, counteracted by much genuine and true philosophy, found in other portions of his scholarly volumes.

41. Mr. Spencer, as we have seen already (§ 1), holds not only that motion, &c., is convertible into thought, but that thought may be reconverted into motion. A certain motion is,

for example, transformed into sound by the firing of a gun, it enters my brain, performs a mathematical demonstration, passes on, and is next heard of as the striking of a lucifer-match! Yet notwithstanding these assumptions which directly negative personality, he argues strongly in favour of personality (p. 64) against the sceptic who denies it. But it seems impossible to hold at one and the same time this belief, and that of sensation, emotion, and thought being not the functions of a person, but mere transitory modes of motion.

42. But, if emotion be indeed a mode of motion, although the modes vary, the amount must be always the same, especially when the emotion can be re-transferred back into its original state. That such is a fact may be assumed, but can never be proved till some instrument be constructed capable of measuring the velocity of thought. It has been done by Joule, as we have seen, in reference to motion and heat; but who shall do it in reference to emotion and affection? Apart, however, from measurement, are we in the least justified in assuming that the amounts are equal, speaking from Mr. Spencer's point of view? He says, "No idea or feeling arises save as the result of some physical force expended in producing it." But take a case by which to test this. Let us suppose that of a widowed mother hearing of the death of her only son at sea. She looks at certain black strokes on paper: the only physical force expended is the slight wave motion that passes from the paper to her eye; but the mental emotion is something terrible—something that convulses the whole frame, and whose effects are felt for years afterwards. To speak of this great heart sorrow, that silvers the hair and bows the head, as the mere change of a mode of motion, is wholly futile. It, indeed, originates motion in the brain and whole system, but is not itself originated by motion. The same is seen still more clearly, if possible, as Dr. McCosh points out, where no physical force is expended at all, as when we begin to reflect on the actions of the past, and are, if they have been wrong, scourged by the agonies of remorse, till, as before, the whole frame quivers beneath the lash.

43. Professor Parker, of Yale College, tells us, as proof of the conversion of motion into mentation, that "experiments have shown that ideas which affect the emotions produce most heat in their reception;" "a few minutes' recitation to one's self of emotional poetry producing more effect than several hours of deep thought." But this does not prove his point: it only shows that we are more affected by emotional poetry than by reflective thought, and consequently the mind acts more energetically on the brain; but, as before, the heat follows the emotion, and does not precede it, as required by the theory. That there is

a very close connection between mind and brain all allow: a certain condition of one may be always accompanied by a certain condition of the other. Nay, more: a particular state of brain may condition a certain state of mind, or the reverse; but that is all we can acknowledge. How this conditioning is accomplished we know not, any more than we know how any one phenomenon conditions any other. All here is mystery, and can only be referred to the will of Him who said, "Let there be light; and there was light."

44. The theory would also give to matter a power denied both to man and God. Man, we are told, cannot guide the forces of nature; neither can God, and therefore prayer to Him is asserted to be a folly; but matter is perfectly competent for the task. We need not stay to show that this is an inference from the doctrine of which we have been speaking; it is directly asserted by Professor Huxley in his "Introduction to the Classification of Animals." "This particle of jelly," he says, "is capable of guiding physical forces," so as to give rise to the wondrous structures of the animal world. Jelly guides—oh, wondrous jelly!—that transcends the power of the highest intellect! We would, if we dared, ask him for an explanation; but as Dr. Beale well observes, "He speaks so authoritatively about *fact* and *law*, that one scarcely dares to venture to beg for an explanation of anything Mr. Huxley has affirmed." In reply to Professor Huxley's assertion, I cannot do better than again quote from the same well-known author, whose words on this subject must have far more weight than mine:—"1. Living matter is not jelly; 2. Neither jelly nor *matter* is capable of *guiding* or directing forces of any kind; 3. The capacity of jelly to guide forces, which Professor Huxley says is a *fact* of the profoundest significance to him, is not a *fact* at all, but merely an assertion."*

45. The strongest argument, however, against the theory is, that it is directly opposed to every utterance of consciousness. If consciousness assert one thing more definitely than another, it is the existence of self; it is that we are not modes of motion, or of any force whatever; that we are not feelings, sensations, thoughts, but persons who feel, and think, and will. This is felt by our opponents, and consequently Mr. Bray does his best to dethrone the veracity of consciousness from its regal position in the mind.† I need scarcely say he does not succeed, and the very necessity of attempting to do it renders his system "*ab initio* false, and unworthy of refutation."

* "Protoplasm," by Lionel S. Beale, M.B., F.R.S., p. 72.

† "Force and its Correlates," p. 27.

46. Man, therefore, is not a mere automaton; the helpless plaything of every mode of motion with which he may be brought into contact; the transmitter of heat, electricity, and magnetism from matter, through himself, as thought, on to matter again, in its former modes; but he is an intelligent agent, conscious, and responsible, having the power to originate voluntarily his own volitions, which have no congruity whatever with the phenomena of matter, compelled by his very constitution to assert the existence of an extra-mental world, of which, however, he is not conscious, but of the existence of which he is as well assured as he is of his own existence; capable of originating motions in that material world which, after many a change perhaps in velocity or mode, ceases to be motion. This power of originating motion being called force—matter also having the power of producing motion, but not in the same sense as an agent does it—and whatever possesses this power is never without it, powers of matter and mind being as inseparable from them as are their qualities. In this sense I affirm the “Persistence of Force” as strongly as I deny the “Conservation of Energy.”

The CHAIRMAN.—I am sure we shall all join in the vote of thanks to Dr. M'Cann for his able and interesting paper. I regret that, on account of the state of the weather, there are comparatively few present, for the question is one which involves some of the most important matters to which human thought can be directed. It embraces four distinct subjects, namely, Physical Science, Mental Science, Metaphysical Science, and important questions of Logic. It may be remembered that one of these subjects was treated of on one of the evenings when Mr. Bradlaugh was present. As the subject is of much importance, I hope that it will be well taken up this evening. Should any strangers be present, they are invited to join in the discussion.

Dr. E. HAUGHTON.—It would assist me a little if Dr. M'Cann will kindly explain the last sentence of his paper.

Dr. M'CANN.—The persistence of force means that the power to originate motion is always possessed; the motion itself always begins and ends.

Dr. HAUGHTON.—But the phrase, “conservation of energy” does not necessarily mean the conservation of motion.

Dr. M'CANN.—That is the point I wish to establish.

Dr. HAUGHTON.—It is held that energy may exist as potential energy, and not as actually moving anything.

Dr. M'CANN.—That is the very point I have referred to in the paper. I speak of potential energy.

Dr. HAUGHTON.—With respect to the last sentence of the paper, as to the conservation of energy, I confess that it is not, even now, quite clear to me. The doctrine, as put forth in the paper, differs from what is accepted ordinarily, and I think there does seem to be a want of fixity in the terms used,

and fixity of terms is a necessity when a new thought has to be adapted to an old language, and really this word "energy" is one that was only advanced, as it were, the other day. The word "force" is an old word, and one we are all accustomed to; but we have here the new word "energy," used in an entirely different sense from what used to be its meaning; and it seems to have been employed because some confusion was found to arise in the use of the old word "force." My own view of the subject is that force is an inherent property of matter, like the affinities which all things possess. What is called chemical affinity is only one kind of affinity. I think that affinity is perhaps the most universal term by which to express the forces. It may possibly include gravitation, and the reason why two bodies approach each other may be that they have affinities causing them to attract each other; for when the magnet attracts an atom of iron, the attraction is not all on one side. The magnet has the power of attraction; but the little piece of iron attracts the magnet as truly as the magnet attracts the particle of metal. In like manner, when it is said that the sun attracts the earth, it is equally true that the earth in a proportionate degree attracts the sun. In fact it may be said generally that all particles of matter have an attraction for all other particles of matter. This of course deals with masses. If you go to chemical affinity, there must be that degree of propinquity which brings molecules within the range of their mutual action. You cannot deprive any body or any substance of its affinities. Oxygen will attract carbon, and so on, and certain combinations will be formed by all the different chemical elements which have affinities for each other. These are inherent properties which they cannot lose. The conditions may be altered, but the affinities cannot be altered. This is a point on which Dr. M'Cann agrees with me; but with regard to the conservation of energy it is really very difficult to grasp the subject at all so as to form a clear idea of it, for it may be said to be almost in its infancy. We have been shown that the greatest intellects of the age, some of whom are alluded to, have actually been guilty of great confusion of thought, or at all events, of language. It does not seem to be always the case that confusion of language is at the same time confusion of thought. In a work entitled "Habit and Intelligence," by Mr. Murphy, of Belfast, the writer accuses Mr. Justice Grove of some want of precision in his language, and quotes a passage in which Mr. Grove asserts that gravity, or motion of some kind, was transmitted or converted into chemical affinity, and he apologizes for saying this by telling us that he does not mean to accuse Mr. Grove of confusion of thought, because the nomenclature of the subject is not understood, and people do not always think of using the right word exactly in the right place. These two words "force" and "energy" are so like each other in the way they are used, that it is very hard to employ them without making mistakes. For instance, the only source of energy is force, and yet energy cannot always be reconverted into force. Gravity, which always exists between masses of matter, is force, this may give rise to energy; but when an object set in motion by gravity reaches the earth, the force of gravity remains, whilst that form of energy

and of causing motion have both equally disappeared. Gravity is the inherent liability or disposition of masses to attract other masses. You cannot convert electricity or heat into chemical affinity, or any other inherent property of matter; but potential energy may be transferred,—one body having more at one time, and another body having more at another time. What now appears as heat may appear at other times as electricity, magnetism, or light. All these at times are forms of energy, and one must not confound energy with force, so as to get into an inextricable labyrinth.

The CHAIRMAN.—Can you give us a definition of those terms?

Dr. HAUGHTON.—Dr. M'Cann says, force is that which causes motion, and energy is that which does work; but I think the definition is wrong at starting, and, if so, it is quite impossible that the deductions can be accurate. If we speak of the force of Nature having its origin in certain affinities, then they can only cause motion when the requisite conditions for motion are present. If there were a stone on this mantel-piece, and I were to draw the support away, there would be motion. There was as much attraction of gravitation in the earth towards the stone before this was done as at the time the support of the mantel-piece was withdrawn; but the mantel-piece kept the stone in its place. The motion, therefore, only takes place under certain conditions, so that force is not always that which causes motion: it is that which is capable of causing it under certain conditions. Then, again, the statement that energy "does work" is equally faulty. Energy does not always do work, because, if you have two forces equally balanced,—*e.g.*, if you have the two trays of a pair of scales suspended with equal weights, you have no motion. But if you lift one of the weights, the other immediately begins to move, and the energy which was potential becomes actual, the energy being in the weight all the time. Indeed, everything would be in constant motion throughout the universe if it were not for this fact, that the different forces of Nature tend to balance one another. If I might venture to depreciate in any degree the tone of the paper we have just listened to, and which I admire on the whole, I would say that I do not think sufficient appreciation is shown in it for the real progress Science has made. I think we have got into a very grand train of thought, which must have the effect of leading us on to the most advanced state of progress. The origin of the great modern conception we are now here to discuss, was due to Count Rumford, about seventy years ago, when he discovered in the boring of cannon that heat was a form of motion. I do not know whether he did this by way of experiment, but he thought he would utilize what he was doing in a scientific point of view, and accordingly adapted vessels of water containing thermometers, so that the heat generated by the boring of the cannon could be communicated and measured. He carefully arranged his machinery in such a way that it was quite evident that the only source of the heat was motion—that there was no other source from which the heat could be derived but motion. His demonstrations of this fact were unanswerable, and he is the true author of the contribution to Science that heat is a mode of motion. He proved that the heat was really obtained out of the motion, and

that the motion was converted into the heat. This was the first push which the scientific ball received in this direction. When you have once established the fact that heat, one of our forces, is a mode of motion, the conclusion that most of the other forces may have a similar explanation seems almost irresistible. The only thing to be added is, that some of them seem to be inherent and others seem to be acquired. A body may be more or less electrized : it may be in a highly electrical condition, or it may be in a condition giving no manifestation of electricity. But oxygen cannot have more or less affinity with nitrogen—its combining number is always the same. It has always the same amount of attraction for nitrogen, carbon, or sulphur, at one time as at another, so that it is an inalienable property. Many of those faults of language that have been alluded to are really explicable on the assumption that the terms we use in talking of such highly metaphysical notions as force or energy are not yet settled ; and it will take a good while before a settlement of the language to be employed will be obtained.

The CHAIRMAN.—But is it not possible to reason on the matter under these circumstances until the terms are settled accurately ?

Dr. HAUGHTON.—Every man must know what he means himself when he uses a particular expression. We fancy we differ very often, because we use the same word in a different sense from our neighbours. Some people manage to agree about things for the sole reason that they are using the same terms ; and although they have come to different conclusions, they believe them to be identical. But I confess there is a good deal of metaphysics about all this. I would next refer to the criticism of Professor Huxley in this paper. Let it be understood I do not go in for Huxleyism : I am a strong opponent of Huxley's views. I quote from section 44 :—"The capacity of jelly to guide forces, which Professor Huxley says is a fact of the profoundest significance to him, is not a fact at all, but merely an assertion." Now this is quoted from Dr. Beale. Taking the literal meaning of the words used, this is probably a fair exception to take to the use of the words ; but I fancy that when Huxley talks of jelly he means protoplasm, or what Beale would call bioplasm,—that is, organized matter, and not common jelly. And it is pretty well admitted by all physiologists of any position, that there is organization in the case referred to : the jelly itself is plus the organization ; that is, there is a directive power which is capable of guiding, and which does guide. Let us take a physical illustration. How is a candle made ? The grease is poured around the wick into a mould, and it takes the form of the mould—it cannot take any other. In this sense the mould guides the material used. But let the matter be organized. When the forces of Nature begin to operate, the organized matter produces certain results different from what would have taken place had the matter been unorganized. Living matter, therefore, does guide forces in that sense, because it is constructed and organized (as I believe by Divine Intelligence) in such a way that the forces of Nature, which have their source in a creative fiat, may produce certain results by acting upon it, which could only be produced in matter previously prepared and having a certain constitution. That is the view I have taken in an article which I

published in the year 1862. There is nothing novel in the idea that there is but one force in Nature, and that is an expression of the will of God. It is, however, very hard to be original on any of these subjects. There may, perhaps, be two persons working out the same idea at the same time, and they may possibly arrive by independent routes at the same point. In that case, each may think the other has copied him, whereas, in point of fact, nothing of the kind has taken place. Mr. Murphy's book (which I have mentioned) is full of information and close reasoning, and is, I think, more thoroughly philosophical than Herbert Spencer's book. My own notion is that what is called potential energy is simply affinity having a certain amount of tension. If you fasten an indiarubber cord as a spring to a door, when you open the door you stretch the spring, and the tendency of the spring is to draw the door to again; but it had no such tendency until it was stretched. Before the door is opened, the force possessed by the cord is in abeyance, and when the strain of the opened door is not too powerful, it becomes actual energy or motion; but you require to put the motion into it by putting it on the stretch. When different substances have strong attraction for each other, it is just because there has been a tension of the affinities; and I think that this principle of "affinity" will explain almost any of the other principles which underlie and produce the great phenomena of Nature.

Rev. T. M. GORMAN.—I desire to make a few remarks on certain points which appear to be of primary importance in connection with this subject. And, in the first place, I would observe that so long as the terminology of the subject remains in its present vague and unsettled state, the speculations of physicists must continue to be fruitless. In order to arrive at a clear and distinct notion of force, we must proceed on the sure path of experimental fact and rational knowledge, and, by means of these, ascend by degrees to One who is the origin and spring of all force. A careful study of the phenomena, and a slight effort of the reason, lead to the somewhat startling conclusion that force, as such, is not createable by man. Nor are heat and light. The truth of this conclusion will appear evident the moment we consider that these terms are employed to denote various kinds of activity. Mere activity cannot be created. Apart from some real substance, it is a pure abstraction. Substances which are susceptible of modification are createable, and have been created. And here I wish to say a word in reference to what must appear, on reflection, to be a most fallacious form of expression, which has obtained a considerable degree of currency among men of science in the present day, and which has an evident bearing upon the subject before us. I refer to the phrase "living matter." While one may easily admit that there is a loose sense in which we may use the term, it must at the same time be obvious that, taken strictly, such a phrase begs the question at issue. What can be meant by the life of matter? Matter, as such, is dead. Nature, as such, is dead. Life is something within, above, superior to, altogether distinct from, matter.

Rev. C. GRAHAM.—May I take the liberty of asking the last speaker

whether I rightly apprehend him as stating that activity in man, and in all spiritual beings, is from above ?

Mr. GORMAN.—Yes. No created being has life in itself. The Deity alone has life in Himself. Man, for example, is merely an organized receptacle of life.

Mr. GRAHAM.—If the assertion be that the power of activity comes from above, I accept the statement ; but if it be meant that the activity itself comes from above, then all human actions must be good ones.

Mr. GORMAN.—May I explain ? When the divine influx descends into our minds, it flows into an organ or receptacle of life, *the soul*, which is by nature in a state of evil. The inflowing life becomes modified, according to the nature and character of the recipient. The evil is not in the inflowing life, but in the already perverted will and understanding which receive it. Thus, it is the same life that flows into man and angel ; but it is modified according to the form and state of the recipient. In like manner, in the natural world, the heat and light of one and the same sun flow into a grain of wheat and into the seed of the deadly nightshade, and, owing to the difference of the recipient form, there results, in the one case what contributes to sustain life ; in the other, a narcotic poison.

The CHAIRMAN.—We are going a little too far from the subject of the paper.

Mr. GRAHAM.—I think we are nearly agreed. Having made these observations, I deem it right to say that I am exceedingly thankful to the author of this paper for the way in which he has brought the subject before us. I regard it as a very able paper ; but could wish the author had entered more into the moral aspect of the question, because I think that that is the most important aspect in which we can view it, and I think also that the generality of reflecting people, and more especially those who believe that the subjects of morality and righteousness are the highest we can keep before our minds, would be greatly interested to find the question treated from this point of view.

Mr. PHIPPS.—Although a stranger, I may perhaps be permitted to observe that to me one of the most interesting parts of the paper we have heard is that which speaks of the permanency and non-permanency of motion. It is an old argument that motion of heavy matter once established must needs go on for ever, because although it may communicate motion to something else, and that something else may do the same thing to another something, the motion that is communicated must go on for ever. I should like to know whether the author of the paper conceives that the objection to the permanency of motion, when once established, is the difficulty of saying what infinite space is filled with. I gathered that the difficulty arose from the ignorance in which we are upon this subject, some saying that space is filled with a fine ether, while others conceive it to be a vacuum.

The CHAIRMAN.—The real difficulty of dealing with this paper is that it involves important principles of Physical and Metaphysical Science, of a high

order, and important questions of logical definition, which we have not sufficient time to discuss in their entirety. One thing is obvious on the most cursory perusal of many modern works; that our physical philosophers—men who are great in their own sphere of thought—are in the habit of trespassing on domains of metaphysics, mental philosophy, and logic, which they have never studied; and thus they invest their utterances on these subjects with the halo of their well-earned reputation as Physicists. But a high reputation in one line of thought is no guarantee for ordinary correctness in another. Mr. Darwin's high reputation as a naturalist has certainly not prevented him from exhibiting himself weaker than other men when he has attempted to deal with questions which properly belong to Moral Science. But with respect to the paper and the discussion on it: it is evident that we greatly need a definition of some kind, which will enable us to attach a consistent meaning to the term "Force;" and that our want of it involves us in hopeless confusion. At present we designate two things, while differing in their conception, by the same term—"physical force" and "mental force." As long as we do this, how is it possible to avoid confusion of thought? The one is an idea derived from certain phenomena in external nature; the other from our consciousness of our own voluntary agency. When two trains run into one another, we have an example of physical force. When a great orator persuades a Parliament to do the very contrary to that which they intended to effect, we have an example of mental power. But the two acts differ from each other by the entire interval which separates matter from mind. Yet it is not uncommon to hear "mental forces" and "material forces" spoken of as if they were the same thing—nay, it is even asserted that they can correlate into each other. This confusion of thought has enveloped much of the reasoning on this subject in a complete fog; so that we are in danger of missing our road in places with which we are entirely familiar. The use of this and of several other kindred terms is at present in a state of hopeless confusion. It is really high time that some system of definition should be adopted which will enable us to know what we are talking about. At present even eminent physical philosophers use the term *force* in different senses, and when they apply the same term to denote certain powers of the mind, our confusion becomes inextricable, acrimonious discussions ensue, and after all it turns out that instead of striking at each other, we have been striking at things wholly different, and that the whole has resulted in nothing but a wasteful expenditure of valuable power. How is it possible that any reasoning can end in a useful result, when one man is talking about one thing, and another about a thing quite different. This loose use of language involves us in endless contradictions. Take for an example the use which is made of the word motion. What does it mean? Surely, if it has any meaning at all, it can only mean change of position in space. It is that obvious thing which we see every day before our eyes. But we hear people talk of *latent motion*, or *stored-up motion*, as though, when the motion of a body ceased, there was not an end of

the motion altogether. Surely, when a thing ceases to move, the motion ceases to exist. What is meant by such expressions as latent or stored-up motion is a force or power which, after a certain thing has ceased to move, is capable of setting it in motion again ; but if we use terms after this fashion, how is it possible to reason accurately ? So I apprehend the term potential motion, if translated into simple English, must mean that a certain thing which is not in motion is capable of being set in motion. No doubt the subject of motion may be made to involve many most serious metaphysical difficulties—shall I say puzzles—as the most ordinary acquaintance with an *ancient* philosophy proves. It is perhaps better to give up all attempts to define the subject metaphysically, and to be content to use the term as it daily appears as a phenomenon before our eyes. But it is far from uncommon to speak of certain mental states as though they were motions likewise. To do so may be well enough for popular purposes ; but if we are dealing with subjects scientifically, the only result is to make our confusion worse confounded. I would submit that the states in question cannot with any propriety be denominated motions, except metaphorically. What common idea is there when I say, I have been deeply moved by a tragical story, or I have been carried on at the rate of fifty miles an hour in a railway carriage ? I own that I am also often sadly puzzled by the use of the term “energy.” It seems to me difficult to assign any definite meaning to it, unless we mean by it the active state of a thing, as different from its passive state—a thing doing something, as distinct from a thing doing nothing—*action* as contradistinguished from *passion*. But I think that I have both heard and read of “energy,” which is not “energy” in any of these senses. Now, “energy” which has ceased from an active state, and passed into an inactive one, seems to me to be “energy” no longer, but to have become something else. I am, therefore, quite unable to understand what such a term as “potential energy” means, except that it is one specially invented for the purpose of producing confusion of thought. What I presume is really intended is, some power which can set a thing acting again after it has ceased to act. But if this is the real meaning, why not express it in perspicuous language ? One portion of the paper to-night—perhaps its most important portion—has not been touched upon in the discussion, as to whether it is, or it is not, possible to convert material forces into mental states ; or, in one word, whether so much material force can correlate into so much mental power. I think it unquestionable that a number of the most absurd propositions have been uttered on this subject. It is broadly stated by a number of writers at the present day that all the phenomena of mind are merely different forms of so much material force. The multitude of absurd statements uttered on this point, if not very serious, would be very amusing. Just fancy what our friends would call the force of so much self-sacrifice correlated into so much electricity ! I believe that sound is often spoken of as a mode of motion. Its material vehicle unquestionably is, but sound itself consists of two factors, a material apparatus and a perceptive power of the mind, and if either of them is wanting, what we call sound cannot exist. There is a good deal on the

last page of the paper which requires careful consideration, and it would have been desirable if we could have discussed some of these points separately, instead of having to run over a large amount of human knowledge in a single evening.

Dr. M'CANN.—As the different speakers have, for the most part, agreed with my paper more or less, there is not much for me to reply to. Most of them have referred to its wide scope. My answer is that the fault is necessitated by the subject treated of. It is affirmed that almost everything is force—that matter is force, mind is force, morals are force, and spirit is force; and therefore if everything be force, while treating of force I am compelled to speak of everything. One speaker mentioned a want of admiration for the results of science as conspicuous in my paper. If it be supposed that I am not an admirer of the researches and results of science because I do not give more prominence to my views in regard thereto, I have only to regret that such a conclusion should have been arrived at. I would here refer my audience to a note which I have added to section 33 of my paper, where I say:—

“While we are compelled to differ from Dr. Tyndall on these theoretic points, we would express our unqualified admiration of his great abilities as an experimenter, and our sincere gratitude to him for making known the results of his investigations, in language so beautiful, clear, and precise as to captivate while he instructs, and win students to the study of Nature, who, but for him, might have gone to the grave caring nothing for God, and less for His works.”

I would add, that I yield to no man in my admiration for science and its results; only I did not wish to go into matters that were not absolutely necessary in preparing a paper, which I think you will say is quite long enough. The term “energy,” to which the first speaker referred, is, I think, an unfortunate one, and I do not see the necessity for it; because when we use it we mean motion. The word “motion” conveys a distinct idea; whereas the term “energy” does not. When the first speaker referred to the “conservation of energy,” and the “persistence of force,” I told him that I simply meant, that the necessary qualities or powers of matter were always there. Force is the power to produce motion: that is the definition I give of the term.

The CHAIRMAN.—But not in a mental sense?

Dr. M'CANN.—The origin of the idea of the power to produce motion is from original consciousness. The same speaker rather objected to my quotation respecting Professor Huxley in reference to jelly guiding physical forces, and he went on to argue that organized matter, or protoplasm, guided forces in the same manner as a mould guided the tallow of which a candle is made. If that is all, I do not think there is much guiding in the matter: the first and principal guide in that case is the hand that makes the mould, and that done, the matter must fill the mould according to the form the mould gives it. What has been said about dead and living forces I think I may pass over. With regard to what has been stated about the moral aspect of the question,

I have only to reply, that I could not enter more fully into that part of the subject than I have done, as I felt it was, in the first place, necessary that the physical foundation should be laid down, so that the moral aspect of the question would afterwards be the more easily grasped. If I had written a longer paper, I might have gone into that part of the question, but I felt that I had made it quite long enough. Then I have been asked whether I thought space was filled with matter or not? and the way in which I understood the question was, that if space were filled with matter, the continuity of motion was a possibility, but not a necessity; and if space were a void, the continuity of motion became an impossibility. I do not think it necessary to discuss that, because motion ceases before we get to the boundary of our own material atmosphere. It may be that some of you here present think I have used new words rather dogmatically. I can only say that the words I have employed are only intended to bring out my ideas as clearly as possible, with the view of having the subject properly discussed. The conception of the persistence of force is a very valuable one in reference to the correlation of forces, because it shows how intimately connected are all the physical forces of the universe. Here no lines intersect, but all converge towards one point, the great Force of the universe, Whose will manifests itself in the possibility of other forces, and their phenomena, with the mysteries of which we are not yet acquainted.

The Meeting was then adjourned.

INTERMEDIATE MEETING, APRIL 15, 1872.

C. BROOKE, ESQ., F.R.S., V.P., IN THE CHAIR.

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

MEMBERS :—J. S. Phené, Esq., F.S.A., &c., 5, Carlton Terrace, Oakley Street, Chelsea, S.W. ; F. R. Waring, Esq., Army and Navy Club, S.W.

ASSOCIATES :—C. R. Bree, Esq., M.D., F.Z.S., East Hill, Colchester ; Henry Miller Rowe, Hammersmith, W.

The Rev. J. G. Wood, M.A., F.L.S., then delivered a Lecture “On the Rationality of the Lower Animals.” A discussion ensued, in which the Rev. C. A. Row, Captain F. Petrie, Mr. E. Haughton, M.D., the Rev. J. H. Titcomb, Mr. Byng Gerard, Mr. Ambrose Allen, and the Chairman took part.

The Meeting was then adjourned.

ORDINARY MEETING, MAY 6, 1872.

C. BROOKE, ESQ., F.R.S., V.P., IN THE CHAIR.

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

MEMBER :—The Right Rev. the Lord Bishop of Chester, D.D., Dee Side, Chester.

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

“Transactions of the Royal Society.” Part 133.

From the Society.

“Transactions of the Royal United Service Institution.” Appendix Vol. XV.

From the Society.

“Publications of the Swedenborg Society.” 3 Vols.

From the Society.

A paper “On Phases of Superstition, Social, Scientific, and Political.”* By the Rev. J. B. Owen, M.A., was then read by the Author.

A discussion ensued, in which the Rev. C. A. Row, Mr. I. T. Prichard, Mr. R. W. Dibden, the Rev. Dr. J. Hill, Major G. Cooper Gardiner, Mr. R. C. Shettle, M.D., Captain F. Petrie, Mr. T. W. Masterman, and the Chairman took part.

The Meeting was then adjourned.

* Since this paper was read, its author has passed from the busy scene of this life, in the best pursuits of which he laboured so earnestly. His loss to the Council, of which he was a member, cannot easily be repaired, and the Institute, which recognized in him one of its most useful members, will pardon this slight tribute to one whose energy and firmness of purpose, combined with the greatest kindness of heart, were so well known to all who had the pleasure of his acquaintance.

. Unfortunately, the paper, not being in that complete state which is necessary for its appearance in the Journal, cannot be published.

ORDINARY MEETING, JUNE 3, 1872.

C. BROOKE, ESQ., F.R.S., V.P., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following elections were announced :—

MEMBERS :—

The Hon. Evelyn Ashley, 61, Cadogan Place ;
 The Hon. William Ashley, St. James's Palace ;
 Sir Donald McLeod, C.B., K.C.S.I., 1, Clarendon Road, S. Kensington ;
 The Rev. Canon J. B. Mozley, D.D., Regius Professor of Divinity,
 Christ Church, Oxford.

ASSOCIATES :—

The Right Rev. the Lord Bishop of Llandaff, D.D., Palace, Llandaff ;
 The Rev. H. R. Bailey, M.A., Great Warley Rectory, Brentwood ;
 The Venerable E. Bickersteth, D.D., Archdeacon of Buckingham,
 Prolocutor in Convocation, The Prebendal, Aylesbury (Life) ;
 James Brown, Esq., LL.D., Craigmill House, Stirling ;
 The Rev. H. Collis, M.A., St. Philip's Vicarage, Maidstone ;
 The Rev. J. H. Eagar, M.A., Vicarage, East Sheen ;
 The Rev. Canon C. A. Heurtley, D.D., Margaret Professor of Divinity,
 Christ Church, Oxford ;
 The Rev. W. A. Scott Robertson, M.A., Rector of Elmley, Whitehall,
 Sittingbourne.

Also the presentation of the following Works for the Library :—

- “Proceedings of the Royal Society.” Part 134. *From the Society.*
 “Proceedings of the Royal Institution.” Vol. VII. Part 1.
From the Institution.
 “Proceedings of the Royal United Service Institution.” Part 66.
From the Institution.
 “The Influence of Colloids on Inorganic Forms.” By W. M. Ord, Esq., M.D.
From the Author.
 “The Recovery of Jerusalem.” Published under the superintendence of the
 Palestine Exploration Fund. *From L. Biden, Esq.*

- “The Desert of the Exodus.” 2 Vols. By Professor E. H. Palmer.
From L. Biden, Esq.
- “The Duration and Nature of Future Punishments.” By the Rev. Prebendary Constable, M.A. *Ditto.*
- “Life, its Nature.” By Dr. L. H. Grindon. *Ditto.*
- “Traditions of Eden.” By H. Shepheard, Esq. *Ditto.*
- “The Mystic Woman.” By Dr. Dyonisius. *Ditto.*
- “The Industrial Progress of New South Wales.”
From A. McArthur, Esq.
- “British Sea Anemones.” By P. H. Gosse, Esq., F.R.S. *From the Author.*
- “The Aquarium.” Ditto. *Ditto.*
- “The Devonshire Coast.” Ditto. *Ditto.*
- “Omphalos.” Ditto. *Ditto.*
- “Tenby.” Ditto. *Ditto.*
- “Marine Zoology.” 2 Vols. Ditto. *Ditto.*

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

* Professor Tyndall received a special invitation from the Council to be present at the reading of Dr. Irons' paper, but wrote to say that a prior engagement prevented his accepting it. The *Contemporary Review* for July, two months afterwards, contained an introductory article, written by Dr. Tyndall, in which he remarked on and, in general terms, condemned, the manner in which the subject of *Prayer* had been treated. Dr. Tyndall's criticism would have been welcome had he been present, or even read the paper; as it was he adopted a course unjust alike to himself and to the Institute, which has always urged fair, impartial, but thorough inquiry and criticism, and only condemned *foregone* conclusions.—*Ed.*

**PROFESSOR TYNDALL'S "FRAGMENTS OF SCIENCE
FOR UNSCIENTIFIC PEOPLE,"—in relation with
Theology and Religion.—By the Rev. W. J. IRONS, D.D.,
Prebendary of St. Paul's, and late Bampton Lecturer.**

A STORY is told by Professor Tyndall in his review of Dr. Bence Jones's *Life of Faraday*, which few persons of education could read without regret. It seems that Faraday was present during a conversation that passed between Sir Humphrey Davy and Wollaston, as to the connexion of electricity with magnetism. Wollaston had perceived that a wire carrying a current ought to rotate round its own axis under the influence of a magnetic pole. Something similar to this, indeed scarcely distinguishable from it, was noticed and announced by Faraday some months later; but, it seems, without any allusion to Wollaston, or to the conversation with Davy; and then there arose some jealousy, suspicion, and resentment. "Wollaston's ideas had been appropriated without acknowledgment!"

Physical Science, and its rivalries. Example in Wollaston and Faraday.

2. This, with another equally unpleasant anecdote about the analysis of hydrate of chlorine by Faraday, and the liquefying of another gas by Davy "in the same way," was allowed in the scientific world to irritate the mind of Faraday, one of the best and noblest-hearted of men. Outside the coteries, probably no one believed that Sir Humphrey Davy was jealous, or Faraday capable of the meanness imputed to him. The narrow-mindedness which belongs to the semi-educated will alone account for the development of the *odium scientificum* in such instances as these.

Another example. Davy and Faraday.

3. It were much to be wished that the tone of mind thus de-

tected were more rare than it is; and we doubt not that it will become so, in proportion as students of science attain a more liberal education the only cure. We deprecate, at present, the attitude of suspicion and disquiet, in some who in other respects deserve our gratitude for their labours in the arduous field of physical inquiry. With their love of truth, and fearlessness of investigation, at least in the department they have chosen, we have the most entire sympathy. We only wish for such scientific friends that spirit also which the leading daily journal recently ascribed to a distinguished moral philosopher of our time, that "earnestness of conviction which is without the least asperity or insinuation against opponents, and this, not from any deficiency of feeling as to the importance of the issue, but from a deliberate and resolutely maintained self-control, and from an over-ruling ever-present sense of the duty, on themes like these, of a more than judicial calmness." *

4. Rivalries, however, in the same departments of knowledge, are by no means unmixed evils, and not unfrequently correct each other; while jealousies among those who are workers for truth in different mines of fact, are as injurious as they are wholly unworthy. The real student of physical science, for instance, is engaged in examining the facts of the outer world, observing their arrangement, ascertaining what seem to be general laws, and defining specific tendencies. The student of moral science, on the other hand, whether as philosopher or theologian, has to do with the facts of the inner sphere of human consciousness, the energies and requirements of personality. Collision between those engaged in two such distinct fields must, we should think, be impossible, unless the one or the other were wandering from his proper duty, and mistaking his way.

5. In calling attention to a recent example of this kind of wandering, very noticeable in the recent popular and justly admired writer to whom we began by referring; we will endeavour to be sensitively on our guard against that which we complain of in others; being persuaded that the interests of truth and knowledge will be advanced by excluding from the lecture-room all side-long sneers at morals and religion, and from the theological chair invectives against rational inquiry and physical investigation. The writer to whom we allude, Dr. Tyndall, has issued a book on which we think it right, in the interests of both truth and

* The review in the *Times* of Mozley's Bampton Lectures on "Miracles and their Credibility."

goodness, to comment. It bears the very attractive title of *Fragments of Science for Unscientific People*. In the class so modestly, it may be compassionately, described, all perhaps are willing to be included who do not set up as original investigators and authorities; and Dr. Tyndall's book assumes, after all, no degrading amount of ignorance in his readers; some, perhaps, will even be flattered by the degree of knowledge, and the mental power, attributed to the "unscientific."

6. The first three essays, as we may for convenience call them, are on the "Constitution of Nature," on "Prayer and Natural Law," and on "Miracles and Special Providences."

The principles of the volume are expressed in these pages, and to these our primary attention will be given, though we shall by no means overlook the rest, as illustrating the same views, and pervaded, we must say, by the same spirit. If we ventured at all on criticism as to any scientific statements laid before us, it would not be because we differ from Dr. Tyndall, whatever he may suppose, as to the uniformity of natural law. The believer in Revelation is quite as ready as other men to affirm of the whole phenomenal universe, that which Scripture declares of the starry heavens,—"*He hath given them a law which shall not be broken.*" What we shall rather have to complain of in our essayist is his want of thoroughness in the appeal to facts; and we must be forgiven if we also demur to the *ad captandum* form in which he states his conclusions, and the irregular unscientific, and illogical appearance of his moral inferences.

Apparent mistake as to the grounds of opposition.

7. What we mean by the "want of thoroughness in the appeal to facts," is that Dr. Tyndall practically forgets that our experience brings us in contact with other realities, besides those natural, mechanical, and chemical facts with which his science is concerned; and that

An imperfect appeal to physical facts.

he thus unavoidably gives a fictitious prominence to his own specialities, when he would introduce them, surreptitiously, we should think, into the sphere of morals and religion. In the description of the "constitution of nature," attention, we would observe, is not directed, specifically, to the human body, its form or functions, but rather to the general framework of the universe, of which it at length is summarily said, that "*the whole stock of energy in the world consists of attractions, repulsions, and motions*" (p. 26); and yet, as if it were Dr. Tyndall's main object, he passes at once from this to ethics.

8. He had previously taught us, in his first sentence, that we can only "conceive of space as infinite," and that "the

* Psalm cxlviii. 6, "Pass beyond."

And then a sudden transition to ethics. quantity of force in *the universe*. is as unalterable as the quantity of matter," forgetting the whole world of thought, which as yet appears to have no ontological relation to space. And he proceeds to shut us up to this, and show in what sense it is affirmed. With the impressions produced on the reader's mind by these, perhaps necessarily, incomplete statements as to an "universe" of an unalterable quantity of force and matter—attractions and repulsions—Dr. Tyndall proceeds in his second essay to assail the Christian habit of prayer, as implying a possible change in this "constitution of the world."

With this in view, he gives us two of his experiences to show, as he conceives, the absurdity (the intellectual "savagery," as he would deem it) of "the idea of direct personal volition mixing itself in the economy of nature" (p. 31), and he congratulates himself and his friends, that they are not as other men are, and have "ceased at least to pray for things in *manifest* contradiction to natural laws" (p. 32), which he supposes theologians must needs do.

9. The first case to illustrate the position he takes up is that of a young Roman Catholic priest, whom he met at the auberge, near the foot of the Rhone glacier, who, in conformity with the custom of the Christian population, had arrived there to bless, or pray God to bless, the mountain pastures of the Valaisians. The priest had no idea, he tells us, that any miracle was to be done (p. 33), it was a simple religious service; and yet the charity and penetration of the essayist describe what this clergyman was about to do as "an official intercession" that "the Highest would make such meteorological arrangements as should insure food and shelter for the flocks and herds." Dr. Tyndall and "a Protestant gentleman who was present smiled at this." Very likely.

10. The next narrative equally stirs "a smile" at the expense of "an honest Tyrolese priest," who, fearing the calamity which seemed imminent on the probable bursting of a glacier, dam, went to the icy spot and celebrated the divinest act of his religious worship, the holy sacrament. The comment on this is that this "honest" and "ignorant" clergyman "firmly believed that in yonder cloud-land matters could be so arranged, without trespassing on the miraculous, that the stream which threatened him and his flock should be caused to shrink within its proper bounds;" the truth being, "that without a disturbance of natural law, quite as serious as the stoppage of an eclipse, or the rolling of the St. Lawrence up the Falls of Niagara, *no act* of humiliation,

But prayer is wrongly opposed to natural law.

And is not necessarily a sign of ignorance.

individual or national, could call one shower from heaven, or deflect towards us a single beam of the sun" (p. 33).

11. It is true that these particular examples of misplaced prayer are mentioned to caution us, lest in our prayers we "ask amiss," and not definitely to prohibit all prayer.

But this is a condescension, only for a time, to our infirmities; for a principle is asserted which Dr. Tyndall certainly refuses to limit, though, in these instances, it has only a particular application to one class of prayers. He mentions in a note, that in so applying it (p. 38), he had in view certain prayers for good harvest and fair weather, then recently ordered in our churches, and he praises the discernment of a few advanced clergymen who declined to adopt these prayers. If the uniformity of natural law is a bar to prayer in some cases, it is difficult for us to see how to refuse the principle in others. Some kind of prayer, indeed, as a sort of "emotional" outlet, to which we will again allude, seems allowed at times by Dr. Tyndall, as if an indulgence to almost pardonable weakness, but by no means as relaxing his assertion of a real physical necessity pervading all nature, inconsistent with all prayer, as commonly understood or used, in any of the conditions of human life.

12. Let us now diverge for a moment from the atoms and molecules, the attractions and repulsions and motions of the universe broadly considered, to those which are to be found in the human organization, which Dr. Tyndall fully recognizes, of course, a little further on, but which he does not much dwell on till he has rejected certain kinds of prayer. He says (p. 120) that "*for every fact of consciousness*" (he having examined, of course, a very few), "*whether in the domain of sense, of thought, or of emotion, a definite molecular condition of motion or structure is set up in the brain.*" The relation "of physics to consciousness being invariable" (he continues), "it follows that, given the state of the brain, the corresponding thought or feeling might be inferred; or, given the thought or feeling, the corresponding state of the brain might be inferred." At the same time he almost contradicts himself by saying that his "molecular groupings, and his molecular motions, do not explain *everything*. In reality (he adds) they *explain nothing*."

13. It passes our power to imagine how Dr. Tyndall, with this admission that his science has no final explanation to offer as to the primary action or motion of either atoms or molecules, and saying that "attraction" and "repulsion" can only be described as "a pull" or "a push," a "pull" of which he knows not *what* pulls it, and

The objection to prayer cannot be partial.

But will reach to every condition of our life as men.

Unscientific character of this objection.

a "push" of which he is equally unaware *what* pushes it (p. 75), can, after all, be so confident against "prayer for favourable seasons;" or, if so determined against that kind of prayer, is not equally disposed to say openly that he "smiles" at every other kind of prayer. At all events, as a man of science, feeling, as he says, "a natural pride in scientific achievement"—(though we should have credited Dr. Tyndall with some higher feeling and aim than what seems to us so poor as this "pride,"—Newton's modesty seems better), he should shrink from making assertions which are found so entirely incommensurate with his inductions.

14. We shall not, if we are allowed to speak for ourselves, consent, for our part, to have it thought that we wish the *facts*

Its assumptions, not its facts, are challenged.

of science to be other than they are; we will only stipulate that in science, as in all things else, the assertions shall keep within the limits of the facts.

"But it is perfectly vain," triumphantly exclaims Dr. Tyndall (p. 92), "to attempt to stop inquiry as to the actual and possible actions of matter and force;" as if he were in bodily fear of some dreadful theologian very likely to attempt that feat.

We publicly affirm that we never yet knew any educated theologian who had jealousy of any facts of science. "But depend upon it" (continues Dr. Tyndall) "if a chemist, by bringing the proper materials together in a retort or crucible, could *make a baby*, he would do it." No doubt he would: and more—we, for our part, shall raise no objection to the fact, when it really takes place. Let it not be assumed then that we are, at the present point, the anxious opponents of "the chemist." Let him do, by all means, all that he can; though, after that, we should still inquire, what and whence was the primary endowment of those molecular attractions and repulsions which issued in their complex organization. We well remember the applause of the Theatre, when we gave Dalton, at Oxford, the honorary degree, which the "author of the atomic theory" graciously accepted. The theologians of the Isis surely evinced little of jealousy; but we are not therefore precluded from pointing out still the unscientific character of any approach to the assertion, or assumption, that we know all about the beginnings of vitality, or its inner nature, or its invariable treatment. Even if the Darwinian evolution were ultimately established as science (as Dr. Tyndall owns, p. 159), it would still remain true, that the human mind would seek to "look *behind* the germ" and "inquire into the history of its genesis."

15. When Dr. Tyndall thus confesses that "of the inner *quality* that enables matter to act on matter we know nothing,"

it is natural to us to ask how he knows even that it is a "quality" of matter at all? That is a pure assumption. If then, the human mind in its scientific imaginations is permitted to "look behind the germ," and think of "the genesis," or the pre-phenomenal origin, we cannot understand why religious thought may not also move in the same direction, without being subject to that unreasonable scorn which it is easy indeed to assume, but impossible for thoughtful persons to feel.

Dr. Tyndall tells us that some of the chemists recoil from certain of his notions as to atoms and molecules, while they are reverting without hesitation to the undulatory theory of light (—not yet, perhaps, quite triumphant)—(p. 136). He points out to them, we think rightly, the vagueness and impossibility of that theory, if the atomic system be denied. He bids us "ask our imagination, if it will accept a vibrating multiple proportion, a numerical ratio in a state of oscillation?" Let us ask him, in our turn, to be as clear and distinct as he would have his chemical friends to be. If he "will focus his seeking intellect so as to give definition without penumbral haze" (we use his own terms) "he will hardly be able to crown his edifice with such abstractions as motion and force,"—or "push," or "pull."

16. To our mind then, Dr. Tyndall's own admissions convict him of *inconsistency*, which is a very serious thing, as it implies a powerful *animus* stirring him to unreasonable opinions and dislikes. We appeal to himself and all competent thinkers, whether he has any right as a scientific man, or any foundation as a reasoner, when he indites a vigorous passage at page 93 of his book, as a sort of "Lay Sermon;"—for if we admit the first half of that passage, we shall find that we destroy all excuse for the rest. "If you ask me" (he says), "whether science has solved, or is likely in our day to solve, the problem of this universe, I must shake my head in doubt. You remember the first Napoleon's question when the *savans* who accompanied him to Egypt discussed in his presence the origin of the universe, and solved it to their own apparent satisfaction. He looked aloft to the starry heavens and said, 'It is all very well, gentlemen; but who *made* all these?' That question still remains unanswered, and science makes *no attempt* to answer it. As far as I can see, there is no quality in the human intellect which is fit to be applied to the solution of the problem. It entirely transcends us. . . . Behind, and above, and around all, the real mystery of this universe lies unsolved, and as far as we are concerned, *is insoluble.*" Such being the avowal of science; the writer then goes off into

theological and ethical advice, and tells us what we are *not* to see or think of as possible, either "behind, above, or around" the "phenomena of matter and force" (*i. e.* "pull and push"). We are told that we are "*not* to see in the phenomena of the material world the evidences of Divine pleasure or displeasure;" and here an excuse is even found for denouncing a superstitious view of the Scotch Sunday, and strange to say, *à propos* of nothing, the "Thirty-nine Articles"!—which are made to rhyme with "particles," in a verse of that strangely conservative-revolutionist, and most illogical thinker, Mr. Carlyle.

17. This sensational style of writing is not only unsuitable to "scientific" men, but scarcely complimentary to the logical faculty of the "unscientific." It is as clearly unreasonable as Dr. Tyndall's assumption that he knows all about the antecedents of motion, which he takes for granted (in the most self-contradictory way) in such frequent sentences of his book as that, for instance, in which he declares that "the dispersion of the slightest mist by the special volition of the Eternal, *would* be as much a miracle as the rolling of the Rhone over the Grimsell precipices and down Haslithal to Brientz" (p. 35). If these ethical sallies were at all necessary to the scientific explorations, we might be more patient of them; but being wholly gratuitous and out of place, suitable only for "young men's debating and mutual improvement societies," we firmly protest, as reasoners, against their inappropriateness, self-contradiction, and we must add with all respect, their unworthy tone.

If the facts of science be really such, when thoroughly examined, as to supersede human prayer and Divine volition altogether, no doubt the facts will prevail, and prayer be at length unknown among civilized men. Meanwhile, it is not too much to ask that the facts be stated, as far as they are known, with as much exactness, and as little metaphor as possible. As yet, they appear to some of us to leave that very hiatus which the "hypothesis of prayer" might require,—even though it were "prayer for fine weather."

18. But it is right now to point out that in viewing the physical order of nature as a whole, we have no right hitherto to pronounce that there is such absolute and rigid uniformity, such absence, we mean, of all approach to spontaneity, as the thermodynamic philosophy would assume. There are signs that there, at least, may be other facts. The consideration of the human organization already referred to (*sect.* 12) may open further possibilities of exception or addition to merely mechanical law. In localizing the functions of human life, physiology, no doubt,

*Its haste to
attach ethical
conclusions.*

*And eagerness to
overstate scientific
inductions.*

advances with increasing precision. The general assignment of digestion to the stomach, of circulation to the heart, and of breathing to the lungs, has become very specific; and far minuter knowledge may be regarded as certain. But there is much less completeness when we come to ascribe to the brain the functions and phenomena of thought.

19. An organ truly ascertained to be such, shows its relation to its functions by its fitness. Thus the orifices and valves of the heart are clearly adapted to its office in the system. This kind of fitness, however, is not Especially as to the human organization. ascertained in the least, and it is difficult, as Dr. Tyndall allows, to conceive that it ever can be, in respect of the brain (p. 121). Though we do not, as in Buffon's time, regard the brain as mucous substance of an unimportant character, yet there is nothing apparently in its structure to suggest the process of thought, as we have seen the contents of the cranium lying before us in a basin,—nor even to vindicate altogether the Cartesian notion that the pineal gland is the seat of the soul. Let us ask how far physiology has proceeded in its analysis, and we then may discover how much remains unapproached.

It would seem fairly certain, for instance, that the cerebral organization is enlarged in proportion as intelligence is manifest in animals. In accordance, too, with the form of brain, and the folds spread over its surface, there probably are different degrees of intelligence. There may also appear to be increasing complexity of organization in the higher animal varieties.

20. We may readily accept all this, and much more, on the testimony of the scientific physiologist, until we have further light. The conditions of life are, no doubt, physiologically similar in the cerebral and other organs. And the physiology of the brain. The blood conveys nutrition, warmth, moisture. Let the blood diminish its flow, and the activity of the organ is at once affected. On a total withdrawal of blood we should expect that the brain would cease to act. A modification even of the temperature of the blood has sensible effect on the brain. (Some of us are certainly more equal to intellectual exertion when we are, as we express it at times, "warm through.")

In addition, too, to the law of general circulation, there is some local law of action and repose, in the examination of which, however, we seem stopped. It is in this local department we find the action of the nerves. While the muscular system acts mechanically, the nervous system and the glands, which act chemically, we are told, are subject to this local law. The brain is no exception to the general law of the circulation of the blood, nor to its local adaptations. In all this, however, we have arrived at no analysis whatever of the thinker, or the thought;

but simply traced the *de facto* residence of the higher consciousness, and the instrument of its action.

21. In reply to certain physiologists who wished to resolve intelligence itself into animal heat, Fernard Papillon, if we may trust the writer in the *Revue des Deux Mondes*, denies that there is any such assimilation of the nervous and muscular system as this would imply.

And the nervous system generally. He urges that the nerve has a kind of self-action, almost spontaneity, which the muscle has not. The muscular fibre never contracts of itself,—it needs to be stirred. The nervous cellule, on the contrary, has an active power of its own. Thus the muscular action may be calculated; and not so the nervous. We seem to be here on the very borders of something beyond determinate, mechanical materialism. At times, indeed, the nervous vitality rules the whole animal power, interrupts, suspends, or otherwise influences changes of heat and motion, and seems to defy all attempt to reduce cerebral life to mechanism. Without supposing this diagnosis to be final, we cannot help feeling that it suggests enough of the unknown to restrain the theories of a hard, all-comprehending materialism, such as Dr. Tyndall needs (p. 92).

22. Thus much, then, is abundantly clear; that in the great kosmos, as well as in the microcosm of the human organization, there are countless points where other and unseen agencies are at work, and that we know of nothing to hinder the calling into new action those invisible powers to the existence of which, in some form, science

The doctrine of prayer may even have its true place in science. itself bears witness almost as a necessity of reason. It discovers but a superficial view of facts, then, to reason from the uniformity of certain natural laws against the spontaneity of the genesis, not of one, but even of countless beginnings of action. And this suffices for the whole "theory of prayer." Of course prayer implies a moral world acting on the physical, under the rule of a Moral Governor, and that no doubt is at the bottom of the objections raised. But prayer does not necessarily imply the least change in the elements or the laws of the kosmos, but only the change of *primary* direction by the Ruler of all, or by the manifold powers or forms of originate life ordered by Him.* It contradicts, then, no law, it absolutely requires the intervention of no miracle, to affirm in the universe a place for prayer, so that it need be no fanaticism to assert that even universally "the eye of the Lord is over the righteous, and His ear is open to their prayer."

* See the address on Darwinism, delivered to this Institute in May last, Sections xvi. to xx., &c.

23. There is no need that we should encumber the present simple discourse with any lengthened examination of the argument of Professor Mozley on "miracles," to which Dr. Tyndall so earnestly objects; because it does not stand in our way in the least. It appears to us that Professor Mozley denies the *mathematical necessity* of any "order of nature" that we are acquainted with. Science rightly assumes the order of nature, but has no right to assume its necessity. Nature may, conceivably, have been other than it is, and may therefore be hereafter quite different. "Behold I make all things new" involves no mathematical contradiction, so far as we know, as Mr. John Stuart Mill would himself admit; and we can hardly imagine that any mathematician disputes this, which seems to be the basis of Professor Mozley's argument. With the development of the professor's thoughtful exposition of his subject, especially as to the probability, object, and proof of miracles, we are not here concerned; and we might agree rather at times with Dr. Tyndall in his view that "phenomena are associated with their natural causes" (p. 31), and his openly confessed dissatisfaction with "mere sequences;" in nature. Yet he is inconsistent even here; for, to reduce all nature to necessity is to deny primary causation, or to seek for it beyond the material universe.—But we are treating now of Prayer as capable of holding a place in the system of nature, and we have no need at all to pursue the subject of miracles.

There is no question of the miraculous here.

24. One practical remark, however, of Dr. Tyndall must arrest us before we conclude, because it is an appeal to facts, and by facts alone can we stand. He says he believes that, if tested by experience of its results, its "material benefits" (p. 45), prayer would not "last a decade" among us. Now, we are quite aware that the subject of "answers to prayer" is one of frequent difficulty even to religious persons, and it would not be possible in this place to enter upon it; but it must not be forgotten that thoughtful and patient inquirers have arrived at the opposite conclusion from Dr. Tyndall's. In the nature of the case, no one could, however, exactly judge of the answer to any particular expression of human desire, reverently offered to the Moral Ruler of the world, except the man who had so prayed; and the experience of religious persons has, in all ages, been strikingly uniform as to this. Perhaps there is no class of facts in all human cognizance so unmistakable as this which Dr. Tyndall unconsciously appeals to; and the actual connection of prayer with the realities of life is, humanly speaking, the very stronghold of its power.—And this will lead us to point out how the "pure materialist's" science entirely leaves out of consideration all facts except those of sensible

But of facts,

observation, and takes therefore a most incomplete view of truth and reality.

25. Dr. Tyndall tells us that one of his critics made a mistake in attributing "wit" to him for saying that he took with him to Switzerland "two volumes of *poetry*, Goethe's *Farbenlehre*, and the work on Logic by Mr. Bain."

And of the
widest range
of facts.

Possibly his critic supposed Dr. Tyndall to regard logic as light reading, or had met with logical treatises of a fascinating ambition, and more allied to imagination than to strictly "rational" literature. If so, we can certainly sympathize with the critic, and see how he came to misunderstand Dr. Tyndall's ambiguous sentence. But we shall intend no "wit," and fear no mistake however, in pointing to poetry as a witness to *facts*, and facts which will refuse to be ignored. We ask men to look for instance at the Psalms of David—those marvellous poems of the heart of man addressed to the ear of God. "Hear my prayer, O God!" "From the ends of the earth I cry unto thee!" "O thou that hearest prayer, to thee shall all flesh come!" Such are utterances of human nature always calling aloud for Divine intervention; and the book that contains them has been the world's handbook of devotion, more known and used and loved not only than any other book, but more than whole libraries, these three thousand years.

What a book of *facts* is that Book of Psalms! What a key it is to the history of a vast moral world, known in its fulness to Him only who "seeth in secret." Take Dr. Tyndall's word, that in a world of necessary causation, all this means *nothing*—that prayer is an "emotional" operation of so unreal a kind, that a decade (p. 45) ought to see the end of it, and what are we to make of all these, the widest range of the *facts* of our nature, in the midst of which every attempt at induction is so insignificant and vain!

26. Now, we are not complaining that men of mechanical or chemical science do not make it their business at the same time to be moral philosophers, and students of the facts of human nature; but we have a right to complain of their meddling with what they will not take the trouble to understand or investigate. We have a right to complain of their practically ignoring facts which they acknowledge to be co-extensive with our existence (p. 46), or treating them as unrealities. If it be a fact, as none will question, that wherever man is found, in some way "behold he prayeth," we have a right to complain at the attempt of chemists to teach the generation now rising up, and teach with a supercilious air of authority too, that the whole universe, of which we form a part,

Facts most
unfairly ig-
nored.

consists only of atoms and molecules "satisfied, or unsatisfied." When Dr. Tyndall admits the facts and then disparages them, as if they were ineradicable fancies, he seems to us like the resolute self-deluding theorist who, shrinking from nothing, exclaimed—"Well, I don't deny the facts, but if the facts be so, as you say, then so much the worse for the facts"!

27. A world without prayer seems, no doubt, to be necessary to the moral ideal of the materialist; but he will never get it in the present state of existence. Dr. Tyndall must have some such ideal, for he does not despair of retaining the virtues commonly "termed Christian," A world without prayer. even as a pure materialist (p. 166). He says that he has "as little fellowship with the atheist, who says there is no God, as with the theist, who professes to know the mind of God;" and he acknowledges with Immanuel Kant, "two things fill me with awe; the starry heavens, and the *sense of moral responsibility in man*"! (p. 167). Yet we are to gather from another passage (p. 36) that "the moral responsibility" that so awes him is something independent of that "Free-will" in man which was asserted by Professor Mansel in his Bampton Lectures; though Dr. Tyndall still uses the word "will" (p. 106), and in some sense appeals to it!

28. If Dr. Tyndall could have abstained from what seems, we fear, his besetting habit of fine writing, he might have told us something more clearly of the kind of moral or rightful responsibility which is, after all, the offspring of "necessity." Appeal to the "emotions and affections." But when he approaches this subject he talks persistently in metaphors. It is somewhat trying for plain people to reason with one who tells them that "round about the intellect sweeps the horizon of emotions;" or, that "the circle of human nature is not complete without the arc of feeling" (p. 104). We would ask, are these "emotions" and "feelings" to be exercised on *facts*?—or, on unrealities, that is, fancies contradicted by facts? Elsewhere he warns us of an "incongruous mixture of truth and trust" (p. 48); here he refers us to what he deems the sphere of our "emotions," for our morality and our religion,—leaving us to expect that we shall there find ourselves in that land of shadows. "Appeals to the affections are reserved for cases where moral elevation, and *not historical conviction*, is the aim" (p. 47). We ask, as to these "affections and emotions" which, we are told, are "eminently the court of appeal"—(another metaphor in place of straightforward statement)—"in matters of real religion," are they *true*? We confess that this moonshine style of writing on such a subject is worse than that too well-known "pictorial

sketching" which prevails just now on some of the highest subjects, where exact truth is most wanted. Does not Dr. Tyndall know that the human mind is such that it will at last discredit and distrust "an emotion" which clashes with what it has found to be *true*?

29. Our essayist partly explains perhaps his reasons for adopting his present style of treating these subjects. He thinks that "philosophy is forsaking its ancient metaphysical channels"—and that (if we may try our hand at continuing his metaphor), he may deal with its shallows sportively among the flowery meadows. We think he is mistaken. We will change his metaphor a little. The battle of thought will ultimately rage in those deep places which come close up to the walls of science; and a confident style of writing, even when accompanied by the great merits of Dr. Tyndall, will not be a match for careful thinking on great subjects,—thinking "right on," as straight as mathematics,—with good natural "Barbara Celarent" at hand to help.

We think, too, it is the part of a just philosophical inquirer to represent even those from whom he differs with an equity which they themselves will recognize. We wholly refuse the antagonism which Dr. Tyndall sometimes affirms, and always implies, between men of science, as such, and men of prayer. We feel it to be offensive in purely scientific addresses to have the statement that the "Lord God formed man of the dust" called "a grand old legend" (p. 97), or the words "God saw all that he had made, and behold it was very good," a "grand old story" (p. 99), or to have the same term, "grand fellow" (p. 74), applied to Kepler, apparently to link his illustrious name with the spirit and tone of Science against Prayer. As to this last reference, does not Dr. Tyndall know that Kepler was eminently a man of prayer, and was not only an enthusiastic theologian (like Sir Isaac Newton and John Locke), but worked out all his sublime deductions as *acts of devotion*?—Will Dr. Tyndall accept Kepler's laws as results of prayer? He must: for certainly Brewster says that John Kepler prayed for Divine help and guidance in all his special scientific investigations. If the "working men of Dundee" had been told of this, they might not readily have thought prayer so contemptible.

30. We cannot help thinking that men of science and men of prayer might afford to shake hands together over Kepler's laws. We speak of those who, like Dr. Tyndall, are worthy of the name, for as to others, the inferior spirits of the scientific world, who simply raise a chorus of laughter at the hope and thought that science may one

Rivalries of
theology and
science should
end.

day shut the prospect of a glorious future against a suppliant world lying at the gate of the Eternal,—we care not to speak of them now. So again, there are the rank-and-file of science, collectors and sorters of facts, and nothing more, with no elevation of thought whatever; we can only wish for them an advance in education—perhaps a course of Greek and Latin to brighten their wits. But the bickerings of real thinkers on either side ought to come to an end. It ought, too, to be seen that as surely as oscillations of Uranus detected a far-off planet, and Neptune was revealed at last where the Divine hand had ordered his path unseen as yet, so a confessed want in science, when it tries to trace the path to the origin of all phenomena and spring of all power, points with unerring finger to perturbations which may reveal the spot where the action of the Divine will be found. We “look beyond and behind all the forces of nature;” and even the modern doctrine of the “conservation of forces,” just telling that the sum of the phenomenal remains the same, again teaches us to look beyond the material organization,—even to the pre-phenomenal source of motion, and seek the only answer to the question—“Who made and orders all these?”

31. That the present scientific results are surely leading the way to a higher religious Philosophy, and will conduct to an advanced Ontology, we have no doubt. At the same time it should be confessed that the present *vague-ness* of religious belief, that is, absence of dogma in the true sense of the term, is one of the causes of unbelief among some of the best intellects of our time; though we think the logical results of that unbelief will at length react on the higher religious philosophy. The more earnest, real, and logical science becomes, the more we shall have reason to rejoice. There are no words in Dr. Tyndall’s book more to be prized than these, with which we make to him our closing appeal:—We have “but one desire—to know the truth; and but one fear—to believe a lie” (p. 167).

If it is still for a while to be part of our trial that half-digested theories of science, and “private interpretations of scripture” are to be put in continual collision by less than half-educated minds on either side, let us have patience. Our forbearance may not be misplaced, if we pause in pressing on those who seem now to be antagonists; in order that they may have the opportunity of recovering themselves. It is enough for the present, to point out that no one established scientific fact or thoroughly sure scientific theory, has ever been found to contradict the Bible fairly interpreted by common sense.

On the other hand, let us not be over eager to deduce the knowledge of God from nature, lest while we fail to convince the positive atheist, we put the Christian on the wrong track. For the knowledge of God, so far as nature can suggest it, is, after all, as Pascal simply yet finely expresses it, "barren and useless without the knowledge of Christ."

The CHAIRMAN.—I am sure we all desire to return a cordial vote of thanks to Dr. Irons for his able paper.

Rev. J. HILL, D.D.—As to the subject of this admirable paper; in the first place, I think that we very much over-estimate Professor Tyndall, who has acquired, as it were, a sort of factitious character. I grant that he is a careful experimentalist in the particular subjects in which he has distinguished himself in the world of matter; but in going beyond these, he is altogether a mere trifler, and I think that our lecturer and the public at large, for some reason for which I cannot account, have exalted a man who is a skilful physicist, and a cautious dealer with matter, into a person whose opinions are worthy of consideration upon points which he has not mastered, and in reference to which he is, in reality, no authority whatever. Professor Tyndall is not one of those who have advanced weighty and valuable opinions on the science of the mind; therefore, when he puts forth theories about prayer being opposed to an invariable law, I would ask him, whence comes the law of which he speaks, and is that law superior to the Law Giver? (Hear, hear.) It is in point of fact atheistic to suppose that a law can exist which will counteract the power of Him who made that law. Surely the Being who made the law has the power to abrogate it, and as He has made a law for the regulation of matter, and has determined His own mode of originating and governing the world, so can He alter and adapt the laws He has made to suit His own great purposes. Altogether, if we merely look at the natural world independently of the idea of revelation, we cannot conceive that the Author of that world, the Creator of the ends of the earth, should have laid down a law for the government of the world, and yet should be unable to suspend that law. The theory Professor Tyndall would lay down involves us in the idea of an irresistible necessity over all things. Those who are familiar with Homer will remember that even the Jove of the heathen was inferior to the destinies he was supposed to rule. So inadequate was their conception of the supreme power of the universe, that Jove was actually represented as putting the results of human action into a scale and weighing them in the balance of fate, in order to see how they would turn. We, in these days, have no such low estimation of the Author and Ruler of the universe, and we do not hold with the suggestion that the Great Author of all things cannot control those things which He has created. (Hear.)

Mr. F. WRIGHT.—May I be permitted to ask for a word or two of explanation with regard to a point which, probably through my own fault, does

not seem perfectly clear, and on which I think that all of us might profitably receive another word or two of counsel. It was partially with reference to prayer being opposed to the theory of Professor Tyndall, and to a fact which he is alleged to have ignored. The fact referred to was that David prayed, that all men have prayed, that we pray, and that in all time prayer has been an aspiration of the human heart, and it was said that these facts kicked against Professor Tyndall's theory, and that he had consequently ignored them. I have read the "Fragments of Science" pretty assiduously, and have arrived at much the same convictions and conclusions as those announced by the lecturer; but I do not remember that in any part of those "Fragments" Professor Tyndall either kicks against or ignores the facts alluded to by the lecturer. It is not that Professor Tyndall has disbelieved, or disallowed, or ignored the fact that men have prayed in all time; but that he disbelieves and ignores the statement of fact that those prayers have been answered. As far as I have understood Professor Tyndall, he has looked upon those who have prayed as persons who have prayed in vain,—as having been engaged in idle effort, so far as practical results are concerned. I should like to hear whether I am mistaken upon this point, or whether it is that there are some other facts in connection with prayer which Professor Tyndall may be rightly said to have ignored or disallowed.

Rev. J. MANNERS.—Some time ago, when the British Association met at Norwich, Professor Tyndall gave a very interesting address in his section, and alluded to crystallization, showing that there must be an external intelligence by which crystals were formed. I stated to him at the time that I thought all true science, dealing with causes and origin, had its basis in the spiritual, just as Egypt had its place in history; and to this Professor Tyndall seemed to assent most heartily. He stated that there was a great deal to be said upon the subject, but there were certain phenomena which he did not understand, but was convinced that there was a power or a principle which must be the *causa causarum* of those phenomena. I also gathered from the conversation I had with him that his mind was open to conviction, or rather it was open to inquiry, really, truly, and honestly, into the various causes of the phenomena, apart from what we ordinarily term mere materialism. For instance, I said, in reference to the formation of crystals—"These little particles do not arrange themselves of their own accord: there must be an intelligence, not in themselves, *per se*, but belonging to some superior power, which causes them to move or to be brought into certain conditions." I have not read his book, and do not know what he has stated with regard to prayer, and am not here as an apologist for him, but I do feel that if we rightly understood each other, and if he were here this evening, he might be able to show that his views of true science, and the cause of certain manifestations, would be in harmony and not in any sense discordant with the truth of the Holy Scriptures. I may just say another word; I think that if people would only be content to wait a little, and deal with phenomena as such, and with facts as facts, it would be much better. I once asked a gentleman of high scientific attainments and

great reputation, "When you go into the law of gravitation, or of light, the lines in the spectrum, &c., do you endeavour to determine whether the principle which is at the root of it all works upon its own responsibility?" His answer was, "We have nothing to do with that; we do not go into that at all." Well, that is just what I say. Take an abstract law as such, and what is it? Put this question to the highest authority you like—to La Place, or any great man of science—and they will acknowledge at once that Nature must be pervaded by a Divine intelligence which superintends and directs all these things, that they are not ruled and controlled by any mere abstract law which has simply been impressed on creation. I am certain that were we to compare notes with men in the highest realms of science, there are points upon which,—if really, and truly, and rightly understood,—they would not ignore the simple facts and truths recorded in the volume of Bible history. This, at least, is my firm conviction.

BISHOP M'DOUGALL—I only wish to say a word or two. I was brought up among scientific men, and thrown a great deal into the society of men of unbelief, and afterwards, when I went abroad, it struck me that I found existing among the heathen the very same kind of unbelief that we are now discussing, as to the question of prayer. If you go to the heathen, you find him worshipping a good power and an evil power. He worships the one for benefits, but he is led to be more particular in his worship of the Devil because he fears him most. If you say to him "Do you not believe in the one great Ruler who controls all things?" he will say "Yes; I believe in Him, and that He made all things; but now He sleeps." It seems to me that some scientific men, if questioned in the same way, would say something tantamount to "Yes, we believe in the Creator of all things; but it is of no use to pray to Him, because He sleeps." They have yet to learn to acknowledge that the great God never sleeps, but that His eye is over all things, and that He knows every thought and mystery of our nature.

Rev. C. A. Row.—I feel somewhat painfully placed with respect to this paper. I think it does not grapple with the real difficulty with respect to prayer either from the atheistic or the theistic side; or with the question how it is that prayer can be answered consistently with the maintenance of the laws of the universe. Even taking it from the theistic side, I thought that there the difficulty was, not that God cannot answer prayer, but as to whether He will interfere with the laws of the universe so as to make a direct answer to prayer. The Book of Psalms has been referred to. I do not suppose that Professor Tyndall excepts against the Book of Psalms; but what he does take exception to is the statement that the prayers which involve changes in the physical laws of Nature are answered. He would say that persons pray for things which are very extravagant. It is an undoubted fact that extravagant things are prayed for; but I cannot see in what sense you can allege it against Professor Tyndall that he ignores the fact of these prayers having been offered. What he denies is the fact that the prayers so offered have been answered. There is no doubt that Professor Tyndall has travelled beyond the limits of his facts as a simple student of

physics, and it does often happen that when men have a great reputation for one particular department of knowledge, they fancy that they can maintain the same reputation when they discuss subjects of a totally different character. I do not think, however, that the grounds stated to have been taken by Professor Tyndall—with whose book I am but imperfectly acquainted—have been fully and logically answered. I may be mistaken, having arrived late, and only read the paper since I have been in this room.

Rev. J. W. BUCKLEY.—I should like to put the question in this form : How are we to prove in any way, without taking Scripture into account, that there is ever any answer to prayer? We do not begin, as I think we ought, by proving the truth of the revelation of the Holy Scriptures ; but we start with a sort of loose idea that we can “by searching find out God” in these matters. I do not myself see how any amount of reasoning upon the point can prove that God has answered prayer. A man may say, “I prayed for this ;” but the question is, “How do you know that what has happened is an answer to your prayer ?” I do not see any process open to the human mind, apart from the acceptance of divine revelation, by which it can prove that answers are given to prayer. I therefore demur *in limine* to the discussion of the question whether God hears and answers prayer, unless the revelation of the Scriptures be admitted. We may, indeed, argue thus as to the *probability* that God answers prayer :—If you admit a God—a Supreme Being—at all, it seems to be a most unnatural thing to take up the notion as a truth, that He has constituted us as we are, with our bodies and minds, hearts and souls, so wonderfully formed, and yet that He has altogether withheld His mind from any communication with ours. I hold that this is an unreasonable way of looking at the matter ; that it is a very extraordinary position to take up. If we once admit ourselves to have been constituted, body and soul, by a divine, omnipotent, and intelligent Spirit, as I hold we must do, because we find ourselves here with remarkable faculties ;—if a Being superior to ourselves made us, we can reason on until our reason drives us to this irresistible conclusion, although the Being who is the subject of our reasoning is still totally incomprehensible ;—that there must have existed in the eternity past an infinite and all-powerful Spirit. And when we are driven to this by our reason, we find ourselves almost obliged to admit, that it would be a most extraordinary thing if we were shut out from all communication with that infinite and omnipotent Spirit. But then, by endeavouring to prove this communication, without asking whether this infinite Spirit has revealed anything respecting itself, we are, if I may use the comparison, trying to perform the play of *Hamlet* with *Hamlet* left out,—dealing with a question without touching the foundation upon which it must be based. I therefore demur to the discussion of the question whether prayer is answered or not, without taking the evidence of the Holy Scriptures into account ; because, if you shut the Scriptures out altogether, you are omitting one very considerable and indispensable element. I was glad to hear a gentleman, who has already spoken, say that Professor Tyndall admitted that there was something beyond what he could

account for. But that vague admission is worth little or nothing. We do not want Professor Tyndall, or any "ghost from the grave, to tell us this." We can, I think, account for all, if we have our faith based on reason. And reason shows that there must always have existed some great Infinite Spirit. And then comes the question, has that Great Spirit told us anything of Himself? and if so, how can that be left out of consideration?

Rev. J. H. TITCOMB.—The last speaker has expressed the truth from one side of the question; but I do not think he has approached it from the proper stand-point. What he has said is that which, as Christians, we all fully concur in, namely, that they who discuss the question of prayer ought to admit the truth of divine revelation. This no doubt is eminently satisfactory to those who are here to-night; but it is eminently unsatisfactory to unbelievers, and it seems mere child's play to talk in this way to people who do not believe. We meet on subjects like the present with persons who are outside our own range of thought, and who occupy a totally different stand-point from that on which we are resting. We must, therefore, go into the enemy's camp and attack our opponents where they stand, dealing lovingly, and faithfully, and honourably with them; but at the same time trying to show them that there are difficulties in their own path, and endeavouring to win them over to ourselves. I did not intend to have spoken at all in this discussion; but I could not refrain after what had been said, because I felt it desirable to point out that gentlemen who engage in these matters, meeting as members of a scientific society, ought to deal with such opponents on ground totally different from that of Scriptural belief.

Rev. S. WAINWRIGHT, D.D.—I think that there is obvious ground for us to show that from the stand-point Mr. Titcomb has very properly put down, there is, on scientific grounds, no room for a foothold against what we maintain to be the doctrine of prayer. I hope that Dr. Irons will deal gently with me when he rises at the end of the discussion, if I say that I do not go so far as he has in some respects—while in others I would go beyond him. I think the worthy lecturer has somewhat failed to do justice to himself. I find passages in the paper he has read which contain the germ of a thoroughly complete and crushing refutation of Professor Tyndall's argument; but there they are, waiting, I suppose, for some Darwinian process of evolution to bring them into their final stage of development at some future time. I find in the paper one of those pleasant sentences in which it is said that Professor Tyndall speaks of the relation of physics to consciousness as invariable, and the lecturer says that Professor Tyndall almost contradicts himself. I say that the Professor directly contradicts himself when he says that "the forces which have been present are insufficient cause for all these phenomena." I say that they are altogether insufficient. Coleridge, who thought much on the subject, says there are times when the soul ceases to feel its own impotence, except in regard to its conscious capacity to be filled with the Redeemer's fullness. This may be a delusion on Coleridge's part, and the millions who endorse it may be mistaken; but whether this be so or not, I maintain that they have this consciousness, and I claim that it should be dealt with as a real and ob-

vious fact. It is there that I think it possible to recognise the position Dr. Irons has taken up in speaking of the psalmist. What I understood Dr. Irons to say was, that as a mere matter of fact, man had been praying all over the world, and in all ages, and that this psychological reality must have had the same cause. I have been accustomed to think a good deal of that remark of Coleridge's, in which he asks "Where did the atheist get his idea of the God whose existence he denies?" And I want to apply that thought of Coleridge's to this subject. You will never find an atheist who will be able to answer this question satisfactorily to himself. You say to him, "You deny the existence of God; but where did you get your idea of God? What put it into your head to deny the existence of such a being? Whence came the idea you have formed of the God you deny?" He will probably answer, "I got it from my mother." But then comes the question, "From where did she get it?" There must be an entity to account for the idea. Now I wish to put this question in the same way. Nothing could be more pertinent or just than that, when we get into our pulpits, we should take the scriptural ground upon such a subject; but here we come to maintain the position that the Scripture itself being assailed has nothing to fear when before the tribunal of Science. We take up then the argument of our antagonists, on which it is sought to put the question of scriptural belief, and on examining the grounds of these arguments we find that they prove nothing. You find it to be one of the characteristics of man that he is always found with a capacity and a tendency to prayer, and that he is the only being in whom we find that capacity and that tendency. There is no animal below man in which we find that capacity, and we have never found a single variety of man that is destitute of it. In all ages, and in all parts of the world, we find man yielding to this "superstition," which we are told ought to be exploded in ten years. Professor Tyndall says the relation of physics to consciousness is invariable; but it is clearly not so, for Christian men come into a state of consciousness which they attribute to the spiritual action of an unseen intelligence with whom they believe themselves to be in communion. But at all events they have the consciousness which they are quite certain is not due to physics or to physical causes; and until Professor Tyndall has made his case good, he has no right to draw the conclusion he asks us to adopt. He admits that the molecular groupings he refers to explain nothing in reality. Well, if it be the fact that they explain nothing, we want to know, what is the use of them. There is no man more competent than Professor Tyndall to come into court and state what he believes; but I must object to the conclusions he has arrived at on this subject. I object to much that one reads and hears put forward in this sort of tone. It is often said that people who admit the operation of a law ought of necessity to admit also a law-giver, and that the law-giver has power to change, or abrogate, or suspend his own law; but this admission is very seldom made. On the contrary, we are standing front to front with a system which says that every particle of matter has its own properties, which are capable of making a bubble in the crucible, and that at all events those properties reside in the particles; but another party says "No;

they do not reside in them ; they have been impressed on them." The object of all this is to shut out God from the world, and to assert that there is no God. Now, we face all this rightly when we say, " We will not allow you to assume that there is no force you have not investigated until you account for the origin of the germ or particle, for the genesis of what is behind and beyond the germ." A sufficient answer to all these scientific speculations is that they are assumptions which are based on nescience, and if a man asks " How can God interfere in matters that are going on in the world ? " my answer is " When I am as great as God, and as wise and infinite as He ; when I have entered into the treasure-house of His wisdom, and grasped His infinitude, I will tell you what are the resources of which the Omnipotent avails Himself in order to interfere." At the same time, I think you will agree with me that, taking Professor Tyndall on his own ground, he has failed to prove anything that will tend to establish the conclusions he has drawn.

Mr. J. E. HOWARD.—As one who has been engaged in chemical investigations for the last forty-five years, I desire to say a few words. I am a believer in the efficacy of prayer, and am glad to have heard the remarks which have been made upon this side of the question from all parts of the room. I agree with the last speaker, that the subject has not been entirely probed to the bottom, and that some of the objections of men of science to the assertions of religious men, that prayer is answered, have not been altogether met. I do not know that they could be met except in this way ; that the deeper the researches of science, the more fully we enter upon the investigation of natural laws, the more shall we become convinced of our own ignorance. Before becoming wise a man must be convinced, in a certain sense, that he is a fool ; or at all events, that as the boundaries of our knowledge become extended, they but reveal the vast outlying space of our ignorance. I can see no difficulty in the question presented to us on this occasion ; it may be because I view the whole subject *ab initio* from a different stand-point to that taken by some men of science. I do not believe in a Being who has imposed laws upon atoms, in such sense that the atoms thus endowed with what we call *laws* should be more powerful than the Law-giver himself. If we think, as we must think, upon this subject, we find arising behind us the power of the Infinite, which has been so well described by Sir Isaac Newton in his declaration of faith in the omnipresence of God as the Being who governs all things, not as a soul of the world, but as Lord of the Universe. I cannot repeat that declaration without book ; but my view of the omnipresence and power of God is the same as Newton's ; and that, I assert, rises above and beyond, and far outweighs all considerations about laws, and the mode in which it may please God to act upon matter. If God be pleased to answer prayer, there is nothing that I know of in the constitution of matter which should prevent His doing so. It must surely be as easy for God to act upon matter, as it is for me to crumple up the piece of paper I hold in my hand. That God can answer prayer I am convinced. How he does it is another question which remains to be investigated.

Dr. IRONS.—I shall not detain you long in replying to what has been said, but will endeavour, as far as I am able, to direct my remarks to the point. Dr. Hill wished me to explain, how far the facts of prayer are practically denied by Professor Tyndall? Now, if he refers to my paper, he will find that at section 26 I use the words, "We have a right to complain of their practically ignoring facts which they acknowledge to be co-extensive with our existence," and I refer to p. 46 of Professor Tyndall's book, where he actually admits all that I have said, although he practically ignores it in other places. That must stand as my answer to the implied supposition that I unduly charged him with inconsistency. It seems to me that out of deference, and wishing to pay all respect, to a man of high eminence like Professor Tyndall, I have rather under-stated than over-stated the case. Dr. Wainwright has very truly observed the strength of our side. I have wished, if possible, to be what people might consider ultra-fair. I might, I am aware, have made the matter much more pungent, but not therefore more convincing to the mind of Professor Tyndall, and I wished so to express his position, that if he had been here he would have acknowledged that I had done him no injustice in any of my statements. This leads me to the answer I have to make to my friend Mr. Row, whose many duties have prevented his reading Professor Tyndall's book, or carefully reading my paper. He seems to have been under the impression that I was going to open a general discussion on prayer, and that all the conceivable objections to prayer were to be answered by me to-night. I was not aware that I had undertaken such a task. If you refer to the title of my paper you will see that there is not a word in it about prayer, nor should I have referred to prayer if Professor Tyndall had not done so in several places. I have really dealt with nothing else than Professor Tyndall's book. I am sorry Mr. Row is disappointed. I do not know whether the Council would have wished me to write a paper on the subject of prayer, and to notice all the possible objections to it; I doubt whether they would have entertained such a proposal if I had put it before them; but I had no such object. I knew that Professor Tyndall's book was doing a great deal of mischief, and I endeavoured to deal with its first principle—the necessity of fixed law pervading Nature. I there explained his inconsistency, and showed that he was obliged to make admissions contrary to his very foundations; and yet I am told that I have not answered him! Mr. Row must read Professor Tyndall's book. I am not content, however, to lie under the imputation that I have not, in principle, discussed prayer. I have indeed learnt a humbling lesson from every speaker who has addressed us to-night; for I have been made to feel tolerably certain that no author, however earnest, would willingly write a page if he could only see the shape his propositions would take in the minds of 99 out of every 100 men who read them. In this book-making world one gets driven into writing much which one might not, perhaps, be particularly anxious to do; and your honorary Secretary will bear me witness that I was by no means over-eager to come before you with this paper. I have done so from a sense of duty, and in deference to his expression of the wish of the Council. I hope at

least I have not said in it a single word which Professor Tyndall could justly consider offensive, or which, however misapprehended, scientific men can regard as evincing a wish to travel out of my proper course in order to attack them. I have shown what I deem to be certain of their weak points. Some of them have denied themselves the great consolations of religion, and I have been anxious, if possible, to win them over, and to show them that they are not so philosophical as we. We know their side, and they do not know ours. A large number of the readers of Professor Tyndall's book are among the clergy, for religious men gladly study scientific books ; but on the other hand I believe scientific men only take homœopathic doses of theology—*similia similibus*—they take only what suits themselves. I do wish we could only get them to read our side of the question. As to the gentlemen who have now addressed us, a few words. One inquiry brought forward was,—Where did the atheist get his notion, or how was he certain of his denial of the existence of God ? The speaker who took that line quite forgot that a large and most powerful school of unbelievers is as much aware as he is, that it would be the height of presumption to say there is no God. Herbert Spencer, who is as calm an unbeliever as you can find, rather says—“I don't affirm there is no God. I am simply between the two statements. Some say there is a God ; some say there is not. I only say I am not aware of it.” Then, by another speaker, the universality of prayer has been denied. I can only say that I did not affirm more than I thought to be the fact. I affirmed man to be a praying creature wherever, *bonâ fide*, he is found ; but I did not mean to extend the observation to every member of the human race, inclusive of those who have been almost hunted out of their humanity. I do not think individual exceptions would alter the broad fact that man has an ineradicable tendency and capacity to pray. I have dealt with it as a theological fact ; but I have not attempted to push the argument beyond what I thought the premisses allowed. If any one thinks I have urged one argument unfairly, I should be glad if he would show it. I feel sure, at least, that Professor Tyndall would allow that I have done him no injustice. It has been said by another, that we should remember that scientific men admit that there is a germ of force behind phenomena, a something they cannot get at. I ask, whether I did not fully admit this ? and why did the speaker argue as if I had left out what, in fact, was one main consideration of my paper ? That inconsistency in men of science is the very point of my argument. I wish it to be understood, too, that I did not attempt or intend to prove that prayer was always answered, or that there was a specific kind of revelation to that effect. This was not my business. What I did show was, that Professor Tyndall's book contained nothing which ought to teach us the desirability of giving up saying our prayers. It seems that Professor Tyndall, when at Norwich, made so amiable and gentle a speech to one who addressed us to-night, that he almost persuaded that speaker that he was a Christian. (I may say that I have had this feeling myself, both about Professor Tyndall and Herbert Spencer, that at times they go so far towards the mark, and are so well-spoken, that I cannot help thinking they must, as upright, conscientious

and studious men, become, as some have already become, real Christians in the long run.) But that gentleman must not therefore mis-state the arguments in a book he has not studied. The argument in Professor Tyndall's book is against the possibility of an answer to prayer. That is the point I had to meet.—There are other points on which I might dwell; but they are simply mistakes, or personal, and it would be wrong to occupy your attention with what concerns myself alone. I can only thank you for the numerous attendance to-night, and for your kind sympathy and attention; and I trust it may please God to send His blessing upon what I have written, and what has been said.

On the motion of the Honorary Secretary, a vote of thanks was accorded to the Society of Arts for the use of their House.

The Meeting was then adjourned.

NOTE.

ON THE EXTENT TO WHICH PRAYER IS REPUDIATED
BY MATERIALISM.

SOME months have elapsed since the foregoing paper was read : in it Professor Tyndall's "fragmentary" treatment of the gravest of all subjects has been dealt with in a spirit of forbearance, and with the courtesy due to a man of science who had mistaken his way, and shown that he was not qualified for philosophical reasoning. His sincere "love of truth" (*Section 31*) was not doubted ; it was rather with some confidence relied on. If, then, he has placed himself and his cause, before all capable thinkers, in an unintelligible or embarrassing position,* the blame, at all events, is not with us.

Whatever else may afford to be "fragmentary," love of truth cannot. It may be that Professor Tyndall is so fully occupied in his own particular, though somewhat narrow, department of work, that he has no time to give himself thoroughly to philosophy : but if so, he should not capriciously diverge from subjects which he handles with ability to trifle with those for which he shows no aptitude, and in which he refuses to qualify himself. In one respect he has an advantage on his side in such a course ; just as a lecturer on chemistry, at some young "Institute," attracts popular applause by the apparatus which he exhibits, with all the experiments, the explosions, and the lights, which contrast so strikingly with some less charming lecture on history, or jurisprudence, on a previous evening,—and, for the hour, "he may do anything,"—so it is to be feared that there is around Professor Tyndall a mentally juvenile circle of listeners, ready, with *abandon*, to enjoy that which sparkles, and unwilling to take much pains with the graver subjects on which his hasty light only flashes for a moment. Professor Tyndall, of course, may again write, in his bright way, "Fragments of Science for Unscientific People" ; but we are absolutely precluded from issuing Fragments of Thinking for the Unthinking Classes. Our subject restrains this ; and if it did not, yet there are some of us who are so constituted that it is a necessity for us to be thorough, even in the enunciation of a principle, or the expression of the briefest proposition.

But further than this : If there be one thing more than another which wins the philosophic theologian to the lecture-room of the physical-experimentalist, it is the common "love of truth" which makes them brethren ; and if in any case this be questionable—if the "love of truth" turn out, on either side, to be a love of experiment, or of *à priori* prejudice, a thinker finds himself very soon in uncongenial society. The professed "love of

* See note, page 136.

truth" which is not entire, seems profane to those who occupy themselves seriously with the deeper problems of our being.

In considering the book of the Professor in the preceding address, it was felt that the principal interest of the audience would probably be concentrated on the second chapter of that book, on *Prayer and Natural Law*. But the task imposed on the lecturer was the review of the teachings of the Professor's volume as a whole, which precluded the possibility of entering into much detail as to any part of it. To indicate the *animus*, to exhibit the pervading tone, and in some sense detect the moral object of the work, was a more arduous task than to point out the illogical character of certain parts; and it was all that was possible within the assigned limits. Enough was said, it is hoped, to convict the erroneous hypotheses and fragmentary assumptions of the Professor's essays, so far as they touched philosophy or religion. As the paragraphs of the address are numbered, it will be sufficient to refer to them, and not quote them, in the following remarks, which are intended to show to all experimental physicists, that neither on moral nor religious questions can they accept Professor Tyndall's guidance without giving up *reason* as well as religion. We shall thus supply, in some measure, a defence of prayer as the habit of the Christian life, which Professor Tyndall and others have ventured so unscientifically to challenge.

Let it at once be noted that, as to all the first principles of his reasonings, the Professor has the greatest inconsistency: the results of which must be pointed out. He states that the *whole stock of energy in the world* consists of attractions, repulsions, and motions (*Section 7*). He rejects as an absurdity all "direct personal volition" as affecting this world; and here he so expresses himself as to deny alike the will of God and of man (*Section 8*). He then illustrates his view by two anecdotes, in which he despises two Roman Catholic clergymen for using prayers for God's blessing on the fruits of the earth, and for favourable mountain weather, as though they expected a miracle; while he admits that they did not, and does not see that he ought to have suspected that he had misapprehended their "theory of prayer." Instead of this, he only ridicules them for going contrary to his own theory (*Section 9, 10*.)

After this general view of the universe—this explanation of what the "whole stock of energy" in the known *rerum natura* consists of, and this exclusion of all will or "volition," to make his theory complete, he somewhat contradictorily admits that, after all, the molecular groupings and molecular motions which were the whole "energy" in the world, "explain nothing!" He even descends from his lofty-seeming terminology to speak of this world-wide stock of "energy" as a series of "pushes" and "pulls," without any cause. Now here, at least, was a *hiatus* in his system, where "volition," one would think, might supply a want; and had he been a philosopher, instead of an experimentalist only, he would not have hesitated at once to suspend his theory that there was no *possible* place, except in the imagination of a "savage," for the supposition of volition "in the economy of nature." (*Sections 12, 13*.) Professor Tyndall, of course, admits that there

is something which "enables matter to act on matter," and then he assumes that it is "an inner quality" of matter, of which we know "nothing!" (*Section 15.*)

It would seem to require courage of an unusual kind (or, perhaps, a suspicion that materialism had been too strongly expressed) to enable Professor Tyndall after this to quote a popular story of some saying of Napoleon I., as to "Who made the starry heavens?"—and then to wind off with words which might afterwards be quoted to hint that there is a materialism which is not necessarily Atheism!

The inconsistency between the Professor's principles of Universal Materialism, and such a reference as this to a Supreme Volition, is transparent, even though it should, for the time, save the Theism of here and there a speculator. Professor Tyndall is obliged to own that in the universe, which he at first describes as so bound fast in fate that the "relation of physics even to human consciousness is invariable," (*Section 12*), other and unseen agencies innumerable are constantly at work, beyond all the "molecules" he can tell us of! Religion, however, we remind him, requires no further concession at first than a place for the "unseen agencies." So also prayer needs no more: but the Professor, we conclude, does not perceive this, because he has not studied the subject. If he would not think it too theological, abstruse, and hard, we would suggest he might begin by reading Mr. Croll's careful paper, entitled—"What determines molecular motion—the fundamental problem of nature?"

A love of truth, and a love of thoroughness, oblige us to dwell somewhat longer on the inconsistencies of this materialism in its controversy with religion. When pressed at any time by the charge that the absolute material necessity of universal nature destroys all reasonable religion, the materialists under our Professor's teaching will answer that, even if theologians quietly consent to give up their rationality, they still may rule supreme in the splendid domain of the "emotional." This means, apparently, that men may hope, and fear, and love, and so on, as irrationally as they please. Of course, this may suit the Professor; but it looks to thinkers like insult, and a mockery of the whole subject. For the plain answer is this:—Are not these "emotions" as entirely subject to your "material laws of the universe," as all the physical phenomena around us? If they are so, with what rationality and consistency can we be referred to the "emotional" for a religion beyond the domain of science?

The clergymen whom the Professor praises for refusing to pray for fine weather, most probably are as illogical thinkers as he is; otherwise, they would see that he has furnished them with premisses so comprehensive as to sweep away *all* their prayer-books, and something more, in the conclusions. They have yet, perhaps, to discover that no ingenuity can make a reasonable place for any part of religion, if it be granted that the constitution of the universe is unalterable in every particular, and cannot but be exactly what it is. Any simple example taken from Scripture, or from any book of devotions in any of the churches, might bring this very closely home to a religious mind.

Let any reflect, for example, on such words as these—spoken by a prophet to God Himself, and expressing a truth for us all—“Thou wilt keep him in perfect peace *whose mind is stayed on Thee*, because he trusteth in Thee.” Let this be rationally examined on the principles of universal and unalterable materialism, and the result is of this kind :—

‘The man who knows the unalterableness of every element of existence, may have a *quiet reliance on this knowledge*, come what may ! If, through any defect of his own, he has not this reliance, he may be unreasonable, but yet his own unreasonableness (if that word be at all admissible) is a part of the necessity of his original constitution, and so of his present condition ; and, therefore, it is not unreasonable, but natural, and is even an inevitable or necessary result ; and, therefore, so, it is to be acquiesced in, as really at the same time *reasonable*—even if unreasonable—which, of course, is absurd !’

Advise a person thus reflecting to have recourse to the “emotional” in his constitution, and surely you do not greatly help him, but rather complete his confusion, because he remembers that all human “emotions” are under the same universal law, and they cannot be stirred even by “volition ;” for volition cannot, by any but a “savage,” be supposed to “mix in the economy of nature.” And is he, a good materialist, to turn “savage” in order to keep his religion ? Or, can he, indeed, who is fixed, “turn” anything ?

The truth is, whether they perceive it or not, Professor Tyndall, and the deriders of prayer on his grounds, deny a moral world altogether ; but they do not like to admit it even to themselves. In words we find the Professor even contradicting himself thus :—

“Besides the phenomena which address the senses, which our mind can penetrate, there are laws and principles, and processes which do not address the senses at all ; but which must be, and can be, spiritually discerned.” (See p.p. 74 and 121.)

Could a treatise on the “Power of Prayer” begin with better words ? What then becomes of that totality of “the energy” of the universe which was described as so entirely materialistic ? Professor Tyndall is challenged to answer this. The verbal contradiction seems complete—the inconsistency simply irrational ; but the writer even here does not “speak out.” We complain of all the essayists of this class, that they say and unsay ; and (like the poet’s account of fear) they

“Back recoil, they know not why,
E’en at the sound themselves had made.”

Is it too much to ask for clear heads and honest hearts in those who venture before us on subjects like these ? A perception of the meaning of that which they oppose is the least we can require of them. Before they assail it let them state to themselves, at all events, what our “hypothesis of a moral world” implies—even a vast society of moral agents, individual springs of action, under the moral rule of one Supreme moral Being, the ultimate administrator of all righteousness. (See the “Analysis of Human Responsibility”) ; for until they have mastered this thought, they are not capable of

judging a great moral action, such as true prayer is, from the religious and moral point of view ; and their criticisms are only excused from profanity by being convicted of blindness.

On many grounds it may be well that the battle for Religion has been challenged on the field of Prayer ; because the issue must be both clear and comprehensive. Let no one imagine (as in a late university sermon) that there is any wisdom here in meeting the enemy half-way. On the side of the materialists there is no concession, no modification of the chain of universal necessity, no admission that a volition is conceivable in the "economy of nature." If they speak of prayer as the outlet of human emotions, they also make these emotions to be as truly subject to necessary and invariable law, as are the stars of heaven, or the winds and waters of earth. They know that to admit prayer at all, in the Christian sense, is to admit the Object of prayer, even God, as the moral Governor ; and the idea of God they pronounce "unthinkable, (which may be said of *all the precedentia of thought, as well as of being*"). We can, on our side, admit no less than that to negative prayer, on their ground, is to negative all religion.

To show the denier of prayer that he is shut up to Atheism is to oblige both sides in this controversy to understand their ground ; no slight gain for those who would avoid meaningless wrangling ; such atheism, too, it will inevitably appear, as must deny all morality, as well as religion,—so far as morality depends on volition, or the individual origination of action. We may press this fearlessly home, because the facts of human life and action will eventually always assert themselves and bear down the theorist. Our ethical philosophy must stand on the facts of human nature ; fact alone can determine whether there be a "moral world," in the Christian sense of the words. (See "The Whole Doctrine of Final Causes.")

One illustration shall briefly express what we all mean by a moral world, so that we may confidently leave any one to consider it and compare it with all his experience. Every one may determine for himself whether there is a class of "facts" not mechanical, or not distinctively or principally mechanical ; a class which we usually express by the term moral. Let the case be this :

A man overtaken by some heavy and crushing calamity, overwhelming himself and all who were most dear to him, obtains a sudden and wholly unlooked for alleviation. He may have obtained it in a variety of ways. First, we will suppose it may have come to him in a course of events uncontrolled by either friend or stranger, and perhaps it had come as inevitably, in fact, as the calamity itself had previously seemed to come. Or next, it may have been that the alleviation came through the intervention of the love of some one who deeply cared for him. Or thirdly, the same alleviation may have reached him through the gratitude of a dependent, or of one to whom he had formerly been good ; or fourthly, through the stirring, in many ways, of a "sense of duty," or supposed duty, in others ; or again, through a desire of some one to repair a previous wrong ; or again, in recoil from some plotted malignity ; and so on. There is no need to multiply hypotheses. The alleviation is a fact in each case, we will suppose, quite complete and unequivocal.

The question here arises then, what is the effect on the mind of the receiver? Simple gladness or satisfaction at the alleviation that had come would not, could not, be the entire result in any case but the first supposed. In none of the other cases would the man have the *same* feeling. Various shades of feeling, quite distinct from the mechanical result, would show with delicate accuracy the man's inward and personal appreciation of his deliverance, in some relation to his deliverance—feelings which he would think it *base to disavow*, feelings which belong to his own character, and the value of which he would simply be ashamed to think *wholly* mechanical. On these feelings the man might, or might not, rightly act according to a high standard; but he would know that he *ought*, and he would not like to think his own volition was in such case “excluded from the economy of nature.”

We shall say no more at present as to the “conception of a moral world,” which, we have observed, every one must form before he discourses on the Christian theory and practice of prayer. Enough is suggested, and more is not needed, to show that mechanical, or material causes will not explain all phenomena, and that will, and personal intelligence, have some place in our world. Materialists appeal with confidence at times to Mr. Herbert Spencer as their “thinker.” Will Mr. Herbert Spencer's admission that religion is, *per se*, a fact not to be ignored, satisfy Professor Tyndall? Or will Max Müller's painful “Science of Religion?” Or shall we ask him to ponder a little the words of Mr. John Morley, in his recent book on Voltaire, as we have seen them quoted:

“There is an unknown Element at the bottom of the varieties, whether we agree to call that element a Volition of a superior Being, or an undiscovered set of facts in embryology.”

Truer thinkers than the experimentalists can thus conceive a possible place for that “volition,” the announcement of which is the announcement of the “moral world,” which Christianity and humanity alike assert.

Then, finally, let us think of Prayer as the act and habit of an Agent who originates thought, will, desire, and who is one of a community of such agents, mutually acting on each other, beneath a moral Supreme Governor, whose rule is inseparable from the conception of a vast Community of such responsible agents. (See again “The Analysis of Human Responsibility.”)

As Christians, we derive our notions of prayer from Christ our Master. He has taught us that prayer is the expression of our will, and so discovers our own character. Nothing so truly determines *what we are* as our real wishes. If we put our wishes into words, they are either petitions to men, or prayers to God. In the latter case, we have to consider that, putting our will into words before our Supreme moral Governor, we are speaking to Him who also has a will as to everything; and as He is our perfect ruler, we ought to defer to His will in expressing our own. We secure the higher morality of our own acts of will by conforming in detail to the Supreme will. To Christians the ascertainment of that Supreme will is no impossible or unrewarded aim of the faith and the reason; just as the conscientious ethical effort of any

man is also followed, in things natural, by a growing success in virtue. Effort from the individual, as the frequent spring of action, however subtle in its origin, is a *fact* vindicated in its results. The Christian attempt to conform to the All-perfect is thus encouraged by both the precept and example of our Master.

"After this manner pray ye," is His first precept and instruction for prayer; and its first movement is towards placing man in his true relation at once with God his Father. "Thy name be hallowed—thy rule or kingdom prevail—Thy will be done, as in heaven so on earth;" this is the preliminary condition of all prayer. *All* is to be "after this manner." And His own last personal example of prayer before he died is this, "Not my will but *Thine* be done." The very coarse supposition of the deniers of the moral world—that we in our prayers are to attempt to give law to God, is their own travestie. Even our effort in prayer to rise to the Divine goodness so that we can even believe we are reaching it, "in prayer believing," is still guarded by this,—“Ye ask and receive not if ye ask amiss, to consume it on your lusts.”

And thus we do not shrink from the examination of the broad question as to the whole subject of definite answers to prayer, if once it be based, as Christ has based it, on this moral foundation. A grand answer to such inquiries is to be found indeed in the lives of all the Saints, both under the Old Covenant and the New. Elijah's prayer both for and against rain, is referred to in the New Testament expressly to tell us how "effectual" even in detail, may often be the prayer of the "righteous," i.e., of those who have brought their will to be one with God's. So Job's intercessions are truly "answered," because he had spoken of God "the thing that was right." On the other hand, St. Paul's prayer for deliverance from some special affliction, being in some degree "asked amiss," was answered not directly, he says, but in a way that brought his will nearer to God's will,—“My grace shall be sufficient for thee.”

What prayer, indeed, has actually done on the largest scale, the whole world can tell. Those few men praying in the Upper Chamber a few days before the first Pentecost set in motion causes which, by the will of God, have created Christendom, and (what is more than all that is commonly called Christendom) a line of "saints" from age to age who have lived above the world, and helped in ten thousand ways to raise the world also. And it is not in the Bacons and Newtons and Keplers alone—the world's giants—nor even in Athanasius or Anselm or Bernard, that we have knowledge of the dignity and moral power of prayer, but in humble hundreds of millions of a baptized world, whose countless utterances, "Thy will be done," have conformed them to that will, and calmed their lives, and cheered their deaths. But there are some things, even as to prayer, which St. Paul said it "was not lawful to utter"—the secret communings of the Spirit of Man with the "God who heareth Prayer." We speak but to Christians here. They have "fellowship" with God.

To conclude. There are no facts more certain, more universally recognized,

more indestructible, than the moral and religious realities of human consciousness. Among those facts the distinctively religious are the plainest. The *consensus omnium* as to the being of a Power superior to Nature is a fact. The conscious good of Being, and hope of Future being, are facts. The desirableness of Right-doing; the wisdom of a pure direction of our Will; the inward Peace of nobleness in action; the inward sense of Retribution for wrong;—these are “facts” which, as Mr. Herbert Spencer will yet teach his feeble followers, cannot be ignored in a true philosophy. Here it is that we see how the physical order of nature and the moral are distinct. Experimentalists insist that the physical order is a necessary whole; they would say, with emphasis, that all “molecules” are mutually dependent beings. But in the moral world we all recognize individual agency,—agency from itself, upon itself, and amidst, and upon the whole.

The Materialists’ philosophy is self-limited at the outset to the phenomenal. It begins with the contradictory assumption that there is no unphenomenal and no prephenomenal. Then it recoils from its assumption, on finding that it cannot detect the starting-point of phenomena, and is obliged to own a coming forth from the unseen.

Some reason that precedes reasoning; some *ego* that precedes thought and action, is as indispensable to Materialists as to us. And the moment they admit this, they have surrendered the entire pretended principle on which alone they can call in question the Christian doctrine and practice of Prayer.

Their Pantheistic-seeming phrases as to the “conservation of force,” or “conservation of energy,” will not help the Materialists in the least to evade our conclusion. The mutual “convertibility,” or the “conservation” alike attests the unseen power which “converts” or “conserves.” So, then, the Experimentalists’ denial of Prayer, as the Scriptures teach it, is not only a denial of Christianity, but a denial of all communion of man and God; and it is even a rejection of the primary admissions of science itself, and of facts of the world, both physical and moral.

WILLIAM J. IRONS.

ANNUAL GENERAL MEETING,
HELD AT THE HOUSE OF THE SOCIETY OF ARTS,*

FRIDAY, JUNE 14, 1872,

THE RIGHT HON. THE EARL OF SHAFTESBURY, K.G., PRESIDENT,
IN THE CHAIR.

The Honorary Secretary, Captain F. Petrie, read the following report :—

*SIXTH ANNUAL REPORT of the Council of the VICTORIA
INSTITUTE, OR PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.*

Progress of the Institute.

1. In presenting the Sixth Annual Report, the Council has to congratulate the Members and Associates on the marked improvement in the Society's position, mainly due to a considerable accession of new Members, several of whom are

* On this occasion a numerous company assembled, among whom were His Grace the Archbishop of York, several Peers, Prelates, and leading Clergy and Laity of various denominations. Letters expressing regret at being unable to be present were read from the Archbishop of Canterbury (in consequence of the consecration of a Church), the Bishop of London (on account of ill-health), the Earl of Lichfield, Viscount Mahon, the Bishops of Chester, Gloucester and Bristol, and Bishop Suffragan of Nottingham, the Right Hon. Stephen Cave, M.P., the Hon. Sir R. Lush, Dean Goulburn, and other members.

well known in the literary and scientific world. A full review, however, of the requirements of the Institute, and of the duties it is called upon to fulfil, has satisfied the Council that not until the number of Members and Associates has been raised to five hundred (of which not more than one hundred should be Associates) can the Society's present sphere of action be extended and its objects fully realized. Consequently, the necessity for co-operating with the President and Council in increasing the strength of the Institute by introducing suitable supporters, will, it is hoped, press itself on each Member and Associate.

2. Since the last Annual Meeting, the Council, after full deliberation, decided upon recommending the amalgamation of the lists of Members and First-Class Associates; and this recommendation was confirmed at a duly-summoned Special General Meeting, held on the 4th of December, 1871.

3. Four vacancies in the Council have been filled up by the election of the Rev. William Arthur, D.D., C. R. Bree, Esq., M.D., Henry Cadman Jones, Esq., and the Rev. J. G. Wood, M.A.

4. The appointment of a paid Secretary is deferred until such an expense can be incurred without detriment to the interests of the Institute.

5. With a view to the convenience of Members, the Reading- and Writing-room, and the Library, have been thrown open from ten till six o'clock. Although, of late, many valuable additions have been made to the Library, and several learned institutions, including the Royal Society, have enriched it by exchanging Proceedings with the Institute, yet it is by no means so extensive as desirable, and gifts of books, as well as further subscriptions to the Special Fund, are invited.

6. The Council regrets to announce the decease of the following valued supporters of the Institute:—Mrs. Bartlett (Foundation Associate), Rev. J. B. Owen, M.A., one of the Council (Foundation Member), the Rev. G. Rankine, B.C.L. (Foundation Member), the Rev. H. Walsh, M.A. (Life Associate).

7. The following is a statement of the changes which have occurred during the past twelve months:—

	Life		Annual	Associates.	
	Members.	Associates.	Members.	1st cl.	2nd cl.
Numbers on 1st May, 1871.....	22	5	164	9	56
			┌───────────┐		
			.173		
Deduct deaths ...	—	1	2		1
		—	—		—
		4	171		55
Withdrawn	—	—	1		1
			—		—
			170		54
Changes	—	—	+3		-3
			—		—
			173		51
Joined between May 1st, 1871, and May 1st, 1872	6	1	36		31
	—	—	—		—
	28	5	209		82
	└──────────┘		└──────────┘		
	33		291		
				33	
				—	
			Total	324	

Finance.

8. The Audited Balance Sheet of the Treasurer for the year ending 31st December, 1871, is appended, showing a balance in hand of £19. 8s. 5d., after the payment of every debt up to the last day of the year; so that the Institute entered on the year 1872 wholly free from any liability whatever.* It will be observed that the Balance Sheet has been divided into two parts, one headed "General Account," and the other "Special Fund for Library, &c." The first exhibits a balance in hand of £15. 12s. 1d.; the second, a balance in hand of £3. 16s. 4d. The total amount now invested in the New Three per Cent. Consols is £359. 2s. 2d.

* This was owing to the Institute's funds having been relieved from the payment of a Secretary's salary since the 31st January, 1871, the increase of Members, and a system of rigid economy.

9. The arrears of subscription are now as follows:—

	1869.	1870.	1871.
Members.....	3	2	—
Associates	—	—	1
	<hr/>	<hr/>	<hr/>
	3	2	1

10. The estimated ordinary assets of the Institute for the current year, exclusive of arrears and of new subscribers, are as follows:—

209 Members, at £2. 2s.	£438 18
82 Associates, at £1. 1s.	86 2
—	
291 Annual Subscribers.	
33 Vice-Patrons, Life Members, and Life Associates.	
(Dividend on £359. 2s. 2d. Three per Cent. Stock)	10 11
—	<hr/>
324 Total	£535 11

Of this total, it is proposed to invest the sum of £147, being the Life Subscriptions paid in 1871.

Meetings.

11. The following is a list of the papers for the present session, viz.:—

- On the Serpent Myths of Ancient Egypt. Illustrated with Diagrams. By W. R. COOPER, Esq., Sec. Soc. Biblical Archæology. (Dec. 4, 1871.)
- On Chance Impossible. By J. H. WHEATLEY, Ph.D. (Jan. 8, 1872.)
- On the Influence of Colloid Matters upon Crystalline Form. By W. M. ORD, Esq., M.D. (Intermediate Meeting, Jan. 22.)
- On Natural Theology, considered with respect to Modern Philosophy. By the Rev. G. HENSLOW, M.A., F.L.S. (Feb. 5.)
- On Fatalism. By the Rev. J. ROBBINS, D.D. (Intermediate Meeting, Feb. 19.)
- On Prehistoric Monotheism, considered in relation to Man as an Aboriginal Savage. By the Rev. J. H. TRITCOMB, M.A. (March 4.)
- On Force and its Manifestations. By the Rev. J. M'CANN, D.D. (April 1.)

On the Bearings which the recent Researches upon the Seat of Language have on Darwinism. By Dr. BATEMAN. (Intermediate Meeting, March 18.)

On the Rationality of the Lower Animals. Lecture by the Rev. J. G. WOOD, M.A., F.L.S. (Intermediate Meeting, April 15.)

On Phases of Superstition, Social and Religious. By the Rev. J. B. OWEN, M.A. (May 6.)

On the Relation of Professor Tyndall's "Fragments of Science for Unscientific People" to Theology and Religion. By the Rev. Prebendary W. J. IRONS, D.D. (June 3.)

Annual Address. By the Rev. Professor KIRK. (June 14.)

12. Although the regular "ordinary" meetings during the present session have been only monthly, yet others have taken place, at which—in accordance with the fifth object of the Institute—subjects not necessarily requiring permanent record in the *Journal of Transactions*, were taken up in Papers or Lectures, followed by discussions. The advantage in reducing the number of "ordinary" meetings is that the issue of the printed Transactions will be more prompt than heretofore.

13. The meetings during this session have been well attended; that of the 3rd June was held at the large hall of the Society of Arts, the rooms of the Institute not affording adequate accommodation.

Publications.

14. The fifth volume of the *Journal of Transactions* was issued early this year, and included an entirely revised list of the Members and Associates; a re-cast catalogue of the Library, showing the books separate from the pamphlets; and also a list of those who had kindly contributed Works during the past year. Part 21 of the *Journal of Transactions* appeared in April; Part 22 is now in the press, and will be issued this month; Part 23 will be published in September, and Part 24 in December, completing the Sixth volume of our *Journal of Transactions*; it will include several of the Papers and Discussions of the present session.

15. The number of those (not supporters of the Institute) who have availed themselves of the publications has greatly increased.

Conclusion.

16. In conclusion, the Council desires to state that the VICTORIA INSTITUTE was originally devised upon a large scale,

and it is evident that it ought to be no small Society, considering the interests at stake, and the important objects which it seeks to accomplish. That such an Institute was needed, and can do good service, has been fully proved.

Signed on behalf of the Council,

SHAFTESBURY, *President.*

The Honorary Treasurer, W. N. West, Esq., then read the following Balance-sheet :—

SIXTH ANNUAL BALANCE SHEET, from 1st January to 31st December, 1871.

GENERAL ACCOUNT.

RECEIPTS.	£.	s.	d.
Balance from 1870, brought forward	14 14 11
Subscriptions:—			
7 Life Members	147 0 0
1 Member for 1869	2 2 0
3 " 1870	6 6 0
159 " 1871	333 18 0
2 " 1872	4 4 0
26 Entrance fees	27 6 0
9 First Class Associates, 1871	18 18 0
2 Second Class " Life	21 0 0
2 " " 1870	2 2 0
64 " " 1871	67 4 0
1 " " 1872	1 1 0
			<u>631 1 0</u>
One year's Dividend new 3 per Cent. Annuities	10 10 11
Sale of Journals	11 14 1
			<u>£668 0 11</u>

EXPENDITURE.	£.	s.	d.
*Printing	255 19 0
Binding	5 16 0
*Reporting	49 6 0
*Stationery	22 17 8
Postage	35 5 7
*Advertising	19 9 0
Refreshments at and Expenses of the Meetings	10 16 0
*Rent (Six quarters)	120 0 0
*Salary to Mr. W. H. S. Aubrey, July 1st, 1870, to } Jan. 31st, 1871	58 6 8
Salary to Clerk for the year 1871	29 18 0
Housekeeper	21 6 3
Travelling Expenses	10 14 10
Coals	3 5 0
Gas	2 2 4
Insurance	0 12 0
*Sundry Office Expenses	6 7 11
Bankers' Charges	0 6 7
Balance at the Bankers	15 12 1†
			<u>£668 0 11</u>

SPECIAL FUND FOR LIBRARY, &c.

	£.	s.	d.
Balance brought forward from 1870	16 16 6
			<u>£16 16 6</u>

	£.	s.	d.
Books, Repairs, &c.	13 0 2†
Balance at the Bankers	3 16 4†
			<u>£16 16 6</u>

We have examined the Balance Sheet with the Books and Vouchers, and find a Balance in hand of £19. 8s. 5d.†

W. VANNER,
G. C. HARRISON,

} Auditors.
W. N. WEST, Treasurer.

† The items marked thus include debts incurred in 1870. See Section 8.

DONATIONS TO THE SPECIAL FUND.

Paid prior to 31st December, 1869.

	£.	s.	d.
S. MORLEY, Esq., M.P.....	100	0	0
I. BRAITHWAITE, Esq.	25	0	0
R. MULLINGS, Esq.....	10	0	0
Dr. J. H. WHEATLEY	10	0	0
H. W. BLEBY, Esq., B.A.	5	0	0
T. PROTHERO, Esq.....	3	3	0
A. J. WOODHOUSE, Esq.	3	3	0
W. N. WEST, Esq.	2	2	0
G. WILLIAMS, Esq.	1	1	0
Rev. J. H. RIGG, D.D.	1	1	0
	<hr/>		
	£160	10	0

Paid during 1870.

	£.	s.	d.
ROBERT BAXTER, Esq.	52	10	0
W. McARTHUR, Esq., M.P.	21	0	0
JOHN NAPIER, Esq., <i>Glasgow</i>	10	0	0
W. VANNER, Esq.	10	0	0
Vice-Admiral HALSTED	5	0	0
S. PETRIE, Esq., C.B. (the late)	5	0	0
Rev. J. H. A. WALSH, M.A., <i>Bishopstow</i>	5	0	0
Rev. W. NIVEN, B.D.	5	0	0
Rev. W. H. BATHURST, M.A.	2	2	0
Captain JASPER SELWYN, R.N., <i>Tring</i>	3	0	0
Dr. FRASER	5	0	0
T. W. MASTERMAN, Esq., <i>Tunbridge Wells</i>	5	5	0
W. H. INCE, Esq.	2	2	0
Rev. C. KEMBLE, M.A.	5	0	0
A. V. NEWTON, Esq.	3	0	0
Rev. J. B. OWEN, M.A.	3	0	0
CHARLES BROOKE, Esq.....	5	0	0
Rev. A. DE LA MARE, M.A.	3	3	0
JOHN SHIELDS, Esq., <i>Durham</i>	2	2	0
S. D. WADDY, Esq.	5	5	0
E. CHANCE, Esq., J.P. <i>Malvern</i>	2	2	0

Carried forward ... £159 11 0

	£.	s.	d.
Brought forward	159	11	0
Very Rev. Dean PAYNE SMITH, D.D.	1	1	0
J. LEWIS, Esq., R.N., <i>Southampton</i>	1	1	0
Rev. C. A. ROW, M.A.	1	1	0
Rev. J. H. TITCOMB, M.A.	1	1	0
G. C. HARRISON, Esq.	1	0	0
Rev. C. SKRINE, M.A.	1	0	0
J. SHAW, Esq., M.D., <i>Boston</i>	1	0	0
W. PAYNE, Esq.	1	0	0
Rev. R. THORNTON	3	3	0
Rev. G. R. BADENOCH	1	1	0
	<hr/>		
	£171	19	0
	<hr/>		

1872.

	£.	s.	d.
A. McARTHUR, Esq.	42	0	0

Total £374 9 0

THE EARL OF HARROWBY, K.G.—My Lord, Ladies, and Gentlemen,—I hardly know why I have been put forward in so prominent a position, except from two circumstances: the one is that I am a novice here—I have only had the honour lately of joining your Society, and I know there is often more rejoicing over a new comer than there is in retaining an old friend; the other reason is that for the last two years—that is, since its foundation—I have had the high honour of presiding over the Committee of a somewhat kindred body, namely, the Christian Evidence Society, whose objects, although not identical, are similar to some of those of this Institute. Now, we are here, as I understand it, more as a Society of Christian Philosophers ourselves; we are mostly if not all among those who have been convinced that the phenomena connected with the Christian religion are not easily explained except upon the supposition of its truth, and that it requires a good deal of evidence to counteract, or even to shake for a moment our confidence in the truth of those conclusions which the weight of the phenomena attending Christianity would naturally lead us to. (Cheers.) We therefore, I imagine, are just in this position:—We do not pretend to establish the truth of Christianity, or to come to any distinct conclusion upon it; but we are so far prejudiced in its favour that we are inclined to think we have a right to sift the theories which are produced against it, and that it is our duty to do so. We think we have a right, when some men of science—not the majority, but some very distinguished and eminent men—come

forward with a number of theories which apparently are incompatible with the truth of that which we believe, and which the majority of the civilized world has believed for many centuries—when a number of men come forward with theories of this kind, apparently in contradiction of the received truths, we feel ourselves entitled to sift very closely what they produce, and to see whether their conclusions will bear the test of examination; (Hear, and cheers) or whether they are the results of an imagination heated and kindled by the discovery of progressive facts in physical science, which very often from their novelty, from the wonderful insight they give you into the operations of nature, dazzle the minds of those who first discovered them; whether these things are really so soundly established as they pretend to be, or whether they are only the results of rather too hasty conclusions. (Hear, hear.) I believe the philosophical world has of late been somewhat startled by the coruscations that have emanated from certain philosophers, who seem to have departed from the path of calm investigation and induction based upon a large examination of particulars leading to definite conclusions, and to have been content to launch the hasty theories that are naturally suggested by new discoveries, but which have not been fully investigated. It seems to me that we have come back, as it were, to those brilliant theorists of the old world, who were content to imagine how things might be, rather than how they were ascertained to be. They used to say that everything that was light must ascend, everything that was hot must burn, and they had a number of other general maxims upon which they built large conclusions. I met with a specimen of this kind of reasoning the other day in an old work, which in my early days was read with great interest, and obtained for many years a great reputation as a scientific work. I allude to Burnett's "Theories of the Earth." There is given in that work a beautiful description of how the earth might have been put together, but not based upon any evidence as to how it was put together. It is a beautiful book, written in glowing language, and displaying a large fertility of imagination well fitted for men of modern times, judging from some of the magnificent orations we have seen upon certain theories as to the mysteries of creation, which seem to be rather going back than forward, and quitting the calm paths of induction for older methods of reasoning, which misled our less scientific ancestors. I think that it is our business to investigate the theories that are propounded, whether they be connected with metaphysics or physics; to look at them calmly, and to see if they necessarily lead to those conclusions which their propounders would have us to draw. I do not think anything can be more valuable than the spirit of a Society engaging in this work. It is a constant check upon those hasty inferences which dazzle very much, and which, while they dazzle, they blind, especially the senses of younger men, and particularly women, who, when they see a theory proposed by a man of eminent name, of high personal character and great scientific knowledge, take it for granted at once that it must be true. (Hear, hear.) Unless there were some means set at work to test the truth of these theories as they appear, they would have a much wider influence than they now have. This duty of investigating I believe to be our

work, and upon that ground I have had great pleasure in joining this Institute. (Cheers.) I beg leave now to express my satisfaction at the progress of the Institute as indicated in the report; but it is the duty of each of us to do more and more to add to that progress. I hope more of our scientific men will come forward boldly to express their own internal convictions, which we know they possess, and that they will be found standing shoulder to shoulder, ready to throw the weight of their great influence into the scale, which sometimes seems almost to tremble on account of the assumed authority of certain other great names. We can well appeal to ancient names of very great weight, but there are still many modern names of great weight whom we would call as compurgators—to use a legal phrase—in our behalf. I beg to move that the Report which has been read be printed and circulated among the members. (Cheers.)

Sir DONALD M'LEOD, C.B., K.C.S.I.—My Lords, Ladies, and Gentlemen,—The proposer of this motion has already so fully explained the objects of the Institute, that it is quite unnecessary for me to touch upon that subject, and I am even a more recent adherent of this Society than he is. I am, in fact, as yet comparatively a stranger to England, and can only bring my experience in other lands to bear upon questions of this nature. That, however, I certainly can do with great confidence in this matter. We live, as we all know, in a period of great mental activity. We are told in the Scriptures that in later times men shall run to and fro and knowledge shall increase. Everything seems to indicate that we have arrived at that period of the world's history. When we see men of remarkable talent taking up questions which have tended greatly to unsettle men's minds on the most important of all topics,—when we see men of eminence taking up that position, it surely is highly incumbent on all those who apprehend the results that must ensue, to stand forward boldly and endeavour to counteract them. (Cheers.) That I take it is the object of this Institute. (Cheers.) It would be very undesirable, as I have heard elsewhere remarked, to speak with anything like severity, or in a tone of sneer, in regard to those who conscientiously put forward opinions that they have formed, but certainly it is the incumbent duty of all those who do not concur not to keep silence. In the land in which my lifetime has been spent—the great land of India—the intellect of the people is beginning to be aroused in a very remarkable manner. Our educational institutions are having a material, and I am afraid not always a very beneficial effect; and we may rest assured that if that intellectual development which is there largely taking place be not directed into wholesome channels, the day will be a day of disgrace upon, and one of reproach to England, when the intellectual development of India shall have attained to an advanced position, and the young men now being trained in our institutions are able to take a lead and stand apart from us, as they no doubt will do. (Hear, hear.) I know that in Calcutta and in our Presidency towns, a very large number of our youth are largely infected by the writings of those who do not profess our views of the Christian religion. Socinians and even atheists have made their way amongst them, and I was very

much struck myself, once, by hearing a native chief with whom I was closely connected, and one who had been at one time strongly inclined towards Christianity, and had almost adopted it, tell me that a perusal of the works of a divine which tended to throw doubts upon the authenticity and authority of the Scriptures, had entirely stopped him in his onward advance, and more than anything else, had led him to hesitate whether he should take up the cause of Christianity among his countrymen. Thus on all sides we must see that the youth of the rising generation are exposed to very great temptations and difficulties (hear, hear), and it is for societies like this to take care that, so far as may in us lie, all shall be done that can legitimately be accomplished to correct the mischief or prevent its progress. (Cheers.) I consider it to be one of the great advantages of this Society that it is not content with the delivery of lectures, *vivâ voce*, but that the thoughts of powerful minds are placed by it on record, so as to be capable of being widely disseminated. I hope that India as well as other lands will reap a large benefit from the works of the Victoria Institute. I have great pleasure in seconding the resolution for the adoption of the Report, and in expressing my gratification at learning that the Society is progressing.* (Cheers.)

The resolution was unanimously agreed to.

The Rev. J. HILL, D.D.—My Lords, Ladies and Gentlemen,—The following resolution has been put into my hands :—“That the thanks of the members and associates be presented to the council and honorary officers for their efficient conduct of the affairs of the Victoria Institute during the past year.” (Cheers.) I am not aware of any special propriety with which this resolution has been entrusted to me except this, that I heartily concur with the expression of the resolution, and that I trust my fellow members and associates of the Victoria Institute will permit me on this occasion to be their mouthpiece in expressing how much we are gratified with the manner in which the council and honorary officers of the Institute have forwarded its interests. (Cheers.) At present my acquaintance with the Institute is limited to the past year, but during that time I have had reason to know much of the operations of the Society. I have been much gratified by hearing the various speeches which have been delivered, and the papers which have been read, and I have listened to most interesting discussions upon different questions which, if they did not quite convince, at any rate compelled much thought to be directed to the subjects. All of the papers treated upon those great truths which it is necessary for us to examine time after time, going about our Zion and the towers thereof, strengthening its bulwarks so that we should be not only satisfied ourselves of the sacred truths we hold, but be able to give an answer to any

* The Institute numbers members and associates in many parts of the world, and, as far as possible, honorary foreign correspondents and honorary local secretaries are being secured both at home and abroad.

man who asks us the reason of the faith we hold, in all meekness and in all confidence at the same time. (Cheers.) I am persuaded that the way in which the council and honorary officers have managed the affairs for the members of the Institute, is of a very satisfactory kind. I could not help feeling sorrow when I heard read just now the names of those members who have died during the past year. I remember that almost the last paper I had the privilege of hearing at a meeting of this Society, was one from a member of the council who is now no more, the Rev. J. B. Owen. He has gone to his rest, but his works, I am persuaded, will leave a beneficial influence behind him. (Hear, hear.) With respect to the hints thrown out in the report that our officers are unpaid, there is a proverb that unpaid work is never well done ; but I would bear testimony to the fact that the work of the honorary officers of this Institute is an exception to that rule, for I conceive it to be admirably done. (Cheers.) I have at all times been gratified at the courtesy displayed by individuals connected with the Institute. I never yet had occasion to make an inquiry as to any question upon which I wished to get information that I did not obtain it courteously and directly. On the merits of the great subject which has brought us together, it would not become me at this hour of the evening to dilate, but I have been struck by a good deal of what we have heard, especially by the fact that the opinions that are apparently safely promulgated in this part of the world produce such dire effects in other places, particularly among the young. It is like throwing about a firebrand of doubts with regard to our holy faith, and we must wonder rather at those who give rise to these doubts, from the fact that they profess themselves to be inquirers after truth. There is a great field of truth and of zeal open, and why should there be any attempt to ignore the pursuits of truth in that grand department of the human intellect which unites us with eternity and the Supreme Being, and simply to give ourselves to the mere material elements of the world around us ? Must these inquirers limit the province of entering into higher questions ? Perhaps some of you can recall the anecdote of Newton and Dr. Halley. Halley, the famous astronomer, was rather tinctured with the fashionable unbelief of that day, and on one occasion he used expressions in the presence of Newton that threw some contempt upon Revelation. Newton is said to have remarked to him, " Dr. Halley, on all questions of astronomy when you speak I hear you with the greatest pleasure ; but upon questions with regard to Revelation and the Divine purposes I hear you with pain, because you have not given such attention to that subject as entitles you to be authority upon the point." (Hear, hear.) In point of fact, the people who throw about these dangerous opinions have not sufficiently weighed those great departments of mind and thought which are brought before us in life and immortality, which Matter can never bring before us, and which we know alone from Revelation. On the contrary, they altogether ignore these questions, and devote their attention to mere material things. (Hear, hear.) I have great pleasure in proposing that a vote of thanks be tendered by the members and associates of the Victoria Institute, to the Council and to the honorary officers for their

efficient conduct of the affairs of the Institute, and I recommend the motion to the acceptance of the meeting. (Cheers.)

Mr. G. C. HARRISON seconded the resolution. Unanimously agreed to.

Mr. A. McARTHUR.—My Lords, Ladies, and Gentlemen,—Our time is limited and valuable this evening, and there are yet several speakers to address the meeting, to whom I am sure you will listen with very great pleasure and profit. You have also to hear, what I have no doubt all of you will pronounce very admirable, the Annual Address from Professor Kirk, who is no stranger to this Institute, and has on several occasions rendered us valuable and efficient services. (Cheers.) I feel, therefore, that it would be altogether out of place were I to occupy many moments of your time. Allow me, however, on behalf of the Council of the Victoria Institute, to thank the meeting for the manner in which this vote of confidence has been proposed, seconded, and received. I am quite sure that the Council of the Institute appreciate and value this expression of confidence on the part of the members, and I trust that during the coming year they will endeavour to make themselves still more worthy of such a resolution on a future occasion. I may just say that most of the members of the Council are gentlemen who are largely engaged in various ways, whose time is very valuable, and I believe that nothing but a sense of duty would have induced them to devote so much of their time to the Institute as they have done. They have felt, as has already been expressed in the report, and by one or two speakers, that an Institute of this kind was necessary and calculated to be useful; and every succeeding year since its commencement has fully convinced us that we were right in the ideas we then entertained. I may also say, with reference to the remark of the seconder of the motion, that the unpaid work of the Institute has been well done, that we are under many obligations to our honorary treasurer and secretary. (Cheers.) The duties of the treasurer are not very onerous or heavy, but he has discharged them faithfully and efficiently. The duties, however, of the secretary have been very onerous, very laborious, and very successful. (Cheers.) The secretary, on his part, has intimated that the success of the Institute has arisen from two or three causes—one, the fact that we have not had to pay a secretary, and another, the increase of members. But, my lord, I think I express the opinion of the Council and of all the members of the Institute who know much about its working, when I say that the great progress we have made during the past eighteen months has been mainly and almost entirely owing to the indefatigable exertions of our honorary secretary. (Cheers.) He has thrown an amount of energy into the work which has surprised and delighted us all. Many of us, when deprived of the valuable services of our late esteemed and worthy honorary secretary, Mr. Reddie—who was suddenly cut down—felt very much disheartened, and were afraid that the Institute, if it did not positively go down, would suffer very materially. But, my lord, we have here an illustration of the old adage, that while Providence buries His workmen, He carries on His work. Captain Petrie came to our assistance. He has rendered us most valuable and efficient services, and it is

principally through his exertions that we are in the state in which we find ourselves this evening. (Cheers.) I trust that the information given in the report and by one or two speakers also, will be borne in mind by the meeting, and that you will feel that while we are grateful for the position we occupy, we must get up our number to 500 before we can have that influence which I trust we shall yet exercise. It is said that we live in peculiar times. Perhaps there never was a period when the contest between light and darkness, between truth and error, was carried on with greater energy, ability, and determination, than it is at the present period ; and although we believe that truth is mighty, and must and shall prevail, yet much must depend upon how we, as individuals, discharge our duty, and support societies like this. (Cheers.) It is a trite saying, but no more trite than truthful—the saying of the immortal Nelson—that “England expects every man to do his duty.” At this time Christianity expects every man to do his duty, and the duty of every Christian man is to forward the interests of the Institute to the best of his ability. (Cheers.) I beg to thank you cordially for the vote of thanks which you have passed.

Captain F. PETRIE (Honorary Secretary).—My Lords, Ladies, and Gentlemen,—I return you my most hearty thanks, and also those of the Honorary Treasurer, for the kind manner in which you have spoken of the honorary officers of the Institute. The Honorary Treasurer will, I am sure, pardon my saying that the Institute owes much to him for one of the most important parts of the work in an Institution of this character is taking care of the funds ; in point of fact, its Chancellorship of the Exchequer. I have endeavoured, as far as I could, to support him in showing a good balance-sheet ; but though we want money, yet we want men, and good men. That is why I am so pleased to see that it is urged in the Report that the Members and Associates should co-operate with the President and Council in increasing our strength. (Cheers.) That, believe me, is one of the most important matters touched upon in this Report. When we have got a large number of Members, and good Members too, the papers will increase in value, although those which have been read this Session and in previous Sessions are, many of them, much sought after, which is a fair indication of their value. (Cheers.) As one of our learned societies has subscribed for 250 copies of a recent paper—(cheers)—I need say no more upon this point, except that with an increase in the number of Members there must necessarily be an increase in the value of the discussions. Before I sit down, I must again express my thanks for the kind expressions used in reference to myself. All that I have attempted, I have tried to do with all my might, because that which is worth doing at all is worth doing well. (Cheers.) May it have been “*ad majorem Dei gloriam.*” (Cheers.)

The Rev. S. BLACKWOOD, D.D.—The resolution which I have to move is of a very simple and formal character—“That the following be the Council and Officers for the ensuing year” :—

COUNCIL AND OFFICERS FOR 1872-3.

President.—The Right Honourable the EARL OF SHAFTESBURY, K.G.

Vice-Presidents.

PHILIP HENRY GOSSE, Esq., F.R.S. Rev. WALTER MITCHELL, M.A.

*CHARLES BROOKE, Esq., M.A., F.R.S., F.R.C.S., &c.

Rev. ROBINSON THORNTON, D.D.

Honorary Foreign Correspondent.—CONSTANTIN DE TISCHENDORF,
LL.D., D.C.L., &c.

Honorary Treasurer.—WILLIAM NOWELL WEST, Esq.

Hon. Sec. and Editor of Journal.—Captain F. W. H. PETRIE,
F.G.S., F.R.S.L., &c.

Honorary Foreign Secretary.—EDWARD J. MORSEHEAD, Esq., H.M.C.S.

Council.

ROBERT BAXTER, Esq. (*Trustee*).

Rev. A. DE LA MARE, M.A.

Rear-Admiral E. G. FISHBOURNE,
C.B.

R. N. FOWLER, Esq., M.P. (*Trustee*).

WILLIAM H. INCE, Esq., F.L.S.,
F.R.M.S.

ALEXANDER M'ARTHUR, Esq.,
F.R.G.S.

ALFRED V. NEWTON, Esq., F.A.S.L.

WILLIAM M. ORD, Esq., M.D.

S. D. WADDY, Esq., B.A., Barrister-at-Law.

WILLIAM VANNER, Esq., F.R.M.S.

ALFRED J. WOODHOUSE, Esq.,
F.R.M.S.

Rev. J. H. RIGG, D.D.

*Rev. C. A. ROW, M.A.

*Rev. J. H. TITCOMB, M.A.

Rev. M. DAVISON.

J. A. FRASER, Esq., M.D., I.G.H.

Rev. G. HENSLOW, M.A., F.L.S.

*Rev. CHARLES GRAHAM.

T. W. MASTERMAN, Esq.

H. CADMAN JONES, Esq.

Rev. J. G. WOOD, M.A., F.L.S.

Rev. W. ARTHUR, D.D.

C. R. BREE, Esq., M.D., F.Z.S., &c.

I will only say that as a foundation member of this Institute I have recognized from the first, its great importance, and the fact that, in the present state of society, there is a demand for such an institute as this. I may add that though we live in critical times, and the truth on the right hand and on the left is brought into great controversy and contest, I for my part have no fear for its victory, either against science falsely so called, or the attacks of false religions. (Cheers.) I have seen it suggested in various publications of the day that science is progressive, and that it is a blot upon our religion that it stands still. To my mind that is a proof of its reality. (Hear, hear.) Truth is eternal and unchangeable. It is the rock of ages. The waves may float around and change and dash against it, but they pass away in foam, while truth still remains. (Cheers.) I fully recognize what our friend Mr. M'Arthur said that at the same time it is our duty to do our work in relation to that truth with respect to those with

* Editorial Committee of Reference.

whom we are brought in contact, and especially with regard to the rising generation. I do believe that this Institute is calculated to perform an important subordinate work in the advancement of the grand cause of truth to victory. I move the resolution for the election of the new Council. (Cheers.)

Mr. I. T. PRICHARD.—I have much pleasure in seconding the resolution. It would ill become me to say many words on this occasion. I may perhaps, however, be allowed to say this much, that I heartily endorse the sentiments which have been put before you to-night by an eminent statesman from India—a man whose name is well known in that country as being among the foremost in every good work in the great intellectual movement going on there. He has called your attention to the remarkable manner in which the intellectual movement in this country is reflected on the mind of India. Under such circumstances, I consider it a matter of the last importance that the work of a Society of this kind should be carried on with vigour and energy, because though we may regret the promulgation of sceptical notions among the people of this country, we must recollect that, injurious as that result may be here in this Christian land, it is a thousand times more injurious in that land in which the intellectual movement of England is reflected. (Cheers.) I will not occupy more of the time of the meeting further than to second the resolution which has been placed before you.

The resolution was unanimously agreed to.

Mr. C. BROOKE, Vice-President.—There are two or three matters connected with the working of the Society upon which I wish to move resolutions. At this late hour of the evening, and in order not to interfere with Professor Kirk's address, I beg leave to move them without any prefatory remarks. The first is that in future the accounts be audited on the same plan as those now submitted to the meeting,—namely, by two Members, one of the Council, the other not a member thereof. The next is that the treasurer be empowered to receive benefactions from non-members, and that all the sums so received be invested for the benefit of the Institute. I need not remind those here present that there are necessarily large expenses connected with the efficient working of a Society of this kind, especially in printing and distributing in the most liberal manner we can those indications of right-mindedness and truth which are declared among us at our meetings. Of course, without sufficient means we should not be enabled to disseminate our papers as extensively as we might do had we larger funds. Therefore we propose this last resolution, inviting any to assist us by their contributions, even if they do not join us as Members or Associates. (Cheers.) The third resolution is that the necessary alterations be made in the bye-laws to enable us to carry these resolutions into effect. I also beg leave to move that the Council have power to make such bye-laws in regard to the library as may be desirable. We are hoping, by taking advantage of the opportunities which occur, to develop a useful library of reference for those who are disposed to carry on the essential work of the Institute, and for its management it is necessary that a certain code

of rules be established such as are known in all public libraries. That is simply the scope of the last resolution.

The resolutions were put, and carried unanimously.

The PRESIDENT.—Before the Address is read, it is customary to ask if any Member has anything to urge or any remarks to make in regard to the general management of the Institute.

[An interval here elapsed, during which there was no response.]

Professor KIRK then delivered the following Address :—

ANNUAL ADDRESS.

MY LORD SHAFTESBURY—LADIES AND GENTLEMEN—

AN annual meeting is in some sort a time of reckoning. That of such an institute as the Victoria is such a time, not so much in a commercial sense as in that of the navigator, or traveller, who observes and calculates, that he may know his true position and the direction in which he is tending. The winds and currents of contemporary thought have been acting upon us during another year, and it cannot but be well that we should, as far as possible, ascertain what their combined effect has been.

If I were asked to indicate the most dangerous set of the currents by which our course has been affected, I should refer at once to the doctrine of “evolution,” so-called. A writer in one of our popular magazines* lately put the question as to whether this doctrine “makes it difficult to believe in immortal souls.” He was evidently inclined to answer in the affirmative, so he hoped that “some means” might “be found of reconciling those instincts of which the belief in immortality was a product”—that is, seeing the belief itself, at least in its present form, must die! He imagines that what he calls the “essence” of that belief must remain, but cannot tell what that “essence” may be! Should this utterance express a general state of mind among the most important classes in society, we are clearly drifting from our course, and are loudly called upon to inquire as to how our direction may be changed.

It is, I think, because this doctrine of “evolution” so powerfully affects men’s faith in all that is truly distinctive in human nature, that it has become of such importance. It appears, therefore, specially suitable to our present reckoning that we should consider one, at least, of those points of divergence in which this distinction is most clearly seen. The one to which I have been directed specially to call your attention

* *Fraser’s Magazine*, for April, 1872.

is that which is found in the Moral sense. This, then, must be our subject for the present occasion. Popular philosophy gathers round this peculiar capacity of man, on the one hand in hostility to its peculiarity, and on the other hand in defence. Let us see how the conflict goes.

We may place one of ourselves as the instance of humanity under review. We stand, as it were, outside this individual, and with whatever openings and light we can command we endeavour to look within, so as to discover one, at least, of his grand characteristics. Specially, we wish to find out that element of his being in which he is moveable by the true and the right. This is properly his *Moral sense*.

The man is material, and may be controlled mechanically. He is animal, and may be ruled, as other animals are, by affections of his merely animal nature. Is the man more than can be expressed by "material" and "animal"? Like most animals, man is social, and may be moved by considerations arising out of certain of his relations to his fellow-creatures. He may be moved by considerations of this kind of a very lofty character; such as respect his country, his race, and even the universe at large, with the Great Father at its head. Yet in all this he differs in degree, rather than in kind, from the lower creatures. Has he any capacity by which he may be moved and regulated when not only no mechanical force is applied, but, also, when no merely animal or social element of his being can be addressed?

When we are in search of that which is generically distinct in the capacities of man, as a creature capable of being governed, we find ourselves, by careful thought, carried entirely beyond all ideas of personal, social, and even universal safety and comfort, into another region altogether. Every action that is *right* may appear also to be *useful*—if the sweep of thought connected with it be wide enough, it will, no doubt, always appear useful as well as right,—but that same "if" implies a great deal. In the vast majority of minds there is no such sweep of thought as is implied in the perception of the utility of all that is right. In these minds, in multitudes of instances, there is nothing but the idea of right to go by. May they be controlled when nothing but that idea affects them? May they be repelled when nothing but the idea of wrong repels? In other words, may a man appreciate the maxim that he should never do wrongly, even that good may come? These questions direct us in our search for that which is supremely moral in man, that, too, which supremely distinguishes him from the lower creation. Our moral constitution is not to be sought for in physiology, nor yet in our

perception of utility, but in those facts of our experience which are inseparably associated with ideas and feelings of right and wrong, or with duty and its opposite.

In this region of inquiry there are three great features of the soul's capacity which present themselves for our earnest study. These are, *feeling*, *idea*, and *will*. In search of a sense we might perhaps confine ourselves to the first of these; but to have a satisfactory conception of a *moral sense*, we must consider all the three. This will appear as we proceed.

What, then, is a sense? In order to furnish the answer to this question in a satisfactory way, let us take one or two of the ordinary senses. First of all we shall look at that of hearing. There is a certain vibration of the atmosphere; the wavelets of this motion reach the aural nerve; we may imagine (though we are not sure that any one can) some other affection than that called a vibration into which these wavelets pass as they enter the nerve or brain itself; but nothing of this kind can even be thought of as a *sensation*. The finest *movement* of matter is just as different from a *feeling* of mind as any one thing can be different from another. The capacity of movement and that of sensation are utterly diverse, and in the case before us are demonstrably separable.

Hutchison rightly remarks that "sensations bear no more resemblance to the external reality which is the means of producing them, than the report of a gun or the flash of powder bears to the distress of a ship."* In the life of Beethoven, the great German musician, we learn that he composed his finest music after he had become stone-deaf. Harmonies that now charm the most critical listeners were created in his soul when he had no organ by which external song could reach it. In search of a sense, then, we must look for that capacity by which this master-mind could inwardly hear when vibrations reaching him so as to pass into sensations were impossible. That capacity is the *sense of hearing*. Air may be made to vibrate, and nerve may be affected in some way which is as different from vibration as light is from heat; but *mind alone can hear*.

It may be well that this should be more deeply impressed upon us. Take, then, the sense of smell. What is that which we call the sweetness of a rose? According to the best authorities, it is only a *movement*, like that of sound and all other affections of matter.† Let us suppose that we could get a microscope sufficiently powerful to enable us to *see an odour*. Would the material movement which we could then see have

* Hutchison's *Moral Philosophy*, ed. 1755, p. 5.

† See Grove, *On the Correlation of Forces*.

any resemblance either to the *seeing* or to the *smelling* of which we should be sensible? Suppose again, that a person looking through the microscope and seeing the odour, had no sense of smell, would he be able to form the least notion of what smelling is as a feeling from the sight? Clearly, never. Hence there is no meaning for the word sense, or sensation, discoverable till you are beyond the material, which is capable of vibration or other movement, into that which cannot vibrate or move, *but can feel*.

This brings us close to the object of which we are now in search. If there be a feeling as real as that of hearing or smelling, which is as certainly the effect of the idea of right or wrong as the sensations of hearing and smelling are the results of sounds and odours, in that feeling we have the *moral sensation*, and in the capacity of it in the soul we have the *moral sense*. A glance at human experience shows us that there is such a moral sensation, and its existence implies the moral capacity for it. This sense is not equally keen in all men, any more than is that of hearing. It is even absent in some men, like that of seeing or any other sense; but just as certainly is it in man as man as either hearing or seeing can be. It is by fixing the truth of this capacity firmly in the mind as an indisputable fact of human consciousness, like that of any other sense, that we are placed in a position to review satisfactorily a world of conjecture as to the nature and destiny of man.

It may probably occur to some here to think that it is a mistake to call the capacity of feeling under consideration a "sense," and a still greater mistake to call the feeling itself a "sensation." Hutchison, who introduced the phrase "moral sense," and those who have followed him in its use, regard it as expressing what he calls "a higher power of perception."* They regard all the senses as having the nature of intellectual faculties rather than as mere capacities of impression. Mr. Hutchison uses the word "sensation," however, as expressive of the effect produced through the moral sense. He says, "The approbation of moral excellence is a grateful action or sensation of the mind."† I am shut up to use the word for a stronger reason than that on which Mr. Hutchison used it, inasmuch as I regard the capacity as one of feeling, and not of perception. The affection is identical with each of those of the senses, as an impression of the nature of feeling, and nothing more. The sensation is *moral* because it is the immediate effect of a moral idea, just as sight is optical

* Hutchison's *Moral Philosophy*, p. 24.

† *Ibid.*, p. 53.

because it is the effect of the optic ray. By keeping strictly to this use of the word, we maintain a very decided advantage in such an inquiry as the present.

This moral sense has features that constrain us to class it with the other senses. For example, it is affected by ideas of right and wrong; so is the sense of hearing by harmony and discord; so are all the senses by that which distresses, as well as by that which pleases. This sense, too, is useful to man, as other senses are to their possessors. Like the feelers of an insect or reptile, or the wings of a bat, by their delicate sensibility of touch, enabling their possessors to find their way, so does the keenly sensitive moral susceptibility enable its possessor to find the right path in action when his intelligence as to that path is defective in a high degree. As the affections of other senses constrain by the pleasure they give, or the pain they inflict, so does this moral sense in man. Hence it seems to me most important that it should be recognized and cultivated, just as sight or any other sense, and even more fully and carefully than all the rest put together.

The true moral sensation is clearly and easily distinguishable from all affections of the lower animals. It is utterly different from the effect of approbation or its opposite, and also from that of promised reward, or threatened punishment. Many of the lower animals are susceptible of these effects, and very keenly so. A dog, for example, is made to cower, and even to run off and hide itself, when spoken to as having acted wrongly; and it shows signs of unquestionable gratification when praised, as for a useful or noble action. This is more readily mistaken for the action of a moral sense than the effect of threats or promises of reward. But it is to be observed that the dog is equally affected by the praise or blame, whatever be the right or wrong in the case. That simply shows that he has neither the moral idea nor the capacity of feeling in accordance with it. The moral sense is as distinct from the susceptibility of praise and blame as hearing is from tasting, or from any other sense.

In saying this, we do not deny thought to the animal. That in which one sensation is distinguished from another, so as to make objects of a material nature affect what may be called the lower mind, *as objects*, must be of the nature of thought,—must, in fact, be reasoning. So far as there is evidence of this in the lower creatures, it is unwise to deny it. But so is it unwise to mistake such thought and reasoning, and the feeling which results from it, for that thought in which true moral distinctions are perceived, and the moral sense made evident. Where there is no blame from others, nor the slightest idea

that such blame may ever come, there is in man that which gives the keenest possible pain when wrong is remembered; and in spite of even the greatest possible praise, this pain goes on increasing in the soul, in which the remembrance continues to show its power. There is nothing of this kind among all the facts which the naturalist gathers from the experience of the lower creation; and yet this alone is the moral sense.

We come now to the point at which it is necessary to remark that *sensation is not thought*. Sensation is feeling, and feeling is not thought. We may, no doubt, use the word feeling where we mean thinking; but we never can do so when careful to express correctly the states of mind of which we are discoursing. It is not necessary to a sensation that any attention should be directed even to itself, still less to the object by which it is produced. A little observation will satisfy any one that he may feel cold without directly thinking of his coldness, or of the air around by which he is chilled; and especially he will observe that he may have that comfortable, though not always honourable feeling, which is called "*lukewarm*," without thinking of his sensations at all. So he may have all sorts of sensations without referring them to external objects. Sensation is separable, and is often separated from thought.

The confusion of popular thinking is illustrated on this point by Professor Huxley, who gives us very remarkable words on the point now in hand. In criticising an article in the *Quarterly Review* lately, and denouncing the idea that sensation is distinct from thought, he says, "If I recall the impression made by a colour or an odour, and distinctly remember blueness or muskiness, I may say with perfect propriety that I think of blue or musk; and so long as the thought lasts, it is simply a faint reproduction of the state of consciousness to which I gave the name in question when it first became known to me as a sensation."* Mr. Huxley apparently forgets that "blueness" and "muskiness" are abstract thoughts. No single sensation can give such thoughts. They are the result of the comparison of many sensations. They are possible only as such a result. They are no reproduction of a sensation or sensations, such as colour or odour produces, but the results of reasoning on a great variety of impressions. He could scarcely make a greater mistake, or one more fatal to his reputation as a careful thinker, than to confound such abstractions with simple sensations produced for the first time in the soul.

It would be every whit as rational to hold that a sight is a

* The *Contemporary Review*, vol. xviii. pp. 459, 460.

smell, and that both are hearing, as to contend that a thought is a sensation or a sensation a thought. Mr. Huxley says in the same paper from which I have just quoted, that "no amount of sound constitutes an echo, but for all that no one would pretend that an echo is something of totally different nature from sound." I am disposed to ask what is an echo but a sound? Because the vibrations in the atmosphere go off to a distance and return, they do not cease to be only vibrations. "No amount of sound constitutes an echo"! One can scarcely believe his own eyes when he sees such words from such a pen. It is amazing that one who can distinguish between an echo and a sound is unable to see the difference between a sensation and a thought, and that too when the sensation is a mere first impression, and the thought is a long-perfected abstraction!

We may look in passing at one or two other specimens of Mr. Huxley's philosophy. We do so, because of the vast influence of the man. He says, "It is wholly inconceivable that what we call extension should exist independently of such consciousness as our own. Whether, notwithstanding such inconceivability, it does exist, or not, is a point on which I offer no opinion."* I not only conceive, but perfectly understand and believe, that my bed is six feet and a half long when I am sound asleep as it is when I am awake. The same as to the breadth. The same as to everything that is extended. Mr. Huxley has got his mind so twisted, that he conceives of extension as only a state of mind, and he cannot both conceive this and its contradictory at the same time. That inconceivableness need neither puzzle him nor any reader of the *Lay Sermons*. It is only the very simple fact that one who believes an error cannot at the same moment believe the truth on the point on which he is in error. With such examples before us, we may safely hold that sensation is not thought, though Mr. Huxley should not be even able to conceive of the difference!

Mr. Herbert Spencer says, that "to remember the colour red is to have, in a weak degree, that psychological state which the presentation of the colour red produces."† This is, perhaps, the foundation of Mr. Huxley's mistake. Is it strictly true? For the first time a red object is presented to the eye of a child, the peculiar impression which that red object produces is the "psychical state," as Mr. Spencer regards it, in its strong degree. Then, also, for the first time, a blue object

* *Lay Sermons*, ed. 1871, p. 327. † *Principles of Psychology*, p. 559.

is presented to the child. Another psychical state is produced, also in its strong degree. How is it that the one object is at length called *red* and the other *blue*? Can the mere "faint reproduction" of the first impressions account for *this*? Certainly not. And still less can such reproduction account for the abstract idea which is expressed by redness or by blueness. The psychical state, which is the result of a *relation*, perceived between a red object and a blue one, can never be confounded in true thinking with the mere result of a colour, or any other sensible quality. Nothing but helpless confusion of thought can account for any man's huddling together states so palpably different from one another. Hence we must dismiss Mr. Spencer as well as Mr. Huxley.

Yet we may glance at another illustration of confusion in popular thought. Professor Bain speaks of the "consciousness of a tree, a river, a constellation."* His queer use of the word "consciousness" makes us naturally look for his meaning. Well, he tells us that "consciousness is mental life, as opposed to torpor or insensibility; the loss of consciousness is mental extinction for the time; while, on the other hand, a more than ordinary wakefulness is a heightened form of consciousness." Mr. Bain would probably join Mr. Huxley, and say that whether the tree existed independently of his consciousness is "a point on which he offers no opinion"! So with regard to the river, and so with the constellation! Hence these wise men could not say whether their "extinction" during sleep was not that of every body and thing too! Nor could they venture to guess even whether any "heightened form of consciousness" in them were not a revival in the universe! No wonder if they cannot see the difference between a sensation and a thought, when they fail to see that trees grew and rivers ran, while the stars held on in their courses, before they were born.

Now we must go on to remark that the feeling which is the result of a thought does not generically differ from that which is produced by an external object. A strongly scented plant is brought near to me—a feeling which I call smelling is the result in my soul. An idea of wrong occurs to my memory—a feeling which I call remorse is the result, exactly as that of the smell was of the odour. Both these feelings are involuntary, and hence necessarily the effect of their distinctive causes. It may, no doubt, be truthfully said that the one feeling is from an external, and the other from an internal cause; but it is difficult to say that the mind has an outside

* *Mental and Moral Science*, ed. 1868, pp. 1 and 93.

and an inside, or to tell how an idea affects it as distinct from the way in which it is affected, say by a state of the aural nerve. While it is of vast importance to mark distinctions when true differences exist, it is equally important to make the most that truth allows of likenesses such as this.

The moral sense is not the conscience. That is the judgment when giving us the moral idea, or when showing us right as distinguished from wrong; but this is not a judgment giving us an idea, but a capacity of feeling affected by the idea when given. This distinction is, I think, of great importance. The province of conscience is to judge so that the true right shall be presented in the soul as the right, and the real wrong as the wrong; but the moral sense has no more to do with such judging than the sense of hearing has to do in determining the character of the sounds which fall upon the ear. That which has in it as an idea the element of right will produce in the soul having that idea the feeling appropriate to the right, whether the idea is true or false, just as a certain state of the aural nerve will give the sensation of hearing, though no actual sound is in the atmosphere at the time; and a certain state of the optic nerve will give the sensation of seeing, though no light is falling upon the eye. It is the work of conscience to decide whether the right is real; but the moral sense must feel in accordance with the idea entertained, whether that right is real or unreal.

It is interesting and important, even repeatedly, to trace in some measure the likeness of the moral sense to the other senses. One man does not hear so well as another; so there is great diversity of moral susceptibility among men. One has the sense of hearing so keen that it is impossible for him to be comfortable unless in the midst of silence; another is not affected amid deafening din; so is it with the moral sense. One is so easily affected by the least wrong, real or imaginary, that he can scarcely be said to be fit to live under the ordinary conditions of social life; while another is unaffected even by many and serious instances of iniquity. As sounds affect the ear, whether emitted by ourselves or others, so do actions in their moral character affect us, whether our own or those of our fellow-men. As it does not at all affect the reality of hearing, that sounds that are delightful to one are horrible to others; so it does not affect the reality of the moral sense that men differ ever so widely in their feelings of what is right and what is wrong.

I am thus particular as to this sense in its true character, because sufficient place is hardly given to it in the discussions of morality, or, perhaps, I should rather say moral philosophy.

It has not yet ceased to be true that *thought* on this point is made to take more than its proper place, to the exclusion of feeling. Dugald Stewart said, "If health and leisure allow me to put in writing some speculations which have long been familiar to my own thoughts, I shall endeavour to place the defects of our common logical systems in a still stronger light, by considering them in their application to the fundamental doctrines of ethics; and more particularly, by examining how far, in researches of this sort, our moral feelings are entitled to consideration; checking, on the one hand, our speculative reasonings when they lead to conclusions at which our nature revolts; and, on the other, sanctioning those decisions of the understanding in favour of which the head and the heart unite their suffrages. According to the prevailing maxims of modern philosophy, so little regard is paid to feeling and sentiment in matters of *reasoning*, that, instead of being understood to sanction and confirm the intellectual judgments with which they accord, they are very generally supposed to cast a shade of suspicion on every conclusion with which they blend the slightest tincture of sentiment or enthusiasm."* These are wise words, and they go with all the force of their wisdom to show how high a place must be given in such discussions as that now in hand to the moral feeling, or sensation, as distinguished from judgments in moral things. If any proposition sounds harshly on the moral ear—glares badly on the moral eye—smells offensively in the moral nostril—or rasps painfully on the moral touch,—it must receive more than average scrutiny from the moral reason.

I may give an illustration of what I mean. Mr. Tyndall, in his *Fragments of Science*, institutes a comparison between the building of the pyramids of Egypt and the formation of a crystal of common salt. The former he represents rightly as the result of the action of men on the stones of which the pyramids are composed; but the latter as that of the self-action of the molecules which constitute the crystal. He speaks of the "forces" with which these molecules attract and repel each other, and so on, with his account of their wonderful work.† He says, "While thus the blocks of Egypt were laid down by a power external to themselves, these molecular blocks of salt are self-positing, being fixed in their places by the forces with which they act on each other." Mr. Tyndall says, in the same volume, "Where the aim is to elevate the mind, to quicken the moral sense, to kindle the fire of religion

* *Philosophical Essays*, ed. 1816, p. 62.

† *Fragments of Science*, ed. 1871 pp. 114, 115.

in the soul, let the affections by all means be invoked; but they must not be permitted to colour our reports, or to influence our acceptance of reports of occurrences in external nature.”* The occurrence in external nature before us is the rearing of a crystal of common salt. We at once admit that, so far as this mere fact is concerned, the feelings can have little to do. But Mr. Tyndall reports not only an occurrence, but states something entirely different from an occurrence. He affirms the idea of self-determining power as an attribute of a molecule! There is no question as to the occurrence; it is the *doctrine*, not the fact, which is of moment in the case. Self-determining power, such as Herbert Spencer denies to *mind*, is here predicated of a material atom! By this doctrine the Author of Nature is excluded from Nature! Have the affections no claim here? If not, how can they be rationally invoked to kindle religion in the soul? If there is no living God to be known, how can there be religion, either with or without fire? So if that God is to be shut out from the universe with which physical science has to do, where else is He to be sought for? And, moreover, if there be no God, from whence is the moral sense to derive its quickening? It is, to say the least of it, a grievous mistake to imagine that the distressing feeling which rises in the soul in view of such ideas as Mr. Tyndall here promulgates is the result of prejudice or priestcraft. You may as well imagine that any other sensation of the soul is the creation of such causes. The sense which revolts at the denial of God in the changes of material nature is beyond all question a momentous part of the soul of man, and never can be safely ignored or mistaken for a moment.

The culture of this same moral feeling is essential to the life of nations. If a people show to a great extent indifference to the great principles of morality, and hence spread mischief and misery in society, it will be found more important to cultivate their moral sense than merely to expound morals after an intellectual method, and to condemn their immorality. That culture will be secured by an education which tends to draw out the capacity of moral feeling itself, rather than by one which drily gives them the rules of conduct.

The idea which above all else is essential to the culture of the moral sense is that of the *unchanging right*. As the diversity of view which prevails regarding what is really right does not at all affect the reality of the moral sense, so neither does it affect the reality of this vital moral idea. There is one, and only one, best route from Liverpool to New York, though

* *Fragments of Science*, p. 48.

it may be that no two navigators could be found exactly to agree as to what that route is. Because one will take the worst route for the best one, and that in perfect sincerity, it does not follow that the worst is the best, or that a man may choose any one of them to equal advantage if he is only sincere in doing so. There is one way of acting which is in itself the right way, as certainly as there is one route between the two ports I have mentioned which is the best of all.

Darwin seems to teach that the strongest impression is our only rule in morals. The idea is in keeping with his strangely defective notion of what a moral being really is, coupled with his equally defective notion as to the unchanging right. He says, "A moral being is one who is capable of comparing his past and future actions or motives, and of approving or disapproving of them." Here he misses entirely that by which morality, or moral nature, has its significance. A thief, for instance, compares his past clumsy attempt to pick a pocket, on account of which he has got lodged in prison, with the much more dexterous practice by which he hopes to get the money and escape the next time! He exceedingly disapproves of his past action, and as strongly approves of the future—is he therefore "a moral being"? The right and wrong of his conduct escapes him as entirely as it does the dog which worries a sheep simply because of his "impressions." Moral nature in its essence is seen in neither of the cases, though in both Mr. Darwin's definition might be realized. That thought of the unchanging right on which morality hinges seems to have dropt out of his remarkable mind.

This is not the case because Mr. Darwin is unaware of the importance of the moral sense. He says, "Of all the differences between man and the lower animals the moral sense or conscience is by far the most important."* In common with many others, he fails to distinguish between the feeling and the judgment; but what is vastly more serious he fails to see the true nature of both. "Acting for the public good" is his highest idea of duty, and "public opinion" his highest view of the standard of that duty. The habit of acting according to public opinion is with him "conscience." He says, "If, for instance, to take an extreme case, men were reared under precisely the same conditions as hive-bees, there can hardly be a doubt that our unmarried females would, like the worker bees, think it a sacred duty to kill their brothers, and mothers would strive to kill their daughters, and no one would think of interfering. Nevertheless, the bee, or any other social animal, would,

* *Descent of Man*, vol. i. ed. 1871, p. 70.

in our supposed case, gain some feeling of right and wrong or a conscience.”* If I understand at all what the term right truly means in moral discussions, “the public good” which can be promoted by killing the individual who merely stands in the way of it, and from no fault of his, has, and can have, nothing in common with that meaning. It cannot be *right* to promote such “good,” nor can it be *wrong* to abhor it. The moral sense is just that capacity of feeling by which we are shocked at such a representation of “good,” and the moral idea is essentially that eternal thought which underlies that capacity.

It may be well to remark here that I do not find it possible to cope with the more popular of philosophical errors while adhering to the common use of certain terms, or even when following in the beaten track of thought without deviation. It is forced, I think, upon one who reasons impartially to observe that the strongest points in sceptical argument are laid to the sceptic’s hand by authors whose aim is directly opposed to his. The Christian thinker is bound to consider this, and to let go his own most cherished terms and notions, when false, and fitted only to favour the foe. You will see the bearing of this remark as I proceed.

In seeking to clear our way more fully to the true moral idea, we come strongly into collision with the too common notion of “*instinct*.” Darwin says of the moral qualities, that “their foundation lies in the social instincts,” including in this term “the family ties.” He says further, that “these instincts are of a highly complex nature; and, in the case of the lower animals, give special tendencies towards certain definite actions; but the more important elements for us are love and the distinct emotion of sympathy. † It is, so to speak, the friction caused by the crossing of instincts that gives rise to the idea of “ought,” or “duty,” as Darwin views it. He says, “Any instinct which is permanently stronger or more enduring than another, gives rise to the feeling which we express by saying that it ought to be obeyed. A pointer dog, if able to reflect on his past conduct, would say to himself, ‘I ought’ (as, indeed, we say of him) ‘to have pointed at that hare, and not have yielded to the passing temptation of hunting it.’” ‡

What is really meant by “instinct” in such connections as these? The “instinct” of pointing at the hare is contrasted with the “instinct” of hunting it. Why should we call these “instincts”? If we look into the mind of the dog by means

* *Descent of Man*, vol. i. ed. 1871, p. 73.

† *Ibid.*, vol. ii. p. 394.

‡ *Ibid.*, p. 392.

of any light which we can bring to bear upon it, we see, first of all, certain *sensations*, then certain *thoughts*, and last, certain *volitions*. We see all these states as surely as in any mind among men. Why should we call their combination "instincts"? The senses in at least some animals are keener than in men; the thoughts are much more rapid, as a rule; the volitions are more vigorous; but that gives no ground for calling their combinations by a name implying their blindness or unaccountableness. Similar questions rise as to "love" and "sympathy" when called "instincts." Why, for example, should the gregarious actions of either animals or of men be called "instincts"? The sentinel of a flock has certain sensations; he sees an enemy approaching; he has instantly thoughts of danger; he clearly thinks of the enemy's designs; he gives the well-known signal to the flock;—why call all this "instinct"? Then the love of animals is as real as that of man, and so is their sympathy; and both are as really the results of thought. Both are the results of processes perfectly well known to us through our own experience. Lay the states of the animal soul out in all their variety, and value them at their utmost; then search, not in something to which you are blind, and which you call by an unmeaning name; but in the sensations, thoughts, and volitions of animal life, so as to see if you can find anything that can be identified either with the true moral idea, or with the true moral sense. If you find it, then tell us that you have; if you do not find it, then cease to fancy it under the meaningless term of "instinct." This alone is worthy of science. Conjecturings are offensive when put in the place of good, honest facts, in the search for what *is*, not what may be imagined.

But in following this matter we come to the "*ought*" of Mr. Darwin's pointer dog. What does that mean? As represented, it comes to nothing more than the difference between two "instincts"! Perhaps he means two feelings—that of desire to chase, and that of the desire to point. That to point, it seems, is permanently the strongest, and the creature's "*ought*" means nothing more than a perception of the difference. "*Ought*," then, really means nothing more than that it is more comfortable in the long run to act in one way than in another! This is something all but infinitely different from the meaning of that "*duty*" which contemplates the loss of being itself as preferable to the doing of *wrong*. We turn with sorrow from the sad proof which Darwin furnishes of his having lost the true thought in this momentous matter.

Giving up altogether, then, the notion of "*instinct*," we come to that of "*intuitive*" ideas, as giving explanation of

moral nature. And here I must confess that I have insuperable difficulty in finding the origin of any experience in what are called "innate" or "intuitive" conceptions. Every idea is born in the soul, and in that sense is "innate." No idea is born with the soul, so none can be "innate" in that sense. An idea, or conception, is not a capacity of thought, but a thought itself; so every idea is an inward teaching, and hence an "intuition." I can understand how men plead hard to be granted certain starting-points of discussion, and so cling to what they imagine "*necessary truths*" or "intuitions;" but their feeling of need for such starting-points springs simply from their having as yet failed to go back to the true starting-points. Bring two dissimilar sensations up in the soul, and more or less of a thought is the result. Continue to vary the sensations, and the thoughts will vary. Gradually more and more of the nature of intelligence will be the product in such a process. The thoughts will, by-and-by, have, in some instances, the character of "intuitions"; such as that "two and two make four," or that "all the angles of a triangle are equal to two right angles"; but that distant goal will be reached only after years, it may be, of progress. It will be long ere such ideas as those of space and time have any place in the soul, though these are so firmly believed to be "necessary."

That notion of "innate" ideas, for which Dugald Stewart and others so energetically argue, is, as I think, groundless. Speaking of what he calls "many of our most familiar notions (altogether unsusceptible of analysis)" he says: "The point at which these thoughts first arise in the mind is of little importance, provided it can be shown to be a law of our constitution that they do arise whenever the proper occasions are presented."* Here I remark that it is a law of our constitution that any truth whatever, when placed before the mind with sufficient evidence, is necessarily believed. Take any fact that can possibly occur—let it be as far from one of the notions to which Mr. Stewart refers as anything can be, only let it be in idea before the mind with sufficient evidence, and unbelief is impossible. Why, then, call one idea "innate" or "intuitive" more than another?

If we seek an instance of an intuitive idea which seems the same as that which Mr. Stewart would not scruple to call "innate," he gives it thus: he says, "It is surely an intuitive truth, that the sensations of which I am now conscious, and all those of which I retain any remembrance, belong to one

* *Philosophical Essays*, by Dugald Stewart, ed. 1816, pp. 102, 103.
VOL. VII.

and the same being, which I call *myself*. Here is an intuitive judgment involving the simple idea of *personal identity*.* The question which first arises here is as to the simplicity of the idea. Is it impossible to analyze the idea of personal identity? Let us try both from the particulars of which it is a generalization, and from it, as a generalized thought, to these same particulars. Is the "me" possible as an idea without the "not me"? Then, is either the one or the other possible, apart from a vast number of perceptions that must all be in the soul as thoughts before the thoughts of objects, such as the "me" and those which are "not me," can arise. Again, is not the thought of "myself" resolvable into at least the thought of a person, and those other thoughts which fix that of a person to me, so that it makes me known to myself as myself and not another?

Then as to the *necessity* of the idea of personal identity. Certain memories and reasonings make it impossible for me to discredit the fact that I got my dinner yesterday, so are certain memories and reasonings necessary to my belief that I am myself, and not another person. It seems, therefore, absurd to call certain ideas "innate," or "intuitive," or "necessary," when all are equally so, if the proper occasions are presented. The plain state of the case is merely this—a truth cannot be both known and unknown in the same mind and at the same time. Take the ideas of my personal identity and that of my having had my dinner yesterday. What does it really amount to that these ideas will inevitably and infallibly spring up in my mind whenever the required conditions are present? Simply this—that when these truths are known, they cannot be unknown. Mr. Stewart quotes Locke as affirming exactly what he himself means, when the former says,—“He that hath the idea of an intelligent but frail and weak being, made by and depending on another, who is omnipotent, perfectly wise and good, will as certainly know that man is to honour, fear, and obey God, as that the sun shines when he sees it.”† What is this but that he knows the sun shines when he knows that it does, and so he knows that God is to be worshipped and obeyed when he knows that too? Locke confirms this when he says,—“But yet these truths being never so certain, he may be ignorant of either or all of them who will never take the pains to employ his faculties as he should do to inform himself about them.” That is, if he is ignorant he is ignorant, and if he knows he

* *Philosophical Essays*, by Dugald Stewart, ed. 1816, p. 98.

† Locke's *Essay*, book iv. chap. xiii. § 3.

knows—which has really nothing to do with the intuitive or other character of the truths themselves, further than to show that they are by no means necessary notions in the human soul.

What are called necessary truths refer, in many cases, neither to truths nor falsehoods, but only to words without meaning. "A thing cannot be and not be at the same time." This is given as an instance of *necessary thought*. But the words do not refer to a thought at all. They refer to a sentence in which the meaning of the one half neutralizes that of the other, leaving the sentence, as a whole, meaningless. This is clear at once, on our trying the two halves of the sentence as two sentences,—"That thing is"; "That thing is not." What is the effect of these two statements jointly? Merely this, that nothing is either affirmed or denied—that is, nothing is meant. No thought cannot be a necessary thought, nor can it be the opposite of necessary—it can just be nothing. Take the sentence, again, that "two and two cannot be five,"—it is said to be a necessary truth. What is it really? Merely this, that the word *five*, if used to mean one more than two and two, cannot also mean two and three, minus one. It must mean just what it means. To say that it does not mean what it means is only to utter another sentence in which the one half neutralizes the other, rendering it literally nonsense. It is a great mistake to regard arguments of such a character as the basis of reasoning—the starting-points of safe thought. The eternal value of truth does not depend upon its necessity as thought, any more than the value of virtue depends upon the fixity of fatalism. However freely it is accepted and cultivated in the soul, its reality and worth are the same.

The mind of man is so formed that certain impressions made upon it, and certain states within it, are the necessary results of certain conditions. Some of these conditions are provided, so that they are not under human control, but by far the most important are made to depend for their existence, so to speak, upon that which is neither a sensation nor a thought—neither a capacity of the one nor of the other—while yet it is the helmsman of the mind. The sea over which this pilot has to steer is not one on which we *must* reach the haven of even so much as one truth, however rudimentary. The starting-point in so many speculations, the *ego* itself, is utterly denied, and that by some of those who are of the greatest rank among what are called "thinkers." The idea of "infinite space," which passes with so many for an "intuition," Professor Bain calls "an incompetent, irrelevant, impossible conception."*

* *Mental and Moral Science*, ed. 1868, p. 34, *Appendix*.

I will not, therefore, seek the origin of the moral thought in "intuition," and hence cannot associate the moral sense with such intuition. I would just as soon seek the origin of my capacity of hearing in an innate or intuitive sound. The moral thought is really a judgment, the result, like all other judgments, of *reasoning*, and that, too, of reasoning for which man is responsible, inasmuch as he ever may, within certain limits, conduct that reasoning as he will. The moral idea, when it is reached in the soul, finds more or less, as a rule, the capacity of feeling ready to receive it as a moral sense. Just as sound finds hearing, or light finds vision, so right and wrong find this peculiar capacity, and in the degree in which the capacity exists and the idea is presented, in that degree is there the moral affection now in hand.

Here, then, I must remark that there is nothing in man so inseparably connected with morals as *will*. Voluntarily the moral idea may be cultivated to a high degree, or obliterated. So may the moral sense, like that of hearing, or any other. By certain processes a man may destroy the susceptibility of any so-called outward sense, and so may he destroy that of this so-called inward moral sense. Tappan says, "We know we are exercising will when we have this presentation in the consciousness; viz., certain phenomena, and I myself the cause of these phenomena, either immediately or by instrumentality."* Cause here does not mean a mere link in the chain of occurrences. The use of the word in such a sense is an absurdity. It is so because, if the word cause is equally applicable to all such links, it is absurd to use it as if applicable to one alone. John Stuart Mill says, that "a volition is a moral effect which follows the corresponding moral causes as certainly and invariably as physical effects follow their physical causes. Whether it *must* do so, I acknowledge myself to be entirely ignorant, be the phenomena moral or physical. All I know is that it always *does*."† Mr. Mill should have said, "so far as I have observed and choose to remember!"—that is, he can *know* that effects, such as we call volitions, follow what he calls their causes certainly and invariably, *so far* as he has observed and chooses to remember the facts he has noticed. It is really childish to talk as if *he* could possibly settle the truth in relation to the whole universe, and for all eternity, that volitions *always* follow the experiences he calls their "causes." He can know that in a few cases which he has observed, certain volitions follow the presenta-

* Tappan *On the Will*, ed. London, 1860, pp. 196, 197.

† *Examination of Sir W. Hamilton's Philosophy*, ed. 1865, p. 501.

tion of certain inducements to volition, as he can know that in physical changes certain things, so far as he remembers, follow certain other things; but that no one else even in England, or in London, or within a dozen yards of him, has observed otherwise, is what he assuredly cannot know. Mr. Mill's language is absurd, if volitions are as certain and invariable as physical effects. Bring a red-hot wire into contact with gunpowder, and the powder will explode. If a certain motive to will has its result in a volition as certainly and invariably, and as much of necessity as is the case with the explosion of this gunpowder from contact with the wire, why call the one thing "*moral*" and the other "*physical*"? The distinction is without a difference. Above all we should say, why *blame* the volition and not the explosion?

Mr. Mill says, "I am told that, whether I decide to do or to abstain, I feel that I could have decided the other way. I ask my consciousness what I do feel, and I find indeed that I feel (or am convinced) that I could have chosen the other course if *I had preferred it*; but not that I could have chosen one course while I preferred another"!* This is surely lame philosophy. To prefer a course is, all the world over, to choose it; and Mr. Mill's consciousness tells him only this,—that he cannot choose to act in two opposite ways at the same time or in the same volition! We shall lack manhood among us soon, if we have not a more vigorous style of thinking than this.

Man, in having true will, possesses true cause as an element of his mental constitution. He is capable of being the first cause—the uncaused cause of his own actions. In believing this, we need have no dread, as Sir William Hamilton had, of what he called "an absolute commencement." Nor need we place such an idea, as he did, among "inconceivables." Sir William held that such a thing as free will must be believed, though it could not be conceived! I am not philosopher enough to see that he meant anything when he said so; but, as to the conception of an absolute beginning, so far as that is found in an act of free will, no one need have any difficulty in its conception. Take an instance as an illustration. A stack-yard is burning: what "absolutely commenced" the fire? A volition in the mind of an incendiary, or, more correctly, the incendiary himself, by an act of free will. You say that there was a process in the mind of that incendiary before that volition. No doubt there was; but no part of that process would have fired the stacks, and *all* that process has passed in other minds without

* *Ex. Sir W. H. Phil.*, p. 504.

any such volition as constituted the crime in this case. The very thoughts and feelings that came next to the volition might have all been there, and yet no such volition; but once that, and all else followed. It was the "absolute commencement" of the act of crime.

Writers on the side of true will are often rendered helpless by false notions of *motive*. Mr. P. P. Alexander gives us a notable instance of this. When arguing against Mr. Stuart Mill in favour of freedom of will, he admits, and even repeatedly insists, that it is an inexplicable mystery! He does worse still. He says, "The motive, considered as an act, must depend on some previous motive, by which it in turn was determined; and so through a regressive series, in which freedom fleets for ever, or steps back from us, and is never to be caught and detained."* It is surely absurd to speak of a motive as an act, and equally so to speak of an act of will as *determined* by anything. The latter is as much a contradiction in terms as "a free slave." Motives are simply objects of thought. They may be considered externally in relation to the soul, or internally. A shilling is a motive to a lad, if offered to him, when his "volitions" are required for a short time. This is neither a feeling nor a thought, if you take it externally; it is just a shilling. In the soul of the lad, "psychologically," it is an object of thought. Professor Bain would say that the lad is conscious of the shilling. It probably awakens desire, and brings the lad into a favourable state of consciousness for the volitions in request, and, as a consequence, their muscular results. But it is in the very essence of these volitions that they shall be determined by nothing but the lad himself. The lad is just as free to will in the very opposite direction to the wishes of those who require his services, as if the shilling had never been offered.

Mr. Herbert Spencer says that the "passing of an ideal motor change into a real one is that which we distinguish as Will."† I decidedly object to being included in that "we." "An ideal motor change" are to me words without meaning. All ideal states have the nature of thought, not of volition; and thought is just as different from volition as seeing is from walking, or indeed as any state can be different from another. Ideal movement is like melodious sugar, so far as I can make anything of the language. Motor change, too, is muscular—not ideal. Volition is not motion, nor is it necessarily connected with any motor change. The volition which in one

* *Mill and Carlyle*, by P. P. Alexander, 1866, pp. 18, 19.

† *Principles of Psychology*, p. 261.

case moves a limb in another case fails to do so. Volition is an act of mind, motor changes are effects in matter, and hence Mr. Spencer's explanation of Will is more illusory than even he imagines Freewill itself to be. He has a curious explanation as to how we distinguish between voluntary and involuntary movements. He says, "The difference between an involuntary movement of the leg and a voluntary one is, that whereas the involuntary one takes place without any previous consciousness of the movement to be made, the voluntary one takes place only after it has been represented in consciousness; and as the representation of it is nothing else than a weak form of the psychical state accompanying the real movement, it is nothing else than a nascent excitation of all the nerves concerned which precedes their actual excitation."* What is a truly involuntary movement of the leg? If the limb is moved by some one else than its possessor, we should say so far the movement is involuntary. If the limb is convulsively moved, whether the owner will or not, this also is involuntary. But it is neither of these Mr. Spencer contemplates. He has in view merely a case in which a man moves his limb without thinking of his doing so. There is the volition, only there is not the thought of it. Because there is no thought of it, Mr. Spencer concludes it is non-existent! He supplies us himself with a perfect correction of his own mistake. In speaking of Berkeley, he says that that author confounds "*the having a sensation with the knowledge of having a sensation.*" Again, "while the reception of a sensation may be a simple undecomposable mental act, to observe the reception of a sensation is decidedly a composite one. The knowledge of a sensation so far from being an act of immediate consciousness, presupposes a much-involved process." He goes on to enlarge the same idea. Now, let us only put "volition" for "sensation," and it is clear that Mr. Spencer simply confounds the act of volition with the knowledge of our performing that act. Mr. Spencer abundantly refutes his own explanation.

This author has a remarkable piece of logic which he gives as his strong reason for rejecting "the dogma of Freewill." He says, "Psychical changes either conform to law or they do not. If they do not conform to law, this work, in common with all works on the subject, is sheer nonsense: no science of Psychology is possible. If they do conform to law, there cannot be any such thing as Freewill." What does Mr. Spencer mean here by "law"? We learn from another utterance. He says, "Freewill, did it exist, would be entirely

* *Principles of Psychology*, p. 614.

at variance with that benevolent necessity displayed in the progressive evolutions of the correspondence between the organism and its environment."* This clearly indicates that Mr. Spencer's idea of "law" is simply that of "necessity." Only he says "*benevolent necessity*"! What can he mean by the use of such an adjective? Benevolent is really good-willing, and *willing necessity*, I confess, is to me a refractory phrase, whether the willing is good, bad, or indifferent. If I understand the word at all, necessity can be neither benevolent nor malevolent; it cannot be "volent" at all, any more than "yes" can be "no." Moreover, it cannot be "law," for it admits of no "breach," nor does it admit of "obedience." "Necessity has no law" is an irresistibly evident proverb. No doubt, Mr. Spencer dreads the admission of that which would make his works "sheer nonsense;" but the heavens might not fall even if that calamity should come. A good many authors, and their readers too, would still see sense in those works, which contend that volitions in very many cases do not conform to benevolent law.

I, for one, am greatly easy as to the fate of necessitarian psychology when I venture to think that true law not only may, but must, involve free-will; in other words, it must be a part of, at least, benevolent law that there should be true freedom. It surely may be one of the decrees, and as fixed and irrevocable a decree as any other, that within certain limits, a scope of action shall be provided for minds, so that they shall be truly free to conform to benevolent order, and so to act in breach of it. If a philosopher declines to see that this is the case in reality, and is no "illusion," it furnishes only another instance of human folly which will sometimes show itself even in the very "greatest." Books must be very bare of sense if the admission of such an idea converts them into nonsense.

There is a remarkable tendency to leave out by far the most important fact in an argument manifest in a certain class of minds. We have an illustration of this in the case of Professor Tyndall, when speaking of "matter and force," and one which is to the point in our present subject. Look at him performing an experiment before a meeting of working men, and you will see what I mean. He takes a drop of water, in which a crystal has been dissolved, and places it on a piece of perfectly clean glass.† Listen to what he says, and notice how completely he forgets *himself*. He is the only efficient cause in the case;

* *Principles of Psychology*, p. 620. † See *Fragments of Science*, p. 84.

he alone does anything that is done; that force which performs the entire experiment is *his own force*. How is it that he so completely forgets this truth? His will, or he himself in volition, is the "absolute commencement" of every change that takes place; yet he never once mentally refers to this in all he says, though speaking of "matter and force"! According to his teaching, the matter arranges *itself*, divides *itself*, unites *itself*! though in every instance he gives that *initiatory motion* which merely passes through certain changes till it is balanced by other forces and then ceases. How wonderfully (as we might put it) John Tyndall forgets John Tyndall, and yet all the while speaks of him. He says "I can show you something." Then he adds, "I pour a little water in which a crystal has been dissolved." He tells us that "all force may be ultimately resolved into a push or a pull in a straight line." We thus learn that that which pushes or pulls alone has force. Suppose that fifty people stood one behind another,—the last man of the row *pushes*, the next to him is *pushed*, and so on to the last. All are affected, but one only has used *force*. So it is with all Dr. Tyndall's experiments, as with those of every one else. However numerous and interesting the changes are in matter which take place, the experimenter alone *pushes* or *pulls*. He alone has the *force*. It is only because he fails to consider his own personal position in such experiments that he is involved in the far more serious error of failing to recognize the actions of One whose force is so much more vast; and yet nothing can be more palpable than the truth that mind alone is cause, and is cause alone in *will*.

This is the truth in which, so to speak, morality has its foundation. The word has absolutely no meaning, if true will is denied. Right and wrong have no meaning in a necessitarian philosophy. If all is "invariable," all is as it must be, and hence it is absurd to say that anything is as it ought not to be, or as it ought to be. Moral sense—moral idea—moral anything—are phrases which express not even *illusions* if all is necessary; for then the illusions so-called are among the necessary changes, and form part of the "benevolent" whole! The "*ought*" of Mr. Darwin's pointer dog is unworthy of even canine sagacity, if his hunting was necessary and his pointing at the moment impossible! Reason rebels at the idea of changes being both *moral and necessary*, and manhood scorns the ignorance which refuses to know. The moral sense groans under the effect of those teachings and actings that would, if successful, make its very existence an "invariable" blunder. We fall back, then, on the perfect

freedom of the soul of man in its volitions, and hence on one grand element of the ideas of right and wrong.

It will be necessary now to show what is the other grand element of that idea. I have already indicated that *utility* is not *rightness*. A river flows for the general weal; a tree grows for the same; even a hill raises its head, and catches the passing cloud for the same; but no one will call these moralities. The acts of insane persons often produce great calamity, yet no one will call these immoralities! Mathematics are as much moral philosophy as ethics, if we have no difference by which to mark them off but utility. It is consequently absurd to speak of an "ethical standard" as found in the mere usefulness of action.

There is a relation existing between minds and minds, and between minds and things, and in that relation an *order*, the declaration of which is *perfect law*. Free accordance with that *law*, or, in other words, with that *order*, or, in still other words, with that *relation*, is moral right. Free discordance, moral wrong. This relation, order, law, forms the twin grand element, along with true freedom in the moral idea. It is the office of conscience to make sure of this accordance, and to mark it off from all discordance; while it is the office of the moral sense to give force to the judgments of conscience.

Let us look at the most important instance of what I mean. There is a relation between man and God. No amount of false thought can affect that relation. Even the most ardent denial given to the very idea of his being, leaves that relation untouched, as much so as does the most perfect faith. There is an order which arises out of that relation which is as unchangeable as itself. No conceivable subjective state, or states, of the soul can modify that order in the least degree, any more than the fancy of an enthusiast can produce the perpetual motion. The relation makes a certain thing right and another wrong,—in other words, a certain thing *in order* and another *out of order*; the law is simply the declaration of that which is in order, and of that which is out of order, or out of "keeping," as we say, with the relation. That man, who depends, as he does, on God, and is treated as he is by God, should supremely regard Him to whom he stands thus related, is pure reason when considered as thought in the soul, and true order, as it ever must be in reality, whether it is thought of or not.

Relations similar (more or less) to this exist between man and man, and between man and all other creatures; an order similar (more or less) arises out of these relations; true law is just the declaration of that order. These relations are the

true foundation of the moral idea considered objectively: the capacity of perceiving the order which they involve is its foundation considered subjectively. The origin of the moral sense is found only in the origin of the soul itself.

But here we come into the presence of the philosophy of "evolution" as it makes one of its formidable points. Mr. Herbert Spencer, in a letter to John Stuart Mill, says: "There have been, and still are, developing in the race certain moral intuitions,"—"these moral intuitions are the results of accumulated experiences of utility, gradually organized and inherited." These same "intuitions,"—like, for example, "the intuition of space" in an individual,—"have arisen from organized and consolidated experiences of all antecedent individuals who bequeathed to him their slowly-developed nervous organizations." The "moral intuition," according to Mr. Spencer, is only a state of nerve matter. His account of "the ego" is curiously in keeping with this notion. He says, "Either the ego is some state of consciousness, simple or composite, or it is not. If it is not some state of consciousness, it is something of which we are unconscious—something, therefore, which is unknown to us—something, therefore, of whose existence we neither have nor can have any evidence—something, therefore, which it is absurd to suppose existing. If the *ego* is some state of consciousness, then, as it is ever present, it can be at each moment nothing else than the state of consciousness present at that moment."* Here is philosophy every way worthy of the theory of evolution!

It may be tried on our conception of the philosopher himself. First of all, then, the only substance recognized is *nerve*. What is called the "organization" of this substance is the result of a process which reaches from Adam downwards, or, if you will, from the first "pre-Adamite" man, or from some "primordial cell" of vastly more ancient birth! Probably some similar unit would call this almost infinitely elaborated unit of nerve Mr. Herbert Spencer; but, if he did, he would soon, we hope, find out that he must not call it Mr. Spencer's "ego,"—that is, Mr. Spencer *himself*! My *ego* is just *myself*, and Mr. Spencer's *ego* is just *himself*; and, as he teaches, neither *ego* is anything—for he insists that it is only a state of consciousness. It is not even a permanent state, it is only that of a moment—the *ego* of one moment being one, and that of the next moment another! I confess that reading such philosophy makes one hunger for a grain of common sense.

* *Principles of Psychology*, p. 618.

But Mr. Spencer's fallacies are palpable. What can be more so than his confounding consciousness with knowledge, and unconsciousness with ignorance? It is surely absurd to hold that everything of which I am unconscious is unknown to me, even if you take the word in the meaning which we have already quoted as that of Professor Bain. If I am not at a particular moment "conscious of a horse," it surely does not follow that I am ignorant of all such quadrupeds. Is it true that everything of which we are unconscious at the moment is "unknown to us"? If Mr. Spencer should insist on holding "unconscious" to be equivalent to "unknown," then what is the force of his "therefore"? He would thus simply argue that what is unknown to us is unknown to us! And if there is a difference between the true meaning of "unconscious" and "unknown," his reasoning is worthless; for the one cannot logically follow as the necessary consequence of the other. Then, if an object is "unknown" to us, does it follow that we "can have" no "evidence of its existence"? And is it "absurd to suppose existing" everything of which we are either unconscious or ignorant? Is it absurd to suppose that when one has passed the night in sound slumber he has nevertheless existed? Is it absurd for the man himself to "*suppose*" even that he was not quite annihilated—that he ceased not to be for some hours—and was not created afresh? We hear of "cultivated minds" that cannot get on without something like this sort of writing. Surely it must be strange "culture" that makes a man capable of relishing such confusion of both idea and language.

Look a little at the fallacy of the *ego* considered as a *state*. That which is a state of nothing is only nothing. It is not at all "unthinkable," it is perfectly intelligible; but only as it is, and that is as nothing. A state which is a state of something is a mode of being belonging to that of which it is a state; but a state which is only a state of nothing is just nothing. If, then, there be not an *ego*, of which consciousness is a state, consciousness as positive is only an unmeaning term—that is, it means *nothing*. If Mr. Spencer should wish us to think of a state which has no *ego* of which it is a state, then let us try how his idea will stand a very simple test. Here are the vocables—"I am conscious." We remove the pronoun "I," for it has no meaning—it represents nothing, and need not stand there. Then we must remove the "am," for if the "I" is not the "am" is false. The "conscious" alone must remain; and the inevitable question arises, "*Conscious what?*" There is no answer but "*conscious nothing*," which is just *nothing*.

This is very much akin to Mr. Spencer's "intuition of space." What is *space*? It is "*room*," says one whose "intuition" has got at least two words by which to express itself! Then, what is "*room*"? We are not anxious as to words, but we do desiderate that they shall mean something, or at least an honest "*nothing*." "*Space*," or "*room*," in which there is nothing else but "*space*," or "*room*," what is it? There is a certain space, and it is at present full of something. Take that something away, and allow nothing else to enter, the space or room remains; but what is it? Nothing remains. But nothing is not something. The "intuition" of this philosopher called "*space*" is the same as his "*ego*," the intuition of only nothing!

We cannot rationally seek the origin of the moral sense here; if anything be evident that is evident; nor do we seek it in any organization of nerve. The sense that feels an idea is something never to be confounded with nerve, though, like all other senses, it is associated with nerve in our present state of existence. The poisonous liquid or fumes that affect the nerve affect the sense, just as the harmonious wavelets of sound affect the soul; but that does not necessitate our confounding ear and soul. Water has an effect on rocks, and rocks affect water, too; but we do not think it necessary to confound the two: neither do we need to confound nerve and mind.

But, even if we should so far give way to his confusion, a very brief appeal to the facts of the case would dissolve Mr. Spencer's view of evolved intuitions. Is it true that one man bequeaths to another his experiences of Utility? Is it matter of fact that a father bequeaths to his son any experiences whatever, organized or unorganized? What are experiences? Are they not facts of consciousness? If they are organized, they are still facts of consciousness. Can the facts of a father's personal consciousness become the facts of his son's? If Mr. Spencer means that the effects of these experiences on the father's brain, or nerves, become states of the brain of his son, we must still insist that the idea is not in the slightest degree borne out by fact. The rule in society is, that the son is found utterly unfit for the path which his father has pursued with success, and fit for one altogether different. And even where there is special fitness for a similar path, an amount of training of no inconsiderable measure is required, in order that the son may follow in his father's track. If Mr. Spencer's theory were true, there would be no training required to make the son follow the father. Leave him to grow up as he lists, and the "organized experiences" must

show themselves. Who does not know that such never is the case? Inherited "moral intuitions" are only figments of the wildest fancy, whether we understand the phrase to mean moral ideas as thoughts, or states of nerve, as Mr. Spencer seems to understand it. The "moral intuitions," in either sense, instead of descending from sire to son, are, in innumerable instances, found to be just the reverse in the one from that which they are in the other. Hereditary morality, like hereditary wisdom, has not hitherto *evolved itself* to the satisfaction of mankind. Neither in the keenness of the moral sense, nor in the clearness of the moral idea, can men rationally trust to inheritance. If anything be evident, that is.

To what, then, shall we trace this moral sense as to its origin? We are looking to an individual man—one of ourselves—what efficient cause produced in that man the capacity of feeling to which our thoughts have been directed? Who gave the talent upon the good use of which so much in the present and future is depending? I feel shut up to reply that He who gave that soul being gave it the capacities which are its modes of being. He who gave the talent, and He alone, can require his own with usury. This is the result of the purest reason, and scorns the aid which is supposed to come from a merely credulous faith. It is of the nature of that faith which is the conclusion reached by the most severe logic of which the human soul is capable. Begin with two of the most "undecomposable" states in which that soul can be conscious, these two states differing from each other. There will be a thought of the difference. Let there be another state differing again, and another thought will be the issue. Sensations will be compared with sensations, thoughts with thoughts, volitions with volitions, and all among each other—results will follow such as reach the highest truth. Let this process but go on honestly and fairly, and the Great Author of all being, and of all its essential modes, will stand in His divine majesty and goodness before the soul as the true origin of every capacity of both the lower and the higher creations.

If this grand result is to be reached, however, there must be no wilful halting at points in the progress of reason, such as are some of those I have indicated—no saying that you *know* the sequence of moral affections to be always certain and invariable, when you know only a fraction of even your own experience of these sequences, and yet saying that whether these sequences are necessary or not, on that point you can offer no opinion. There must be no bewilderment

about unthinkables and inconceivables, that are only words without any meaning. All that sort of thing is unworthy of reason, and fatal to its purest and highest issues. We must compare and compare—remember and remember—ponder and ponder—listen and learn with unshaken trust in the Divine Teacher, who will never deceive us, nor suffer us to be deceived, when looking to Him for guidance. This is pre-eminently what is needed in the present state, especially of what is called science, and it is most cheering to know that it is not so much wanting in society as some would lead us to imagine. There is here and there a group of proud, and consequently misguided, minds; here and there a cry is heard as if in despair, or in madness, because God is thought to have hidden himself, or been found out to be the enemy of man. But, in spite of all that, and all else to be deplored, there are millions of souls bathing in the light of Jehovah's countenance, and cultivating their highest capacities in the fellowship of Christ.

Admiral HALSTED.—I beg to propose a very gratifying resolution; namely, —“That the best thanks of this meeting be presented to Professor Kirk for the Annual Address, and also to all those who have read papers during the present Session.”

Rev. J. W. BUCKLEY.—In seconding this resolution I need add little to what has been said by Admiral Halsted, as I am sure we have listened with very great attention to the Address which has been delivered by Professor Kirk; and we must all have been impressed with the idea that it required great thought and study in its preparation. We are deeply indebted to him for the attention he has devoted to the subject. (Cheers.) I have myself given some thought to the Darwinian question, and matters of that kind, and it appears to me that they are modern theories based upon very few facts. What is produced to us is nothing like a theory founded upon distinctly proved truths, but is generally an idea connected with an immense amount of hypothetical matter. If we are to come to the conclusions which Mr. Darwin proposes, we must arrive at them on a very much firmer foundation than any which he has yet given us. (Cheers.)

The resolution was agreed to.

Mr. BROOKE.—My Lords, Ladies, and Gentlemen,—I feel certain that it must be a great satisfaction to all the members of the Victoria Institute that we have on this occasion in the chair, a nobleman who has ever set such a high example in devoting his life to that good cause which is the soul and life of this Institute, and which I feel satisfied that all now assembled together have come here to support. (Cheers.) I have great pleasure in moving that the thanks of this meeting be presented to Lord Shaftesbury for his occupancy of the chair this evening. (Cheers.)

Rev. J. G. WOOD.—My Lords, Ladies, and Gentlemen,—It is with

the greatest pleasure that I second this resolution, and the more so in consequence of a remark made by his Lordship on a recent occasion, when he stated that we need not be so much disquieted at the scientific facts which were supposed to contradict the Scriptures, because, in the first place, it very often happened that what was considered one day to be a fact was known the next day not to be a fact, and that very few so-called facts which were thought to upset the Scriptures, stood the test of many months, much less years. (Cheers.) He added, further, that when certain matters are brought forward that are really facts they are found not to contradict the Scriptures at all. (Cheers.) Now we find that all the way through. When the fact was discovered that the earth positively went round the sun, and not the sun round the earth, it was at first thought to upset the Scriptures altogether. But now we have learned to understand that it does nothing of the kind. Then we come to the discoveries of geologists. Certain facts have been made known which are facts, but a good many theories which have been put forward as facts have been proved to be but theories. (Hear, hear.) The consequence is, that we do not find the slightest part of the truth of Scripture upset by anything the geologists have discovered. Just now the question seems to be with anthropology. I had a letter addressed to me a short time ago, in which the writer, quoting certain words from the Prayer Book, begged leave to be delivered from the Jews, Turks, and Anthropologists. (Laughter.) I think I rather alarmed him by stating that I was an Anthropologist myself, that I thought all the clergy ought to be Anthropologists, and that they would not do their duty unless they were. We never find any real fact that can upset Scripture, and it is impossible that it could do so. Every fact when it is first brought forward is called a phenomenon, and it is called so more truly than people think. It is rightly a phenomenon, because it shows forth and makes plain something that was hitherto obscure, or something of whose very existence we were not aware. Remember it is not the discovery that makes the fact, but the discoverer has been enabled by the Divine Spirit to show forth something that was there from the first. And there is not a fact in nature that has not some deep reason for it. There is not a pore in a blade of grass, not a scale on the wing of a moth, that the Maker had not some good reason for making in the particular shape and colour in which He has made it. I am perfectly certain of this also, that whatever our Maker takes the trouble to make, we His creatures may take the trouble to examine; and the more we do so the more we shall find that not only are Scripture and Science not opposed to each other, but that they are one and the same—the two books of God. (Cheers.) I have great pleasure in seconding the resolution, thanking Lord Shaftesbury for taking the chair on the present occasion. (Cheers.)

The resolution was passed with acclamation.

The PRESIDENT.—Ladies and Gentlemen: It can only be in conformity with long-established rule that I am entitled to a vote of thanks this evening. I have discharged but very little duty, and with respect to the Institute itself, I understand almost less; not from any want of interest in its proceedings, but simply because I have not had adequate leisure. When I was

first invited to the honourable position which I now hold, I accepted it with a view to aid, so far as I could, in founding such a Society. I think the time has now come when a better man is required to be at the head of the Institute, more adapted to the present position of its scientific dignity. I cannot aspire to any position of that kind, therefore I only hold my post until you can find some one to occupy it with more efficiency than myself. I have been very glad to hear what I have heard to-night, and I am very grateful for the vote of thanks which you have passed. At this hour I will not enter upon the subject which has brought us together. We have been engaged in some abstruse and yet at the same time interesting subjects. There are points which we might touch upon with a great deal of feeling and propriety on this occasion, and which we might hear with advantage. But the best thing I can do now is, I think, to say in the words of old Hooker—"My words shall be wary and few." (Cheers.)

The proceedings then terminated.

ORDINARY MEETING, DECEMBER 2, 1872.

The Rev. C. A. Row, M.A., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections announced :—

MEMBERS.—The Lord Teignmouth, Langton Hall, Northallerton ; The Right Rev. Bishop P. C. Claughton, D.D., 2, Northwick Terrace, N.W. ; The Right Hon. Stephen Cave, M.P., 35, Wilton Place ; The Venerable S. P. Boutflower, M.A. (Archdeacon of Carlisle), the Abbey, Carlisle ; The Ven. P. Jacob, M.A. (Archdeacon of Winchester), Crawley ; The Ven. C. M. Long, M.A. (Archdeacon of the East Riding of Yorkshire), Settrington ; The Ven. R. Wickham, M.A. (Archdeacon of St. Asaph), Gresford, Wrexham ; The Rev. G. Currey, D.D. (Master of the Charterhouse), Charterhouse ; The Rev. J. J. Coxhead, M.A. (Vicar of St. John's), 24, Gordon Square ; The Rev. E. B. Elliott, M.A. (Prebendary of Heytesbury), Vicar of St. Mark's, Brighton ; The Rev. J. McDougall, D.D., Darwen, Lancashire ; The Rev. R. Mitchell, Church Lane, Harper Hey, Manchester ; The Rev. J. Moorhouse, M.A. (Rector of Paddington), 57, Sussex Gardens ; The Rev. J. W. Reece, M.A. (Portman Chapel), 112, Harley Street ; T. Barker, Esq., Bramel Grange, near Stockport ; J. Colebrook, Esq., M.R.C.S., 15, Hans Place, Chelsea ; A. J. Dodson, Esq., M.I.C.E., Cambridge Park, Twickenham ; W. A. Drown, Esq. Jun., Philadelphia, U. S. ; W. Klein, Esq., 24, Belsize Park ; W. Leaf, Esq., Park Hill, Streatham ; W. Mewburn, Esq., jun., 3, Tavistock Square ; S. Vincent, Esq., Sussex Villa, King Edward's Road, Hackney.

ASSOCIATES.—The Right Rev. Bishop C. J. Abraham, D.D., The Close, Lichfield ; The Right Rev. Bishop H. Cotterill, D.D., Edinburgh ; The Right Rev. Bishop F. F. McDougall, D.C.L., Godmanchester ; The Very Rev. E. M. Goulburn, D.D., Dean of Norwich, Norwich ; The Ven. P. Freeman, M.A. (Archdeacon of Exeter), Thorveolin, Collumpton ; The Ven. T. Hill, B.D. (Archdeacon of Derby), Chesterfield ; The Ven. A. Huxtable, M.A. (Archdeacon of Salisbury), Sutton Walden, Shaftesbury ; The Rev. G. Bartle, M.A., D.D., LL.D., Ph.D., Principal of Freshfield College, Formby, Liverpool ; The Rev. G. B. Blenkin, M.A. (Prebendary of Lincoln), Boston, Lincolnshire ; The Rev. T. P. Boulton, LL.D. (Principal of the London College of Divinity), St. John's Hall, Highbury ; The Rev. J. W. Buckley, M.A. (Vicar of St. Mary's), Paddington ; The Rev. G. T. Fox, M.A. (Vicar of St. Nicholas's), Durham ; The Rev. C. J. Glyn, M.A. (Rector of Witchampton, Wimborne ; The Rev. R. Gordon, 5, Red Lion Street, Wapping) ;

The Rev. J. Halley, Mem. Sydney Univ., Williamstown, Victoria, Australia; The Rev. S. Kenah, B.A., H.M.S. *Rattlesnake*, Cape of Good Hope; The Rev. Wm. Lee, D.D., Roxburgh, Kelso; The Rev. J. Martin, Sydenham Park, Sydenham; The Rev. J. Simpson, LL.D., (Vicar of Kirkby Stephen), Westmoreland; The Rev. R. J. Simpson, M.A. (Rector of St. Clement Danes), 5, Russell Square; The Rev. O. P. Vincent, M.A., 23, Devonshire Street, Portland Place; G. W. Baynham, Esq., 24, Sancheshall Street, Glasgow; J. Carr, Esq., 19, Osborne Road, Finsbury Park; T. W. Cave Thomas, Esq., Camden Road Villas; W. Forsyth, Esq., Q.C., The Firs, Mortimer, Reading; J. H. S. Graham, Esq., 1, Belgrave Terrace, Shepherd's Bush; E. Vernon Harcourt, Esq., Whitwell Hall, Yorks.; R. Heaton, Esq., The Mint, Birmingham; W. S. P. Henderson, Esq., Ryder Hall Lodge, Guildford; Professor G. S. Morris, M.A., Michigan University, Ann Arber, Michigan, U.S.; Professor H. A. Nicholson, M.D., D.Sc., M.A., Ph.D., F.R.S.E. University College, Toronto, C.W.; W. Ogle, Esq., M.D., Friargate, Derby; B. Shaw, Esq., M.A., Barrister-at-Law, Late Fellow of Trinity College, Cambridge, 8, Cambridge Square; M. J. Stewart, Esq., M.A., Barrister-at-Law, Ardwell, Stranraer, N.B.; W. R. Warwick, Esq., M.D., Southend, Essex; T. Windeatt, Esq., Tavistock; C. Winterbottom, Esq., 16, Sloane Street.

Also the presentation of the following Works for the Library:—

- “Transactions of the Royal Society,” Parts 135–8. *From the Society.*
- “Transactions of the Royal United Service Institution,” Parts 67–8.
From the Institution.
- “Transactions of the Royal Smithsonian Institution of Washington,” 1871.
From the Institution.
- “Transactions from the National Association for Promoting Social Science.”
From A. C. Brebner, Esq.
- “Christian Sacerdotalism.” By J. Jardine, Esq., LL.D. *From the Author.*
- “The Conformation of the Material by the Spiritual.”
By W. C. Thomas, Esq. *From the Author.*
- “The Science of Moderation.” By W. C. Thomas, Esq. *Ditto.*
- “The Increase of Faith.” By the Rev. W. Lee, D.D. *Ditto.*
- “The Days of the Son of Man.” *Ditto* *Ditto.*
- “Nineteen Years in Polynesia.” By the Rev. G. Turner, LL.D.
From the Rev. S. J. Whitmee.
- “Reply to the Bishop of Salisbury.” By the Venerable Archdeacon Martin.
From W. H. Ince, Esq.
- “Sermons.” By the Rev. J. M'Dougall, D.D. *From the Author.*
- “What Determines Molecular Action?” By I. Croll, Esq. *Ditto.*
- “Zoilism.” By J. Poyer. *Ditto.*

The CHAIRMAN.—It is only fair to say that this large addition to the members of the Institute is mainly due to the indefatigable exertions of the

Hon. Secretary. (Cheers.) I regret, however, to say that we have lost two members, through death, during the past week ; namely, Lord Harris and Sir Donald McLeod.

The following paper was then read by the Author :—

FORCE AND ENERGY. By CHARLES BROOKE, M.A.,
F.R.S., V.P.V.I., &c.

THE principle of the Conservation of Energy having been by some writers misapplied to the promotion of views that lead directly to Materialism, Pantheism, or Atheism, others who rightly hold it to be one of their first and highest duties to oppose such views and to counteract their tendency, appear to have held it necessary to impugn the principle altogether, instead of assigning a limit to the scope of its legitimate application. Two essays are here specially referred to : one by the Rev. J. Moore, entitled "The Heresies of Science," published in the London *Quarterly Review* for July, 1871, in which the theories discussed are those of "Natural Selection" and "The Conservation of Energy"; the other by the Rev. J. McCann, D.D., entitled "Force and its Manifestations," and recently read before this society.

2. Dr. McCann states (§ 1) that the conservation of energy, if established, would "in Biology lead to Evolution, in Theology to Pantheism, in Philosophy to Materialism, and in Morals to Necessitarianism : this cannot be conceded as a necessary sequence, for if it be freely admitted, as the writer most heartily does, that all physical laws must ever be held to be subservient to the far higher law of an Almighty Will, he cannot be supposed, in upholding the truth of this principle, to advocate those evil tendencies, which it is admitted must ensue, if the existence of that higher law be either directly or by implication denied.

3. On the doctrine of "Evolution by Natural Selection," impugned by Mr. Moore, it would be foreign to the subject of this paper to enter at any length. That the existing order of nature might have so arisen, had it been in accordance with the will of the Creator, cannot be denied ; but that any such supposed course of events has actually happened is quite another question. To the mind of the writer this doctrine presents such grave difficulties that he is unable to accept its probability, and is generally in accord with what the author of "Heresies" has written on the subject. It will only further be remarked that a belief in the progressive development of

man from any inferior animal whatever is absolutely incompatible with a belief of the existence in man of an immortal spirit; for by no conceivable process can that which is essentially not material be developed from any combination of mere material elements. It is nowhere stated of any inferior animal that "God breathed into his nostrils the breath of lives"; and it may not unreasonably be assumed that the plural noun *chayim* stands in the same relation to man's tripartite nature that *Elohim* does to the tripartite existence of the Godhead.

4. Before proceeding in an attempt to confirm the principle of the conservation of energy to the satisfaction, it may be hoped, of even the writers of the above essays, it is quite necessary to come to a distinct understanding as to the precise meaning of the terms employed, and especially those of "Force" and "Energy," since the writer has seen reason to modify in some measure the views on this subject expressed in the introduction to the last edition of his "Elements of Natural Philosophy."

5. The commonly received relative signification of the terms "Force" and "Energy" is of considerable antiquity; the terms *dynamis* and *energeia* are employed in the ethics of Aristotle, and may perhaps be best represented by the terms "potentiality" and "actuality," related as that which has the power of producing activity is to that which acts.

6. The usual definition of force is, THAT WHICH PRODUCES OR TENDS TO PRODUCE CHANGE IN THE STATE OF MATTER WITH RESPECT TO ITS REST OR MOTION. But if it be the essence of a definition, that while it comprehends the predicate or thing defined it excludes all else, then this definition is open to grave objections; it is perfectly true that force will produce or tend to produce, &c., but the inverse proposition, viz., "that which produces, or tends to produce," &c., is necessarily force, is by no means equally true, for "change in the state of matter with respect to its rest or motion" may be produced by other matter in motion (and therefore possessing energy) without the intervention of any force. This definition, therefore, appears to the writer as tending to confound "force" and "energy."

7. Force has been thus defined by our ablest recent master of experimental physics* :—"What I mean by the word force is the source or sources of all possible actions of the particles or materials of the universe." But this definition is open to much the same objection as the former, because the "source of possible actions" of matter is not necessarily force. Both

* Faraday MSS. *Croonian Lectures on Matter and Force*, by H. Bence Jones, M.D., p. 35.

these definitions, in fact, appear to comprise both force and energy.

8. The definition of force which appears to the writer least open to objection, is—THAT WHICH PRODUCES A MUTUAL ACTION BETWEEN DIFFERENT PORTIONS OR PARTICLES OF MATTER, BY WHICH THEY ARE EITHER ATTRACTED TOWARDS OR REPELLED FROM EACH OTHER. Hence, force must be essentially either attractive or repulsive in its character. By this action "energy" is imparted to the matter put in motion: hence force may be further characterized as having the power of imparting energy. But for the same reasons as those above stated, "the power of imparting energy" will not serve as a definition of force, because energy may be imparted by other matter possessing energy, without the intervention of any force.

9. Cohesive attraction may be quoted as a force acting between contiguous atoms or molecules of a body; electric and magnetic attraction and repulsion as forces acting between certain particles and masses under certain conditions only; gravitation, or weight attraction, as a force acting indiscriminately between all portions of matter: the mutual actions of masses being only the aggregate of the actions of their component particles. Heat, or more correctly speaking thermic energy, is an universal source of repulsive force acting between the particles of all kinds of matter.

10. Energy was first (as the writer believes) defined by Thomas Young to be THE POWER OF DOING WORK, and this definition does not appear to require any amendment.

11. Energy, as it exists in moving matter, is called *actual* or *kinetic*: and this kind of energy implies the existence of motion and *vice versâ*, but it is not (as it has frequently been assumed to be) identical or synonymous with motion.

12. When energy, from the circumstances of the case, remains undeveloped in matter, inactive but capable of being called into action, it is termed "potential energy." Thus the energy of chemical affinity existing between the elements of gunpowder is *potential*; but when called into action by elevation of temperature, the repulsive force existing between the particles of the highly-condensed and heated gases into which the gunpowder is resolved imparts *actual* or *kinetic energy* to the shot.

13. If a weight be raised, a certain amount of energy is expended in raising it, and so long as the body is supported, the energy expended in raising it remains potential in it; but when allowed to fall freely *in vacuo* to the level from which it was raised, the body acquires, in an active or *kinetic* form, exactly the amount of energy that was expended in raising it. Similarly

the vapour raised from the earth's surface by the heat of the sun acquires in the clouds potential energy; in again descending to the sea-level, it acquires actual energy, and may do useful work in the shape of mountain torrents, the usual motive power in mountainous districts, or mischief to the garden and greenhouse, in the solid form of hail. In a mixture of oxygen and hydrogen gases in combining proportions, the energy of chemical affinity remains potential, until by the action of heat, such as that of an electric spark, some of the gaseous atoms are brought within the sphere of their mutual attraction, when the whole unite violently with the evolution of light and heat, and form water: and the theory of conservation requires that exactly the same amount of energy that was developed in the forms of heat and light at the time of combination would be required to tear the atoms asunder again, and to place them beyond the reach of each other's attraction. Again, the energy of a pendulum is wholly potential at each extremity of its oscillation, and wholly actual at the middle or lowest point. By some writers of eminence the potential energy here described has been termed "energy of position." Practically, the term "actual" is not used, and potential is frequently used elliptically for "potential energy"; thus, we speak of the potential of an electric charge, or of a voltaic current. But it must be observed that the term potential, used substantively, has a definite meaning as employed by Laplace and Green in the analytical investigation of theories of attraction: this subject, for the purposes of the present paper, it is not necessary to consider further.

14. The theory of the conservation of energy implies that no kind of energy can be produced by human agency except at the expense of an equal amount of the same kind, or an equivalent amount of some other kind, of energy. From this it follows as a corollary, that so far as physical law is concerned, the total amount of energy in the universe must remain *unchanged*; but to assert that it is, under all circumstances, *unchangeable* is a very different matter. The creation of matter must necessarily imply the creation of energy; and those who deny the possibility of the one, must deny that of the other also: they must, in fact, deny the existence of Omnipotence. It may further be remarked, that the principle of the conservation of energy is identical with that treated in all theoretical works on dynamics as the "conservation of *vis viva*."

15. It is much to be regretted that a far greater degree of logical accuracy in the use of terms than is usually met with does not exist amongst even the ablest writers on physics, for many of the arguments adduced against physical principles lie not against

the principles themselves, but against the indefinite language in which they have from time to time been expressed. There is probably no term employed in physics that has been more misapplied, and in its misuse has led to greater confusion of ideas, than "force."

16. Mr. Justice Grove writes thus :*—"Physical science treats of matter, and what I shall term its affections, namely, Attraction, Motion, Heat, Light, Electricity, Magnetism, Chemical Affinity ; when these react upon matter they constitute Forces." Attraction undoubtedly constitutes a force, but motion can mean nothing else than the act of changing the position occupied in space, and how that act can be held to constitute a force it is not easy to understand. Heat, Light, and the rest, in acting or reacting upon matter, constitute not forces, but forms or kinds of energy.

17. Professor Balfour Stewart* avoids any definition of force, but the illustrations given involve the above commonly received definition. Thus, in the case of a stone resting on the edge of a cliff that author writes :—"Whilst the stone lay on the top of the cliff the force with which the earth attracted it was counteracted by an opposite force, namely, the resistance of the support on which the stone was placed." Now, the "resistance of the support" is obviously not a *force*, but a *statical pressure*, and differs totally from its opponent, the force of gravitation, in that the one is capable, and the other incapable, of producing motion.

18. It is easy to put a case in which one force may really be counteracted by another force ; as, for example, if the stone be suspended either from one end of a spring of which the other end is fixed, or by an elastic cord, then elastic force is opposed to gravitation, and both are really forces, for both are capable of producing motion.

19. Professor Ball, in a recent treatise on Experimental Mechanics, states, very dogmatically, that the true definition of a force is that which "tends to produce or destroy motion." If that be so, every obstacle to the movement of a body is a "force," which is obviously absurd. Subsequently he terms friction a "force," in strict accordance, doubtless, with the language of his definition, but not in accordance with generally received ideas on the subject.

20. Mr. Moore, in reference to the confusion of the terms employed by writers on physics, quotes from Professor Bain that "Inert matter in motion is force under every manifesta-

* *Correlation of Physical Forces*, fifth edition, preface, p. x.

† *Lessons in Elementary Mechanics*, second edition, 1871, pp. 7 and 8.

tion." This is so obviously an abuse of language that it needs no further comment.

21. Mr. S. Baring-Gould, in a very unsuccessful attempt to elucidate dynamical principles,* has defined force to be that which produces or resists motion; and further on we meet with confusion worse confounded, for not only "light, colour, heat, electricity," but "dimension . . . solidity, liquefaction, vaporisation;" are modes or modifications of force: how "colour" and "dimension" are to "produce or resist motion" it is not easy to apprehend. An indefinite number of such misapplications of the term "force" might be further adduced, but enough has been stated to show the very loose manner in which that term has been used by writers on physical subjects.

22. The terms force and energy are frequently used indiscriminately in common parlance; "thus, it is common to speak of the *force* of the powder, and the *force* of the shot: the powder has force, but the shot only energy. Again, the terms 'force of inertia,' 'force of percussion,' 'centrifugal force,' have been frequently but erroneously employed. Inertia is simply the negation or non-existence of any disturbing energy. In cases of percussion, the energy of the striking body may be more or less imparted to the body struck, either with or without the intervention of the force of elasticity. This may be shown by means of two suspended ivory balls. If a little bit of putty be placed on the point of impact of one ball at rest, and the other be raised and allowed to impinge directly upon it, they will swing together to half the height that the one ball descended from, because the energy acquired by the descending ball is just sufficient to raise double the mass to half the height. But if the elasticity of the balls be allowed to come into play by the removal of the yielding material, then the striking ball remains at rest, and that which was struck rises very nearly to the height from which the former descended, elastic force having in this case imparted to the ball at rest nearly the remaining half of the energy of the striking ball. The instantaneous transmission of the energy of impact through a long row of glass balls in contact may be adduced as a rough illustration of the molecular transmission of energy: if the first ball of the row be struck, visible motion will be imparted to the last only. The term 'centrifugal force,' denoting the tendency of a revolving body to fly off from its orbit, will in all cases be correctly replaced by 'centrifugal energy.'"

23. In order to maintain a logical accuracy of diction in treating the subject of this paper it becomes necessary to consider

* *Origin and Development of Religious Belief*, Part I., chap. I.

the precise meaning of those terms which relate both to certain physical conditions of matter, and to the mental impressions which arise from them, namely; Heat, Light, and Sound. Heat was 200 years since very accurately defined by one of our ablest philosophers, as well as most precise and logical writers, John Locke, he writes:—"Heat is a very brisk agitation of the insensible parts of the object, which produces in us that sensation from whence we denominate the object hot; so what in our sensation is heat, in the object is nothing but motion." It would be perhaps still more precise to say, "heat arises from," &c., in place of "heat is," &c., because the latter part of the definition states heat to be not the motion, but the perception of it.

24. Precisely the same definition will serve equally well for Light, if "light" be substituted for "heat, and "luminous" for "hot." It would then read thus:—"Light is a very brisk agitation of the insensible parts of the object, which produces in us that sensation from whence we denominate the object luminous; so that what in our sensation is light, in the object is nothing but motion.

25. A very similar definition may be assigned to Sound, which has, nevertheless, been declared by the authors of both essays to be incapable of definition, thus:—"Sound is the impression on the proper organs of hearing produced by certain vibratory movements of matter;" so that what in our sensation is sound, in the object is nothing but motion."

26. Sonorous vibrations may enter the ear of the deaf man, and it may be that the tympanum may respond to them, while the organic lesion happens to be more deeply seated, but he will tell you there is no sound; similarly, vibrations of another kind may enter the eye, and paint their perfect picture on the retina, but if the optic nerve have lost its function, the blind one will tell you there is to him no light.

27. The correctness of Locke's definition of heat has been remarkably confirmed by a bold and hazardous experiment performed on himself by Professor Tyndall, which he most judiciously recommends *not* to be repeated. If a concave reflector be suitably placed behind the luminous carbon-points of an electric lamp, the rays of light and heat will be concentrated in a powerful focus at a distance of a few inches in front of the lamp. If the eye were so placed that this focus of rays would fall on the retina, there can be little doubt that actual disorganisation of that structure would ensue. By placing a vessel formed of parallel plates of glass containing a sufficiently strong solution of iodine in carbonic bisulphide between the lamp and the focus, the whole of the luminous rays may be intercepted,

while nearly all the thermic rays are transmitted, constituting what has been called "dark" or "invisible" heat. That concentrated, though invisible, heat really exists at the focal point may be readily shown by employing it in lighting a match or a cigar, and if a thin sheet of platinum coated with a deposit of the same metal in a state of minute subdivision, in order to render it more absorbent of heat, be so placed as to receive the focal rays, it will immediately become white hot, and a visible image of the carbon points will be produced on its surface. Professor Tyndall inferred that as these rays were invisible, that is, that they were incapable of affecting the retina of the eye, they would produce no effect on that structure, however concentrated; he therefore so placed his own eye that the focus might fall on his retina, and perceived no effect whatever; the vibratory motion was there in all its intensity, but there was no *heat*, because the appropriate means of perception were absent. But on the contrary if the skin of the hand were placed at this focal point, it would speedily become charred, thus showing its power of being affected by heat.

28. The term "invisible light" has been made use of; but in reference to the definition given above, it evidently involves a contradiction; the term has been applied to those rays which are incapable of affecting the eye, but are at the same time capable of being changed into other rays which have that power, by the action of certain substances on which they may fall.

29. Light and heat have frequently been illogically designated simply as "modes of motion" by able physicists; this appears to have led many (the authors of the above-mentioned essays not excepted) into a hopeless confusion of the terms force, energy, and motion. Doubtless in common parlance the terms light and heat will continue to be applied not to the sensuous impressions produced, but to the agent producing them; but it must be borne in mind that they are forms or kinds of energy, and not "modes of motion."

30. It may be remarked that light and heat, electricity and magnetism, which are all now more or less generally recognized as forms of energy, have all been assumed to be *material*, but *imponderable*. The Newtonian or corpuscular theory of light sufficed to explain ordinary optical phenomena until the discovery of diffraction and interference, when a very forced supplementary hypothesis became necessary—namely, that the molecules of light were egg or spindle-shaped, and made perpetual somersaults during their onward progress, rebounding or being reflected from the surface of a medium, if they encounter it sideways, but penetrating and being refracted, if they meet the surface endwise: but even this is insufficient to

account for the phenomena of polarisation. But all observed phenomena of light are in perfect harmony with the undulatory theory, as now commonly accepted; and not only does this theory fit all previous observations, but the appearance that will be presented to the eye, when a ray of light is transmitted through any hitherto untried arrangement of transparent media, may safely be predicted by analysis, as in the remarkable case of Airy's spirals, seen when a polarised ray is successively transmitted through two plates cut from a right and a left-handed quartz crystal. Caloric was once assumed to be the matter or substance of heat; and the observed radiation of cold induced Black to ascribe to cold an independent material existence; but the observed phenomena are completely explicable on the "theory of exchanges," which means that every body radiates *its own* temperature, whether high or low, and that every surrounding body absorbs the radiations; consequently, the radiations of a cold body will lower the heat of a warmer body in its vicinity, just as a cistern with two pipes of unequal bore will, if fed by the larger and emptied by the smaller, become gradually fuller, while if fed by the smaller and emptied by the larger, its contents will be diminished: the parallel, in absorbed and emitted radiations, is obvious.

31. Again, it was formerly taught that there were two electric "fluids"—the "vitreous" and "resinous"; but these were subsequently merged into one, and the positive and negative aspects of electricity were assumed to be differences in *quantity* only, and not in *kind*, positively electrified bodies being in excess, and those negatively electrified, in defect of the normal quantity. Moreover, magnetic properties were supposed to be vested in two "fluids"—the "austral" and "boreal"—possessing mutually attractive and self-repulsive properties. But all these theories are more than probably alike groundless; they are, moreover, utterly inconsistent with the perpetually recurring interchanges of the various presumed forms of energy; for it is impossible to conceive one kind of matter to be converted into another kind, or matter to be converted into mere motion, and *vice versa*.

32. In the vibratory motions of the atmosphere and other bodies, which convey to the ear the impression of sound, the vibrations are demonstrably longitudinal; that is, the vibratory motion of each particle is in the direction in which the wave is travelling, as in the wave the wind produces in a field of corn: in the vibrations of light and heat, the phenomena of polarisation require that they must be transverse, that is, the vibration of each particle must be in a plane perpendicular to the direction of the wave, as in the ripples on the surface of still water.

33. If electricity, and therefore magnetism, consist also of vibratory motion (an assumption which the obvious interchange of the former with other forms of energy necessitates), then the probable form of electric and magnetic wave-motion becomes an interesting subject of inquiry. It must be observed that both electricity and magnetism possess a dual character not common to other forms of energy; there is *positive* and *negative* electricity, *austral* and *boreal* magnetism, but there is no analogous *a* and *b* condition in light or heat. Now, is there any conceivable kind of wave-motion that would present this duality of character? Undoubtedly there is—namely, a helical wave, in which the motion of each disturbed particle is in a circle, the plane of which is perpendicular to the direction of the wave. If a helix be called *positive* when it turns from left to right, and *negative* when it turns the contrary way, from right to left, then a progressive motion in the same helix will appear positive or negative, according to the end at which it is viewed; also, opposite motions in the same helix may be conceived to interfere, and to give rise to repulsion, while opposite motions in opposite helices would progress without interference—like two series of waves on the surface of the water crossing each other—and this may, perhaps, be the source of electrical attraction.

34. It has recently been stated that no physicist of note has suggested the nature of the motion which constitutes electricity and magnetism. That may be so, but it is a fact that some years have elapsed since the above suggestion was first made by the writer: it has also been made by some others.

35. The intimate relation—it may be said the identity—of electricity and magnetism may be shown by means of De la Rive's floating battery, consisting of a small voltaic element, floating in a vessel of water, the electrodes of which are connected with the ends of a small cylindrical coil of insulated copper wire resting horizontally on the element. This coil manifests all the properties of a floating magnetic needle, taking its position in the magnetic meridian, and one end being attracted, and the other repelled, by either of the poles of a bar-magnet. Since magnetic effects are ordinarily exhibited by steel or iron, it might be supposed by some that this metal is essential to the development of magnetic energy; it is, however, merely the ordinary and most susceptible vehicle of magnetism. Since magnetic energy is manifested in a direction at right angles to the electric current that produces it, the dynamic difficulty of resolving one helical wave into another at right angles to the former must not be lost sight of, but it is probably not insuperable. There is, however, some valid

experimental confirmation of the helical character of the magnetic wave. The energy or, as it has sometimes been erroneously termed, the inertia of rotation—*i.e.*, the resistance which a rotating body offers to any change in the direction of its axis of rotation—is well exemplified by the gyroscope, and a more familiar illustration is found in the undeviating path of the rifle-ball. Now, if a mass of copper be suspended by a string between the poles of a powerful electro-magnet, and be put in rapid rotation by twisting the string, the instant that the magnet is excited, the rotation is arrested; and if the mass be now forcibly rotated, so much heat is developed by molecular friction, that fusible metal contained in a copper tube similarly placed may be actually melted and poured out. This arrest of the motion of the rotating mass would be a necessary dynamical sequence of the helical wave-motion assumed to constitute magnetic energy; for in that case each disturbed molecule would be describing a circular orbit in a plane at right angles to the lines of magnetic energy, and would by its own energy resist any displacement of its axis of revolution; and this view may be further confirmed by another experiment. A ball of copper with a small pulley on its axis is placed at the end of a frame, so as to be capable of being rapidly rotated by a wheel and band, when placed between the poles of the electro-magnet; its axis of rotation either coinciding with, or being placed at right angles to, the lines of magnetic energy. When the axis of rotation of the ball coincides with the magnetic lines, there would be obviously no change in the direction of the planes of the assumed molecular revolution, and consequently no heat ought to be developed; this may be shown to be the case by means of a thermopile connected with a galvanometer and brought near the rotating ball. When, however, the axis of rotation of the ball is placed at right angles to the magnetic lines, heat will be immediately developed.

36. The gyratory nature of the magnetic wave is further confirmed by a fact first observed by Faraday—namely, that if a beam of polarised light be transmitted through a piece of heavy glass placed between the poles of an electro-magnet, so that the axis of the beam may correspond with the lines of magnetic energy, then, if the magnet be excited, the plane of polarisation is twisted a little, either to the right or left, according to the direction of magnetic polarity—a result by no means inconsistent with the hypothesis of molecular revolution.

37. In both the essays before alluded to, the “Ether” theory has been put forward as evidence of the divergence of opinion existing between physicists. It must, however, be observed that

the undulatory theory now very generally received assumes only that vibratory motion is transmitted by matter of *some* kind, and the inferences drawn from it are not invalidated by any hypotheses as to the precise nature of the transmitting medium. The writer, differing from many eminent physicists and mathematicians, is inclined to adopt the view that long since had the able support of Leonard Euler, and was first prominently put forward in this country by Grove, that the hypothesis of the presence of ether interstitially in all kinds of matter is gratuitous.

38. It may, however, be desirable to consider a little more in detail the means by which the various kinds of energy are transmitted. Sonorous vibrations are freely transmitted by all kinds of homogeneous matter, whether in the gaseous, fluid, or solid state; in solid matter not homogeneous the amount of transmission depends upon structure. Thus, the transmission of sound through wood is much less perfect in the traverse than in the longitudinal direction; it is much more impeded by cork, and almost intercepted by cotton-wool and similar substances. Electric energy is more or less freely transmitted by most kinds of matter, except glass, silk, and the resinous products of the vegetable kingdom. Since the transmission of the vibrations of light and heat through an absolute vacuum is obviously impossible, because the transmission of motion implies the presence of matter to be moved, it becomes a necessity that infinite space must be pervaded by some highly elastic and attenuated kind of matter, as the medium of the transmission of light and heat from the central luminaries of all existing solar systems to their attendant satellites. This, in entire and probably unavoidable ignorance of its nature, has been termed "ether," and the existence of ether has been assumed to be demonstrated by the periodic retardation of Enke's comet. But it has been further assumed that ether *alone* is capable of transmitting the vibrations of light and heat, and must therefore exist interstitially in all kinds of translucent and transalcent matter.

39. The only basis on which this *interstitial ether* hypothesis rests is the assumed incapacity of ordinary matter, whether in the solid, liquid, or gaseous state, to transmit the extremely rapid vibrations of light and heat, for no more valid reason than this: that the only vibrations of ordinary matter of which any actual knowledge exists—namely, those of sound—are almost immeasurably slower than those of light and heat, the former being numbered by at most a few thousands, the latter by hundreds of millions of millions in one second of time. But it must be borne in mind that sonorous vibrations are always

longitudinal, in the production of which repulsive forces are *alone* concerned; whilst, on the contrary, light and heat vibrations are necessarily *transverse*, and the production of these is solely due to *attractive* forces. Now, these respective forces obey very different laws, for whilst attractive forces obey generally, and probably universally, the law of the inverse *square* of the distance between the attracting particles, molecular repulsion must obviously—at all events, in gaseous matter—obey the law of the inverse *cube* of the distance, as a corollary to Boyle's law of the constant ratio (within wide limits) of gaseous pressure to density; therefore, from the rates of transmission of longitudinal vibrations, nothing can be predicated respecting the possible rates of transmission of transverse waves. It has been asserted that molecular repulsion is a dynamic resultant effect of molecular vibration, and therefore incapable of expression by a statical law; but it is very doubtful whether molecular attraction is not equally a dynamic sequence, and therefore not a whit more entitled to claim a statical law than the former. This view may be illustrated by an experiment, in which a disc of card at the end of a light suspended rod, and placed near a tuning-fork, is attracted or drawn towards the latter, when thrown into vibration by means of a violin-bow.

40. Sir C. Wheatstone has long since shown that electricity traverses a copper wire at a velocity not less than that of light. Whether electricity be matter or motion, this result shows that the capability of matter to transmit the vibrations of light is by no means improbable. Moreover, it is now generally admitted that when a body becomes heated, its own molecules, and not merely those of the supposed interstitial ether, are thrown into a state of vibratory motion, the amount of heat corresponding probably to the amplitude of the vibrations. If, then, ordinary matter be assumed to be susceptible of heat-vibrations, can any valid reason be assigned for its insusceptibility of light-vibrations, when the close relationship, if not the absolute identity, of these two forms of energy is manifested by so many phenomena common to both, such as those of reflection and refraction, polarisation, and the reciprocal properties of emission and absorption, whether general or selective.

41. The reciprocity between the powers of radiating and absorbing both light and heat which exists in all substances, so far as experiment has shown, presents a cogent argument in favour of the hypothesis that the energies of both light and heat are exerted on the molecules of sensible matter, and not on any supposed interstitial medium. It is a well-established fact that those surfaces of bodies which radiate heat most freely also

absorb most readily—that is to say, that molecular condition which is more or less favourable for imparting to adjacent matter the wave-motion of heat is in the same degree more or less favourable to its reception; and the same holds good with respect to the selective absorption of heat—namely, that any substance absorbs more freely the special kind of heat which it radiates. Thus, while a plate of rock-salt absorbs little more than 3 per cent. of the heat radiated by heated black platinum, it absorbs 30 per cent. of the heat radiated by a piece of its own substance heated to the same temperature. Precisely the same phenomena are observed with respect to light: for example, the scoriæ floating on the surface of a pot of molten metal glow more brightly than the clean surface of the metal; and if an encaustic tile with a pattern on it—say of black and white—be heated red hot, and placed in a dark room, the black portion will be observed to glow much more brightly than the white. In these instances the molecular conditions that facilitate absorption equally facilitate emission; and the case is the same with regard to selective absorption. Thus, a piece of red glass, when heated, emits a greenish light—that is, the absorbed correspond with the emitted rays. And a still more striking instance has been observed by Kirchhoff—namely, that a tourmaline, heated to incandescence, emits light polarised in a plane perpendicular to that which it transmits. Here the structure, that enables the crystal to take up wave-motion in one direction only, compels it to impart motion exclusively in the same direction. If, then, it be admitted that the molecules of all kinds of matter are susceptible of thermic energy, how can it be denied that they are equally susceptible of the energy of light, when the varied phenomena of light and heat are shown to be in all cases precisely analogous.

42. All substances in the state of incandescent vapour are found to originate or emit rays of definite refrangibility, and to form an interrupted spectrum, consisting of bright lines only; moreover, the vapour of every substance is capable of absorbing the rays that itself emits when incandescent—that is to say, of responding to and appropriating those special vibrations of which it is most susceptible. This is readily demonstrated by means of sodium. If burnt in a spirit-lamp it emits only the double D line in the spectrum, and if interposed in a state of vapour, it absorbs the vibrations of the same period, and cuts out the same line from a continuous spectrum. A similar reciprocity of emission and absorption exists in sonorous vibrations. If two harps tuned exactly in unison be placed at the opposite sides of a room, a note struck on one will excite vibrations in the corresponding string, and in that only, of

the other; is it less reasonable to attribute the former phenomena to the special susceptibility of the molecules, than to ascribe the latter to the special tension of the reciprocating strings? It is quite true that incandescent bodies in the solid or fluid state emit rays constituting a continuous, not an interrupted, spectrum. This is no doubt due to the interference of aggregation with the motion to which the molecules are most prone; for it has been observed that the bright lines in the spectrum become more sharply defined by attenuation of the emitting vapours or gas, and that they become broader and less defined by its condensation.

43. It has appeared, from the investigations of Messrs. Huggins and Lockyer, that the periodic time of vibrations emitted by incandescent hydrogen in the vicinity of the sun is sometimes slightly modified by the proper motion of the emitting gas; in this case some portion of the bright line will be slightly deflected towards the violet or red end of the spectrum, accordingly as the wave-length is diminished or increased by the proper motion of the gas; occasionally deflections in both directions simultaneously have been observed, showing the existence of a solar cyclone. A precisely analogous acoustical phenomenon may be demonstrated by placing a free reed at one end of a long hollow rod, and a small pair of bellows at the other end; if the rod be briskly waved to and fro while the sound of the reed continues, its pitch appears to be sharpened to those whom it approaches, and flattened to those from whom it is receding. It follows from these facts, as an irresistible conclusion, that the molecules of ordinary matter are susceptible of the vibrations both of light and heat, and are therefore equally capable of transmitting them; and if so, the hypothesis of the necessity of interstitial ether becomes absolutely groundless. It may be asked how, if ether be admitted to occupy infinite space, it can be imagined to be excluded from the spaces occupied by ordinary matter; to this the writer would reply, by means of a very simple hypothesis, which he ventured to put forward in the introduction to the last edition of his "Elements of Natural Philosophy"—namely, that ether (like its liquid namesake with water) is immiscible with ordinary gaseous matter, and therefore floats above the attenuated confines of the atmosphere; it would thus be not less capable of fulfilling its beneficent mission of supplying organic life with the indispensable energies of light and heat; for, as no limit can be assigned to the *possible* amount of molecular displacement in a medium so attenuated as ether must necessarily be, an amount of energy is conceivable in its molecules which would be sufficient to impart

effective motion to the indefinitely denser forms of cognisable matter.

44. It was objected by Dr. Young to the views here advocated, that if ordinary matter be susceptible of luminous vibrations, all bodies ought more or less to absorb light, and to become luminous, just as all bodies become more or less heated, by absorbing radiated heat. To this it may be replied that a large number of bodies is now known to be phosphorescent after exposure to light; but that in many the duration of that property is exceedingly brief: when enclosed in a glass tube, and placed in a slit in a dark screen, surrounding an electric light, they emit visible light only when rotated with great rapidity, so that the particles may be presented to the eye within the 10th or 20th of a second after their exposure to light. If the velocity of rotation could be indefinitely increased, it is not improbable that all substances would become luminous, for it must be remembered that the 50th or 100th of a second is as an age when compared with the duration of a wave of light.

45. Moreover, matter is equally capable of absorbing the invisible rays, that are known by their chemical effects to be present in the spectrum. This has been shown by the experiments of M. Niepce. An engraving, which has been placed for some days in the dark, is half covered with an opaque screen, and then exposed to sun-light. The engraving is then placed (with the usual precautions of a photographic process) in juxtaposition but not in contact with a piece of sensitive paper. An inverted or 'negative' image of that portion of the engraving which has been exposed to light will be produced on the paper, while the portion that was covered up will produce no effect. Again if the engraving after exposure be placed in contact for several hours with a sheet of white paper not recently exposed to light, and the latter be then applied to the sensitive paper, a faint impression of the exposed portion of the engraving will still be produced.

46. Dr. McCann, having first identified heat and motion as synonymous terms, impugns the theory of latent heat as involving a "contradiction in terms," and it is by no means the first time that that theory has been put forward as a stumbling-block to the dynamic theory of heat. "Latent heat" is an unfortunate and misleading term, and has mystified this writer as well as many others: it ought long ago to have been discarded, together with the material theory of heat, from which it arose.

47. A much better term would be *employed* or *occupied* heat, for the so-called latent heat is wholly employed or occupied in

maintaining the change—first from the solid to the fluid state, and secondly from the fluid to the gaseous. The facts are very plain; a pound of water at the temperature of 0° C., or the freezing point, mixed with a pound of water at 79° yields two pounds at the mean temperature of 39.5° ; but a pound of ice or dry snow at the temperature of 0° mixed with a pound of water at 79° yields two pounds of water at 0° , because the 79° of sensible heat in the water are now employed or occupied in maintaining such an amount of vibratory motion in the molecules of the ice, that they are no longer able to obey that polar attraction by which they were previously aggregated together in given directions in a crystalline form (for though not so evident in ice, the crystalline character of snow is notorious), and the heat-energy, being thus already occupied in doing work, is incapable of doing any other work, as for example on the organs of sensation, at the same time. The same reasoning applies to the change from the fluid to the gaseous state; but in this case a much larger amount of thermic energy is employed in so far removing the molecules from the sphere of each other's attraction, that the balance of their mutual forces is repulsive, and so long as that repulsion is maintained, the dry steam manifests all the properties common to the fixed gases. "Latent" heat, then, when properly understood, ceases to be a "stumbling-block to the dynamic theory of heat."

48. Several quantitative equivalents of energy have been assigned by experiment, but that on which most stress is laid is the equivalence of thermic and kinetic energy. It is a remarkable and unprecedented confirmation of the thermo-dynamic theory, that the numerical results arrived at by three distinct methods of investigation, in the hands of as many independent physicists, should be found to agree within very narrow limits of error.

49. He must be a bold man who denies that the sun shines at noonday; and scarcely less audacious is the assertion that the experiments of Dr. Joule do not confirm this equivalence. Dr. Joule conducted four distinct series of experiments, three series on the amount of thermic energy produced by molecular friction in stirring respectively water, oil, and mercury; the fourth, on that produced by the friction of two iron surfaces against each other. The four numerical results accorded very nearly, and after assigning to each result its weight, according to its estimated liability to error, he deduced the mean value of 772 foot-pounds as the dynamic equivalent of thermic energy.*

* For the sake of those who are not already familiar with this subject, it may be stated that a foot-pound is the amount of energy acquired by a weight of one pound in descending through the vertical space of one foot,

In the metrical system, in which the units of quantity are one kilogramme, one metre, and one degree in the centigrade scale, the above equivalent is represented by 424 dynamic units, which, for brevity's sake, we may as well agree with the French in calling "dynams."

50. It has been found by experiment that a less amount of heat is required to raise a gas maintained at a constant *volume* one degree of temperature, than when the gas is allowed to expand under a constant *pressure*. Suppose, for example, that the gas be inclosed in a vertical cylinder under a piston of 100 square inches area, the atmospheric pressure on this piston will be 1,500 lb., and the raising this piston is equivalent to raising a weight of that amount. Dr. J. R. Mayer, assuming that the difference in the quantities of heat in the two cases above mentioned is equivalent to the work done by the expanding gas, proceeds to determine the numerical value of these equivalent quantities. Taking the specific heat of air to be 0.267, as at that time determined by the observations of De la Roche and Berard, he found the dynamic equivalent of an unit of thermic energy to be 367 dynams. But if, in the calculation of this number, the more careful and accurate subsequent determinations of the specific heat of air by Joule and Regnault be substituted, namely, 0.2375, the result gives as the equivalent 426 dynams; a result almost identical with that of Dr. Joule, but based on theoretical considerations only.

51. M. Séguin pursued a course of observation exactly the reverse of that of Dr. Joule, namely, to determine the amount of heat converted into work in the steam-engine. Taking it as an axiom, in strict accordance with experimental facts, that the difference between the heat existing in the steam as it enters the cylinder, and that remaining in it after its exit, must be the thermic equivalent of the work done in and by the engine, (which difference, in the best constructed engines, amounts to about five per cent. of the total heat due to the combustion of the fuel,) he assigned a value to the thermic unit. Subsequently, M. G. A. Hirn, pursuing the same course, with the aid of more perfect instrumental means, determined the value of one thermic unit to be 425 dynams; a remarkable result, and intermediate between those previously inferred by Mayer, and obtained by Joule. In the face of such overwhelming concur-

or, in other words, the amount necessary to raise one pound one foot; and the numerical equivalent here given means that 772 dynamic units are equivalent to the amount of thermic energy required to raise the temperature of one pound of pure water, at or about the mean temperature of the air, one degree of Fahrenheit's scale.

rent evidence, will any one be still bold enough to assert that the conservation of energy is a myth?

52. Examples without number might be adduced of the conservation of energy, in which the equivalence has not yet been, but probably ere long will be, determined quantitatively; but a few must suffice. Whenever resistance is offered to the passage of an electric current, heat is generated in proportion to the resistance in the circuit, and the heat is evolved at the expense of current, that is to say, there is a transformation of electric into thermic energy; and this may exist in any degree, from the least perceptible elevation of temperature in the conductor, to its actual deflagration and volatilisation, as in the carbon points of an electric lamp, or the deflagration of gold-leaf by the discharge of a Leyden battery. And it has elsewhere been shown by the writer* that under suitable conditions the converse transformation of heat into electricity takes place. If the adjacent ends of a bar of antimony (*a*) and one of bismuth (*b*) be soldered together, it has long been known that when a sufficiently weak current of electricity is transmitted through this thermo-electric element passing from *a* to *b*, heat is produced at the point of junction, but if passing in the direction from *b* to *a*, cold is produced; but when the element is placed in a Wheatstone's bridge, the galvanometer shows a loss of current when heat is gained, and a gain of current when heat is lost. This leads irresistibly to the conclusion that an interchange of thermic and electric energy takes place at the point of junction of the two metals. It may be observed that bismuth presents this property in a higher degree than any other known substance; and it is altogether a remarkable metal, excelling also in the property of diamagnetism, and sharing with water the property of expanding on passing from the fluid to the solid state by cooling.

53. The dynamo-electric machine is another conspicuous example. While at rest it manifests no properties either of electricity or magnetism, but when kinetic energy produced by the muscular force of the arm is expended in turning the winch of the machine, magnetism is produced, and the electro-magnet becomes active; this again induces an electric current in the revolving armature, which in its turn becomes light and heat in a platinum wire, through which it may be transmitted; or if employed in doing any mechanical work, it becomes kinetic energy.

54. Lastly, the sense of vision may be quoted as a highly probable example of the conservation of energy, it being not inconsistent with any known fact to suppose that the action of light on the retina is a true photographic process, not per-

* *L. E. and D. Phil. Mag.*, vol. xxxii., p. 378.

manent, as that produced on the salts of gold and silver in ordinary photography, but generally as transient as the ray which produces it; and that this chemical action is resolved into electric energy, which is transmitted by the optic nerve to the brain. That the duration of the impression on the retina is proportional to its intensity, any one may convince himself by looking at a bright light, and then closing the eyes, when a bright image will for a longer or shorter period, according to the intensity of the light, remain visible.

55. The principle of the dissipation of energy, as a corollary to that of its conservation, has of course been equally ignored; but it must here suffice to give a familiar illustration, both of the conservation and the dissipation of energy, in the action of the rifle-ball. This reaches the target with less velocity, and consequently with less energy, than it possessed on leaving the muzzle; a portion of its energy has been expended in producing heat by friction against the particles of air between which it passes, which is dispersed through the surrounding atmosphere, and thus becomes *dissipated*. On reaching the target the progressive motion of the mass is arrested, and converted into molecular motion, which is cognisable only as heat, by which the mass is reduced to the fluid state, and splashes of molten metal are scattered in all directions. These again impart their heat partly to the air through which they pass, partly by radiation into space, and partly to the ground on which they fall; and thus the whole energy of the ball becomes dissipated. An analogous explanation will apply to all other cases of the dissipation of energy.

56. In the two essays above-mentioned, the objections of their authors to the validity of the correlation and conservation of energy appear to the writer to lie, not against any observed facts, or their mutual relations, but exclusively against the vague or illogical terms in which the interpretation of them has hitherto been expressed by physicists. Mr. Moore having, in consequence of a published remonstrance, withdrawn his unfair criticism of the writer's explanation of "latent" heat,* he is glad to embrace the present opportunity of withdrawing with equal publicity, any imputation he may have made against Mr. Moore's literary candour; the publication of a short letter containing that withdrawal having been declined by the journal in which the remonstrance was published. At the same time it cannot be denied that this writer has grossly misrepresented the course of philosophic thought pursued in regard to many problems in physics, especially those relating to the transmission and transformation of energy.

* *Elements of Natural Philosophy*, sixth edition, p. 786.

57. Dr. McCann writes (§ 25) in relation to potential energy, "this sounds plausible enough while we use the mystic word energy, but as it is motion with which we are at present concerned, we shall use that word instead." Now, firstly, there is no mystery about energy if only it be properly understood, and secondly, the gratuitous substitution of the term "motion" for "energy," would inevitably make nonsense of everything that has been, or indeed can be, written on the subject. It appears, moreover, from the contents of the same page, that the author's views of causation are as illogical and inconclusive as he holds the sentiments of physicists to be. He puts the case of "a heavy book nicely balanced on the edge of the table; the slightest touch of my finger causes it to fall to the ground." But the fall would not result from the slightest touch *unless the book were in a position of unstable equilibrium*; neither would it result from the unstable position *if the touch did not ensue*; the touch, therefore is no more entitled to be called *the cause* of the fall, than the unstable position: both are conditions precedent, but the cause of the fall is the attraction of gravitation.

58. Again, he instances the explosion of a mine by a match held between the finger and thumb, and then contrasts the amount of energy expended in moving the finger and thumb, with the amount developed by the explosion, as though there were any conceivable connection between them, in relation to cause and effect; the match might just as well be supposed to be attached to a steam hammer, and by its descent to explode a single grain of gunpowder, when the balance of the employed and resulting energies, which he pleases to call motions, that is, of the assumed *cause* and *effect*, would be all the other way. Dr. McCann speaks of the applied match as the cause of the explosion,—it may be so in a popular sense, but is the expression logically accurate? It is presumed not to be so. Two little heaps of black granular powder are lying on the table, one happens to be gunpowder and the other coal-dust; a lighted match is applied to each in succession, one explodes, the other remains unaffected: is the match a whit more *the cause* of the explosion of one heap, than of the non-explosion of the other? The application of heat is a necessary condition of the explosion, but the "cause" of both results is alike the chemical constitution of the respective kinds of matter: the potential energy of chemical affinity, that exists in the former, but does not exist in the latter substance. A similar discussion of all the views set forth in these essays would lead to a wearisome dissertation, far beyond the limits of a paper readable before this Society; but it is a grave question, whether if the amount of *mental*

energy, that has been expended in burlesqueing *physical* energy had been devoted to obtaining a fuller comprehension of the subject, the cause of truth might not have been more efficiently promoted.

59. Two further points only of Dr. McCann's paper will here be remarked upon. The quotation (§ 20) from Mr. Spencer's *First Principles* is an elaborate but, to my mind, confused statement of the perfectly distinct and definite ideas of *absolute* and *relative* motion. He writes—"A body impelled by the hand is clearly perceived to move, and to move in a definite direction," *i. e.*, *relatively to the perceiver* and surrounding objects, beyond which perception cannot extend, for the *perception* must obviously be the same whether the observer were absolutely at rest in space, or whether he and the observed body partake alike of the earth's rotation on its axis and revolution round the sun, and the progression, if any, of the entire solar system in space, and any other motion or motions, conceivable or inconceivable—and that is the whole question.

60. In reference to Mr. Spencer's gratuitous assumption (§ 1) that the various forms of physical and mental energy are reciprocally convertible, he writes (§ 41):—"That such is a fact may be assumed but can never be proved till some instrument be constructed capable of measuring the velocity of thought;" evidently not being aware that such an instrument had been constructed some years since, and satisfactory experiments made by Drs. Hirsch, De Jaager, and Donders; * but they afford no confirmation of Mr. Spencer's assumptions, beyond the fact that time is an element in mental operations; but until the precise train of physical changes in the brain and nerves which accompanies perception and thought can be fully ascertained (an amount of knowledge obviously beyond the reach of man), the hypothesis in question must be held to be unsusceptible of proof.

61. It may, in conclusion, be remarked with much regret that the principle of the conservation of energy has by some been misapplied to questions far beyond its legitimate scope, in a fruitless endeavour to supersede the necessity of an omniscient Creator. To the mind of the writer, and, it is earnestly hoped, to that of most of his hearers and readers, the indisputable establishment of this principle conveys only a more exalted idea of that infinite wisdom by which the perpetually recurring transformations and interchanges, not only of the materials, but also of the powers, of Nature are rendered subservient to predetermined laws, which govern the comfort and welfare of all created

* *Elements of Natural Philosophy*, sixth edition, p. 568.

beings. It is a sad miscarriage of the powers of human reason, when those who have laboured most assiduously in unravelling the higher mysteries of physical causation are not thereby brought nearer to their Creator, that:—

“Those earthly godfathers of heaven’s lights,
That give a name to every fixed star,
Have no more profit of those shining lights
Than those who walk, and wot not what they are.”

61. The bearings of Evolution, Conservation, and Continuity on the higher relations of man to his Creator must be left for a future communication, to which the title of “Scientific Materialism” may be not inappropriately applied.

The CHAIRMAN.—It is now my duty to move that the thanks of this meeting be given to Mr. Brooke for his very able and scientific paper. Certainly, if Mr. Brooke and the discussion, which is now about to take place, can do anything to remedy the “confusion worse confounded,” which at present pervades the scientific and philosophical world in regard to the use of the terms “force” and “energy,” a great deal of good will be done, for I confess that as matters stand at present, I never hear the words used without finding that there is a great amount of confusion and uncertainty in their application. I may mention that strangers who desire to do so are invited to take part in the discussion; but as, to-night, there happens to be present one who is pointedly referred to in Mr. Brooke’s paper, I think I shall consult the feelings of the meeting if I ask him to open the debate, after our Honorary Secretary has read a written communication from Dr. M’Cann.

CAPTAIN F. PETRIE then read Dr. M’Cann’s communication as follows:—

I AM glad to find that Mr. Brooke agrees with me in my condemnation of the way in which physicists, for the most part, speak of force, energy, and motion. As he also differs very much from the theories of Professor Tyndall, and the other physicists I have quoted, and has only taken up and fully discussed the statements in §§ 59 to 61 of my paper, there are, consequently, only a few points which I have to notice in his valuable essay.

Conservation of energy, if *limited* by an Almighty will, need not, I grant, lead to the results I have named; but if unlimited, or actually conserved, these results seem a necessary sequence, as is evidenced in my references to those who affirm the existence of these results.

He states (§ 14) that “the theory of the conservation of energy implies that no kind of energy can be produced by human agency, except at the expense of an equal amount of the same kind, or an equivalent amount of some other kind of energy.” From this it surely follows, in opposition to his next sentence, that the total amount of energy in the universe remains not only *unchanged*, but *unchangeable*; which is the usual meaning of the theory, although apparently not that held by Mr. Brooke. If the total amount of energy be changeable, ought not the words to be that “no kind of energy is produced?” The corollary of this view of conservation, is the truism condemned by Sir John Herschel, for if an energy that is not kinetic is potential, it is at once evident that the sum of both must be always equal. In § 29 we are told that “light and heat have frequently been illogically designated by able physicists simply as ‘modes of motion.’ This appears to have led

many into a confusion of the terms 'force,' 'energy,' and 'motion.'" Of course when I followed Professor Tyndall's reasoning about heat as, not designated only, but actually being a mode of motion, I was obliged to follow him also into the hopeless confusion to which such reasoning must lead. I only followed him, however, that I might expose the confusion; but by no means share it. It is well that Mr. Brooke holds sounder and more logical views. Still, after this, he should not charge me (§ 59) with "the *gratuitous* substitution of the term 'motion' for 'energy,'" nor say (§ 46) that I "having first identified heat and motion as synonymous terms, &c.," as though the identification were mine, when it is Tyndall's.

My views of causation are somewhat severely spoken of (§ 58), because I say the touch of my finger *caused* a book to fall to the ground. As I was not concerned at the moment with the theory of causation, I used the word in its popular sense; *occasioned* would have united my purpose equally well in both illustrations, as the argument is not in the least affected by either word. I fear, however, Mr. Brooke is even as illogical as I am myself in this case, for while defining the causation, he says "the cause of the fall is the attraction of gravitation." This is not correct, inasmuch as the cause was my wish to overturn the book, the attraction of gravitation being only, like the unstable equilibrium, a necessary condition. If there be shown any burlesque of physical energy in my paper, as is implied in the remarks in § 37, I will gladly withdraw it. So far as I am aware, any criticisms to which that term could be applied, are in the fancies of those who, while accurate observers, are but indifferent theorists; of those who, to use Mr. Brooke's own words, would misapply the conservation of energy "in a fruitless endeavour to supersede the necessity of an omniscient Creator."

JAS. M'CANN.

Rev. JOHN MOORE.*—I thank you, Mr. Chairman, for the permission you have granted me to take part in this discussion, and, in availing myself of the privilege, I wish it to be distinctly understood that it is not as a physicist but as a metaphysician, that I approach this question. For me, the doctrine of the conservation of energy had no special interest until, some six years ago, I read an article, by Professor Tyndall, in the *Fortnightly Review*, wherein he employs this theory to prove the futility and folly of prayer. This led me to make a most careful examination, and I found that the theory of conservation required of those who would accept it assumptions directly opposed to some of the best-established truths of philosophy. One of its main pillars is a doctrine of causation, associated with the names of Hume, Brown, and Mill, which I am convinced is false. We are asked to believe that the relation of cause and effect is nothing more than a time-relation among events, and, consequently, that the very important term "Power" does not symbolize anything in the nature of the cause fitting it to produce the effect, but denotes mere antecedence. Hence, to repeat the often used but still powerful illustration of Reid, it is quite correct to say that day is the cause of night, and night the cause of day. But, in reply, I ask what do men mean when they speak of the cause of a specified change? Are they

* Author of the article in the *Quarterly Review* called "Heresies of Science," referred to by Mr. Brooke. I regret to have to record Mr. Moore's decease, which occurred before his remarks were in print.—*Ed.*

satisfied with that account of the origination of an event which simply refers it to another event immediately preceding? Can the human mind, in its self-impelled search for causes, stop short of anything other than reality, endowed with powers enabling it to produce certain effects? An examination of our judgments concerning the realities presented to us, reveals the fact that we are compelled to think each of them as possessing a given constitution, as endowed with certain "qualities" and "powers." These judgments we must accept as the starting points of thought; their validity cannot by us be determined in the light of higher truths; to us they are ultimate. Turning to the world of matter, let us begin with the atoms themselves—what, by the very laws of our intelligence, are we compelled to think about them? First, we think that each atom possesses certain "qualities." These all have relation to space, and constitute the "primary" qualities of the metaphysician. Second, we think the atoms to possess also certain "powers," whose existence we apprehend not immediately as we do that of the qualities, but only mediately or through their effects. Now, since each atom has both qualities and powers, the theory that matter is indestructible, embraces two things :—

(1.) The conservation or persistence of material qualities.

(2.) The conservation or persistence of material powers.

To regard these two doctrines as separable is unphilosophical; they are but different aspects of the one truth concerning the indestructibility of matter by human agents. That this is so, is evident from the fact that is impossible, even in imagination, to separate the powers from the qualities, as associated together in the most elementary form, of material existence. In this connection Faraday's words are very important and significant. He says: "A particle of oxygen is ever a particle of oxygen; nothing can in the least wear it. If it enter into combination, and disappear as oxygen; if it pass through a thousand combinations—animal, vegetable, and mineral; if it lie hid for a thousand years, and then be evolved, it is oxygen with its first qualities neither more nor less. It has all its original force, and only that." To-night, Mr. Brooke has told us that "in cases of percussion, the energy of a striking body may be more or less imparted to the body struck." But is not this statement wholly inconsistent with the doctrine of the indestructibility of matter? If, when an atom of oxygen exerts one or more of its powers, there is a transference of energy to some other reality, does it not then cease to be a particle of oxygen? "Energy," says Mr. Brooke, "was first defined, by Thomas Young, to be "the power of doing work," and this definition does not appear to require any amendment." Now, if by "work" is here meant the mere displacement of matter, either molecularly or in mass, the distinction between force and energy is not a valid one. Take any power—mental, vital, or material: we find that we are able to think it either as unexerted or as exerted; in other words, as power "at rest," or power "in action." To denote the latter, philosophers have employed the term energy; so that energy is not the power of doing work, but power doing work, power in work (*ἐν ἔργον*). But this is not the only case in which we think

error has crept in through confusion and misuse of terms. In the Introductory Chapter of the last edition of his valuable treatise on Natural Philosophy, Mr. Brooke refers to the numberless facts which, since the publication of the fifth edition, had been observed and recorded, "all tending to confirm the opinion that the various 'physical agents' are not forms of matter, but 'modes of motion.'" Mr. Justice Grove tells us that if we attempt to analyze our conception of force, viewed as the cause of any perceived motion, we can get nothing beyond some antecedent motion. And Professor Tyndall asserts that "the cause of motion itself must be motion." No wonder that Mr. Mill has so readily accepted the doctrine of the conservation of energy! In the eighth edition of his "Logic," published within the last month, he gives us his own statement of it with marvellous but, in this case, fatal clearness. Stated in a few words, the theory is as follows:—"That the conservation of force is really the conservation of motion; that in the various interchanges between the forms of force, it is always motion that is transformed into motion." ("Logic," vol. i., p. 404.) Now, to the theory of the conservation of energy, I oppose the conservation of power; the power or force in the universe is a constant quantity, but the amount of motion is not the same for two successive moments, while for the theory of the transmutation of energy I substitute that of the correlation of powers. Powers are often correlated in the sense that the action of one supplies the condition of the action of another. I will to move my hand, and the motion immediately follows; this is an instance of correlation. "I" am the cause of my volition: the volition itself is not the cause of the action of the physical powers which immediately determined the movement of the hand, but merely a remote condition. The conscious volition and the observed movement of the hand are merely the first and last members in a series of an unknown number of effects. In a conversation with Dr. Carpenter on these subjects a few weeks ago, I put the question whether, in a case like the above, the motion of the hand is to be considered as a transmuted volition. "Certainly not," he replied, and agreed with me that the volition is merely a condition, not the cause, not even a remote cause of the movement. Some of Mr. Brooke's remarks on my opinions have raised another question, to which I can discover no satisfactory answer. Why should he and other physicists constantly denominate as "material" those theories which they wish to contradistinguish from their own, the so-called dynamical? Even Tyndall admits that we cannot have motion without some form of "matter" moving. Hence, having thrown overboard the imponderables, physicists have been compelled, with the aid of the scientific imagination, to seek for some kind of material basis which shall take their place; and now we have an "ether" filling stellar space, and permeating all ponderable bodies. From Professor Tyndall we learn that this ether is a jelly-like substance, and is marvellously elastic! Mr. Justice Grove, however, regards the assumption of any such material basis as unnecessary, for, in his opinion, it requires no great stretch of imagination to conceive light and electricity as motion, and not as things moving. Once more, I regard the introduction of the term potential energy into the

vocabulary of science as nothing less than a calamity. What is the reality symbolized by these words, and where is it to be found? A simple illustration will serve both to indicate my objection to the use of the term potential energy, and also to bring out my own view. Here are two stones, each of them at the surface of the earth, weighing one pound. One of them I place close to the edge of the mouth of a coal-pit, one hundred yards deep; the other I throw upwards, which, at its maximum height of one hundred feet, is caught on the ledge of a rock. Now the theory of the conservation of energy requires us to believe that the latter stone has, by rising, acquired a potential energy—a power of doing work of which the one remaining on the ground is altogether destitute. The stone resting on the rock can fall, while—so says the theory—the stone on the edge of the pit cannot. Mr. Brooke has referred to Dr. Joule's experiments. I will only say that in none of these as explained to me by Dr. Joule himself, can I find anything opposed to the positions I have been maintaining. The beautiful experiments by which he determined the mechanical equivalent of heat, I am prepared to show, lend no support whatever to the doctrine that the various forms of energy are mutually convertible. In conclusion, I would, sir, thank Mr. Brooke for his able criticism of my opinions as given in the paper this evening, and elsewhere. Every intelligent and sincere objector I ever regard as a true friend, both to myself and the great cause of truth.

Rev. W. J. IRONS, D.D.—I think the paper which has been read, and the observations which have since been made upon it, are so important that they need careful and minute consideration; and a hasty discussion on a subject of so much depth and importance would scarcely be becoming in a scientific Society like this. For my own part, I feel strongly disposed to acquiesce in the distinction which was drawn by the last speaker—namely, that there is indeed a conservation of power, but not a conservation of energy. I think that the conservation of power he refers to is almost identical with the doctrine of Albert and Thomas Aquinas concerning the impossibility of either augmenting or diminishing the sum-total of the physical universe—the impossibility, for instance, of annihilation, affirmed by Albert the Great in very distinct terms. I made up my mind some years ago, when I first considered the doctrine of the “conservation of forces,” that it meant no more than had been understood under other terms in the middle ages; but probably at the present moment we are unable to decide what some gentlemen ultimately mean when they lay down the law so positively about this “conservation of forces.” Is there no initiation of motion? If Mr. Stuart Mill were here to-night, he might perhaps be able to tell us whether he allows any such thing as a kind of initiation of action which is not a deduction from previous forces in the universe. That would at once raise the question whether materialism be the sum-total of the universe. I should hope he would hardly go that length. Scepticism itself would assist him there, as it would scarcely propound what would be almost a negation of mental action itself. The whole subject is one which we are right in considering with gravity. The philosophy of the subject has yet to

be dealt with. Science is the ally of real theology and the handmaid of philosophy and truth, and we must be careful not to rush in suddenly with contradiction of anything that may prove to be scientific truth; but at the same time we are also careful, and we wish our scientific friends would be equally careful, in not adopting as scientific conclusions statements or theories which may be overturned to-morrow. We have had enough of that already. Some people are over-hasty, but we desire to be cautious, because we are lovers of truth. I am sure we shall all profit by the exact and considerate essay of Mr. Brooke, and I think we shall find some admirable corrective thoughts in the speech of Mr. Moore. For my own part I have a hankering after Thomas Aquinas and Albert the Great, who I think may yet put us right.

The CHAIRMAN.—I hope some gentleman will direct his attention to that part of Mr. Brooke's essay which deals with the definition of "force" and "energy."

Mr. A. V. NEWTON.—I quite agree with Mr. Moore that "conservation of energy" is a most unfortunate expression; if we employ in scientific investigations words that are used in common parlance, I cannot help thinking that we should use them according to the meaning they have in common parlance. I think that if a word has taken a new meaning, a writer should adopt that meaning in his writings. There is the word "prevent," for instance, which has two distinct and quite opposite meanings; and here in this paper we have "energy" and "force" defined in three ways.

Mr. BROOKE.—I quote two or three, but I only give one myself.

Mr. NEWTON.—Mr. Brooke's definition comes to this, that "force" is action between particles of matter, by which they are either attracted towards or repelled from each other." That may be a very good definition, but according to my view force is really not action—it is something quite distinct from it, or at all events it may be. I think there is force in gunpowder while it lies quiescent, and there is active force when it is exploding. It would be as well to refer to what are the ordinary definitions of these words. Dr. Johnson gives a number of definitions of force, such as "strength, might, active power," and so on. Now it seems to me that force is or may be a quiescent power. Dr. Johnson gives, as a definition of energy, "power not exerted in action," so that we get a confusion here which it is very desirable to have cleared up. If energy be "power not exerted in action," then Mr. Brooke's use of "energy" and the conservation of "energy" would certainly be correct; and I cannot see any objection to it, for it would amount to precisely the same thing as that "conservation of power," of which Mr. Moore spoke.

The CHAIRMAN.—This is Mr. Brooke's definition: "the power of doing work."

Mr. NEWTON.—Then that quite agrees with the definition I have quoted, and it seems to me to be precisely the same sense in which the word "power" is used by Mr. Moore. Therefore I cannot see any difference between him and Mr. Brooke.

Mr. MOORE.—But there is a material difference.

Mr. NEWTON.—I have ventured upon a definition of force as being “a power” by which changes, whether of position or of condition, are produced. But if “energy” be power not exerted in action, then I see no difference really, between that word and “force” and “power,” and we get into a confusion of terms.

Rev. P. STRUTT.—It seems to me that there is a difference between Mr. Brooke and Mr. Moore. I understood the last speaker to introduce the idea of mental power as quite distinct from the physical power with which Mr. Brooke dealt. But if the conservation of force and power extend to mental power, then the introduction of any human being into the world is the introduction of a new force into the world (the human will originates action, and with the augmentation of persons there is augmentation of power), and when you take that idea, you open up a new metaphysical field altogether. It appears to me that that should be distinctly kept in mind if we are to deal with the physical question.

The CHAIRMAN.—I apprehend that Mr. Brooke deals exclusively with the physical question. It is difficult to say where it infringes on the mental question.

Dr. IRONS.—May we catechise Mr. Brooke?

The CHAIRMAN.—I think we are fully entitled to ask him to explain his terms.

Dr. IRONS.—Then I should like to ask him one or two questions. First, how these ultimate atoms—so to speak—are supposed in his philosophy to work? Do they work in right lines, on the north, south, east, or west of each atom? How did they get their original direction, and how do they afterwards carry out the original idea according to which they began to move? Take the leaves of the plane-tree, for instance; they are all formed on one model, so that an observer may see at once whether a given leaf is the leaf of an oak or of a plane-tree. The original atom began to obtain motion somehow, and I want to know if that motion was in a direct line?

Mr. BROOKE.—We know nothing whatever about atoms. It is all pure conjecture, and therefore when you ask me what the atoms do, I tell you distinctly that I know nothing about them.

Mr. MOORE.—I have always felt that the battle would have to be fought there, and I asked an able physicist, “Do you not put the whole of the doctrine of the conservation of energy upon the doctrine of atoms?” His reply was, “Certainly I do.” We know nothing at all about matter and motion, but we have various forms of motion, and these are the forces of the atoms. That is the whole basis of the conservation of energy.” Though Mr. Brooke may assert nothing on this point, other physicists do. Mr. Croll has written a paper in the *Philosophical Magazine* on this subject—as to what is the cause of molecular motion in reference to these atoms.

The CHAIRMAN.—Mr. Moore surprised me in his previous observations, by seeming to intimate that colour was a quality of the atoms.

MR. MOORE.—Not a quality. The physicist I have referred to said to me, “The ultimate atoms differ in quality only so far as shape and size go.” I asked him, “Do you not admit colour to be an essential property?” but he replied, “No, that is a sensation, an idea”—calling colour a sensation.

THE CHAIRMAN.—At any rate, colour, as we know it, is simply an impression upon the optic nerve communicated to the brain.

MR. MOORE.—No.

MR. BROOKE.—Oh, certainly yes.

THE CHAIRMAN.—The conception in the mind is the combined result of our sensations, and the external reality. We cannot say that the external reality is the same as our sensations; there is a cause, external to my mind, which causes certain perceptions of it, but on my optic nerve. This is an unquestionable truth. I take up this piece of paper, it seems to me quite absurd to say that its colour, as I see it, is in the piece of paper, though I am quite ready to admit that there is something in the paper which causes the particular sensation, which is quite another question. But I understood Mr. Moore to say that colour is a positive quality in the external thing itself.

DR. IRONS.—Perhaps I may be allowed to continue my catechising. I want to know whether forces proceed in right lines. How do they go? Are they circular, or direct, or gyratory, or what? Do they go straight on, and, if not, what gives them any other direction? I am now assuming in my question that force can certainly do something. How does it do it? And is there anything afterwards to modify it and give it shape?

THE CHAIRMAN.—I should like to ask Mr. Brooke a question before he replies. Will he undertake to discriminate between power, force, and energy, according to his own views?

MR. BROOKE.—In reply to the last question, I would say if you will define power, and what you mean by it, for I do not know what the definition is? I will draw a distinction if I can. Until then I do not know what I am talking about. I have not defined power, though I have defined force and energy. With regard to the question put by Dr. Irons, as to the direction in which force goes, it is quite clear that I have defined force to be essentially either an attraction or a repulsion—that is to say, either a push or a pull—between two particles, whatever they may be, or masses or portions of matter. It is either a push or a pull. It cannot go anywhere; it is an existence. You cannot talk of its “going” in any direction. In reply to previous observations that have been made, I will first take Dr. M’Cann, who objects to my strictures upon his view of causation, and says they are wholly defective; because, to take the example he quotes—the case of a book falling to the ground—it is not the force of gravitation, but it is his will which causes it. Well, if that be so, suppose instead of willing that the book should go down on the floor, I will that it should go up to the ceiling. Would that make it do so? My will clearly is not the cause of its falling; it no more descends than it ascends by my will. We have been told that there are certain people who profess to will that a book should go up to the ceiling, and that it does

go up. I know that is stated, but I do not believe it. I must maintain, then, that the objections to my views of causation are not supported by any observations with which Dr. M'Cann has favoured us. With regard to Mr. Moore, he says he speaks as a metaphysician, and not as a physicist. Now, I maintain that, in the discussion of physical questions, if metaphysics come into collision with the inexorable logic of facts, so much the worse for the metaphysics; they must fall to the ground.

Mr. MOORE.—Oh, no.

Mr. BROOKE.—The world will be controlled by the inexorable logic of facts, and not by any metaphysical disquisition offered in opposition to the facts.

Mr. MOORE.—So much the worse for the facts.

Mr. BROOKE.—Mr. Moore spoke of night as the cause of day. Now that is really an idea of causation which produces no impression at all upon my mind.

The CHAIRMAN.—That was in reference to Mr. Mill.

Mr. BROOKE.—Well, at all events, it is not admissible. He laid a great deal of stress on atoms, and upon their nature. I have already stated that we know nothing of their nature. Again, he spoke of atoms subsequently, and of colour being a property of atoms. There is no question about it, colour has nothing to do with atoms at all; it is an impression produced upon the sensitive organs of the eye by vibratory motions of particular periods. A vibratory motion, comprising a certain number of vibrations in a second, produces upon the eye the impression of blue; another number of vibrations in a second produces the sensation of yellow; and another number produces the sensation of red. All this has nothing to do with atoms at all. Then Mr. Moore spoke of sound as motion, and asked why it was that we could not see a sound. For this very simple reason, that the vibratory motion which leads to the perception of sound is a vibratory motion of one character, while the vibratory motion which produces upon the eye the perception of light is a vibratory motion of a totally different character, and the reason why we cannot see a sound is that the vibratory motion which produces it is not capable of affecting the eye, and therefore of producing any sensation in the organs of vision: that is the simple explanation of the matter. Then Mr. Moore has quoted a remark of my own from the introductory chapter in the last edition of my "Elements of Physics." He should not have quoted that passage, for I have now expressly stated in this paper that I have modified some of the views I there expressed. Following the example of some of our most eminent physicists, I spoke of light and heat as not having a material existence, but as being modes of motion, and that is one of the expressions which I have in the present paper taken exception against, as being logically inaccurate. Having stated that, I do not think it is quite fair of Mr. Moore to quote that introduction to which I have referred, as in opposition to what I have stated in this paper, for that is one of the points upon which I have modified my views. I did not then see, as I do now, the force of the objection to it, and which objection I have pointed out in this paper. Then I come

to Mr. Moore's ideas about throwing the imponderables overboard, and here I must say that he seems to have failed to represent my views accurately. The imponderables which have been thrown overboard are the supposed material atoms which constitute light and heat. As I have already explained the views once entertained were that there were material particles or atoms projected from the hot or luminous body ; but the undulatory theory declares that light and heat consist in the perception of certain kinds of vibratory motion.

Dr. IRONS.—The vibratory motion of the ether ?

Mr. BROOKE.—That is another question. It is not necessary to assume the existence of ether interstitially deposited in all kinds of matter to convey impressions of light or heat : the particles themselves will do it.

The CHAIRMAN.—Mr. Brooke has distinctly stated in his paper his belief that ether does not pervade ordinary matter.

Mr. BROOKE.—I have stated that there must be some material medium pervading infinite space by which the vibrations constituting light and heat are conveyed from the centres of systems to their surrounding satellites ; but we are ignorant as to what that is. This medium has been termed "æther," but what its nature may be I do not pretend to say ; I only take it to be matter of some kind in an exceedingly attenuated condition. The term "jelly-like" which has been applied to it has been taken up sarcastically by some, but it merely means this, that the mechanical properties of the ether more resemble the mechanical properties of a jelly than those of a gas. It means nothing more than that gas and air have certain mechanical properties, while gelatinous substances have certain other mechanical properties, and that the mechanical properties of ether more resemble the mechanical properties of a jelly than the mechanical properties of a gas :—there is nothing more meant than that. Now with regard to the potential energy, or "energy of position," in the stone to which Mr. Moore objected : a stone put up upon a shelf has a potential energy which a stone upon the ground has not. Let them both fall down the mine, then the one dropped from the shelf above will fall with greater velocity than the other. It has acquired a power which enables it to fall with greater velocity than the other. That is the simple meaning of potential energy—the energy which the stone acquires in being raised from the ground. As to the "conservation of power" I cannot say anything. Before I can deal with that, I must ask you to define power, and when I know the definition I will say whether the "conservation of power" is the same thing as the "conservation of energy."

Mr. MOORE.—May I say one word ? Power cannot be defined. The truest definition is "power is power," and that is all ; but every one knows what it is. Before I put forward a volition, I am conscious that I have the power to do it. But it does not admit of definition.

Mr. BROOKE.—I take it, then, from Mr. Moore's own lips that "power" is indefinable. Then the "conservation of power" means the conservation of something indefinable, but the "conservation of energy" means the conservation

of something that is defined. I think it is a great pity to introduce into anything that pretends to be accurate logical discussion, terms which we cannot and do not define, because when we do that, we do not know what we are talking about. We can predicate nothing respecting it, if we do not know what the word means: I therefore decline to make any observations about the conservation of power. I think Mr. Newton will now see the ground of the difference between Mr. Moore's and my views. An observation was made about vibratory motion as the force of atoms. Now, force is one thing; vibratory motion is a totally different thing; and atoms we know nothing about. If I am told, therefore, that vibratory motion is the force of atoms, I cannot understand it. It conveys no idea to my mind. The gist of Mr. Moore's objections to the definitions which I have here given, and to the relations of force and energy which I have expressed, appear to be metaphysical rather than physical. At all events, I think he has offered no physical objection. If that be the case, I can only say that his objections do not appeal to my mind in opposition to the logic of facts. (Cheers.)

The meeting was then adjourned.

ORDINARY MEETING, JANUARY 6, 1873.

C. BROOKE, ESQ., F.R.S., VICE-PRESIDENT, IN THE CHAIR.

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

MEMBER :—Captain M. S. Nolloth, R.N., United Service Club.

ASSOCIATES :—Thomas Ball, Esq., 217, Brixton Road ; Joseph Lush, Esq., Southsea ; H. S. H. Jones, Esq., C.B., Llynnon, Holyhead.

The following paper was then read by the Author :—

ON DARWINISM AND ITS EFFECTS UPON RELIGIOUS THOUGHT. By C. R. BREE, Esq., M.D., F.Z.S.

1. It is necessary for me to make two definitions—
 - (a) What I mean by “religious thought,” and
 - (b) What I mean by “Darwinism.”
2. In the expression “religious thought” I wish to include—
 - (c) The consciousness of a God, which is more or less innate in every human being.
 - (d) The existence of a God, as we prove it to reasoning minds, by the study of nature in all its varied forms.
 - (e) The knowledge of a God and Saviour derived from the Inspired Word of God.
3. In these definitions, while I exclude all doctrinal questions, I include that great portion of the human family which, more or less, believes in Divine Revelation and the Immortality of the Soul.
4. By Darwinism, I not only mean the hypotheses of its author, but the expansion which has been given to them by

other writers. Mr. Darwin and his disciples have taught in their works that

5. A primitive speck of matter originally came into being. Some admit that such primordial plasm was an act of creation; others, like Dr. Bastian, that it was evolved from not-living matter by the agency of physical forces. Professor Huxley has called it "Protoplasm," or the "physical basis of life." Professor Hæckel and Dr. Bastian believe that such specks of protoplasm, in the form of protistæ and protamœbæ are constantly being evolved in myriads in the fine mud of our ponds and ditches.

6. Given the speck of matter, Mr. Darwin and his followers have taught, that by inherent blind physical forces, such speck or specks of living matter have given origin to every plant, tree, animal, and human being in the world. I expressly, in the beginning of my remarks, for reasons which I will give in the end, decline to associate men and animals together.

7. Mr. Darwin and his followers have taught that such primitive specks of living matter have been endowed with a potentiality, by means of which they varied into other living things, slightly dissimilar from their predecessors; that these again varied in some way advantageous to themselves, and so survived in what they term the "struggle for existence," while the weaker or less fortunate forms perished and went out of existence.

8. They have taught that these survivors, by reason of their innate potentiality and the operation of molecular forces and interchanges, "evolved" themselves into other forms, which "struggled" and were "selected," as the "survival of the fittest" to vary again, diverge into new lines of development, and so, through vast periods of time, become the living world we now see around us.

9. Darwinism essentially consists in the belief that living things have been perfected from the weak to the strong—from the formless to the formed—from the meanest fungi to the oak of the forest—from the lowest animalcule to the most perfectly organized animal, and man himself, by forces which are known to obtain in the inorganic world and are termed physical—and those which, only existing in living beings, are termed vital—such forces being correlated, and convertible into each other. They deny the existence of any external or miraculous power, and consequently ignore a controlling and designing Providence. They believe that the forces of the world are self-acting and "self-adjusting."*

* Wallace.

10. Mr. Darwin and his disciples have taught that mind or intellect and the reason of man have been "evolved" in like manner from the lowest known psychical attributes of animals far down in the scale of existence, passing through the same formulæ of "variation," "struggle," "survival," and what they term "natural selection,"—which preserves those who live through the struggle, and which is one day the most powerful factor and backbone of the system, and the next is broken down and acknowledged by Mr. Darwin himself to be imperfect and to have been too much relied upon in the exposition of his theory.

11. I have thus broadly laid down the two definitions which were necessary to make this paper intelligible; and I have been more explicit in this because in the present day a common mode of criticising the statements of an opponent is to accuse him of ignorance.*

12. I undertake to prove that a belief in Darwinism and revelation is incompatible and irreconcilable, and in the argument I will first take the most favourable view of evolution as a means of creation by law; and as Mr. Darwin in his recent work, the *Descent of Man*, has fully adopted the doctrine of evolution, it will only be necessary to treat of the whole as one hypothesis under the title of Darwinism.

13. A belief in Darwinism then implies that in the beginning a living thing came into being. It did so, according to Darwin, by the power of the Creator breathing into one form or more the breath of life. According to Mr. Spencer, it might have been evolved: to use his own words, thus "construed in terms of evolution, every kind of being is conceived as a product of modifications wrought by insensible gradations on a pre-existing kind of being; and this holds as fully of the supposed 'commencement of organic life' as of all subsequent developments of organic life. It is no more needful to suppose an 'absolute commencement of organic life,' or a 'first organism,' than it is needful to suppose an absolute commencement of social life and a first social organism."†

* Agassiz, the great naturalist of the New World, in a recent address at San Francisco, on the result of his exploring expedition in the *Hassler*, describes evolution, as taught in this country, "the work of blind forces, of forces without intelligence, without discriminating power, and without forethought," and that the object of the study of nature as so taught is "to determine whether we ourselves are descended from monkeys, or whether we are the work of a beneficent Father." A writer in *Nature*, October 24, 1872, in commenting upon these remarks, calls them "singular misrepresentations"!

† This passage is quoted by Dr. Bastian, without reference, in his *Beginnings of Life*. As there are no indices to Mr. Spencer's works in my library, I cannot give a special indication where the passage occurs.

14. I prefer, however, for the argument in this paper, to take Mr. Darwin's view of the "commencement of life," for it will exempt that gentleman from the charge of atheism, and it will save us a great deal of discussion, which, although intensely interesting, would exceed the limits of this paper.

15. Having breathed, then, the "breath of life" into an organism, the necessities of Darwinism require that it should be endowed with a potentiality by which it would evolve into all the known living forms in the world.*

16. Following the obvious sequence implied in the doctrine of evolution, such a form must have been of a vegetable nature, inasmuch as animals have no power of creating or forming within themselves the elements of food. Without vegetable life no animal could exist now or have done so at any period in the history of living things. Professor Hæckel has discovered a family of low forms of life, which he says are intermediate between the vegetable and animal worlds; and among his Protista, as he calls them, he places the Protamœbæ previously alluded to (para. 5), as well as fungi; all the well-known forms of Amœbæ,—the *Noctiluca*, which produce phosphorescence of the sea; and the Rhizopoda, a large group of what have hitherto been considered animals. But such a classification of the lowest living forms, even if allowed to be scientifically established, which is not yet the case, would not alter the position I take; viz., that as vegetables subtract from the air and soils the elements of those organic compounds upon which the animal feeds, and which he cannot himself form or otherwise procure, it follows of necessity that the vegetable, even according to the doctrine of evolution, must have been the first living thing.

17. Further, I contend that the doctrine of evolution makes it necessary that the vegetable forms of life must have covered the earth with verdure before the evolution of animal life; inasmuch as almost each animal in the world has its own plant, or class of plants, upon which it feeds.

18. Therefore all plants, or the greater part of them, must have gone through their battles and struggles, and been selected and become species before the animals which feed upon them were evolved, or the latter would have been starved.

* Mr. Martineau, *Mind in Nature*, p. 22, says: "If you retain the forces in their plurality, then you must *assume* them *all* among your data, and confess, with one of the greatest living expositors of the phenomena of development, that unless among your primordial elements you scatter already the germs of mind as well as the inferior elements, the evolution never can be brought out."

Lotra's *Mikrokosmos*, bk. iv. kap. 2, band ii. 33 et seq.

19. It has been suggested by a man of great eminence as a physicist, that vegetable life may have been evolved in another planet and have been thrown on to our earth when such planet broke up, by means of a meteoric stone. I only mention such a theory to show how wild may be the speculations of even great philosophers on this subject. We have no proof that vegetable or animal life exists, or has existed, in any other world than our own, and we know that the friction of our atmosphere would destroy, by causing intense heat, any such organism on meteors. Such a means of introducing life into our globe would spoil the potentially-endowment theory, and destroy all belief in the interference of a supernatural Being in the origin and progress of life on our globe, leaving such origin to the *chance* shot of a broken rock deviated from its course round the sun, and falling upon a plantless and lifeless world. Such a wild, hopeless, cheerless, unscientific theory could do nothing towards an explanation of the origin of species, inasmuch as it would merely relegate to another broken-up planet that creation which the science of the 19th century dares not face on this.

20. The earth becoming covered with verdure, the potentiality of the original germ, selecting its own spot and its own moment, is required by the doctrine of evolution to effect a new exercise of forces hitherto dormant for myriads of ages. A "self-adjusting" principle comes into play, and the plant is evolved into an animal.

21. Where, when, how, or why, the theory does not explain. Exercising his finite mind, man treads fearlessly on the path of the Infinite. He has seen an egg become a chicken, a pigeon's plumage vary, a bright feather in a bird's tail entrancing its mate, and upon foundations slight as these he ventures to unravel the greatest, the grandest, the most sublime, and the most divine of all mysteries—that of Creation.

22. I remark that without an atmosphere no plant or animal could live or grow. Therefore, before the plant or animal there must have been an atmosphere, and geology tells us plainly enough that such atmosphere has been modified from time to time to meet the requirements of living things on the earth. Did that occur by chance? Did that beautiful combination of oxygen, nitrogen, and carbonic acid—a compound of the same constitution in every part of the earth—come into existence by "natural selection" or the "struggle for existence"? *

* A writer in the *Edinburgh Journal* for Dec., 1872, has discovered that, among other good things, the atmosphere of Edinburgh contains more oxygen than other places.

23. The in-coming of animal species must have left our original potentially-endowed speck of protoplasm, myriads upon myriads of ages away, even according to the arguments of the Darwinian school.

24. But the animal, when evolved, could not have lived without an atmosphere, neither could it have existed without the plant especially adapted to its organization. Man eats the ox, which derives its nourishment from grass; he also eats wheaten bread, the produce of a grass. Destroy the grasses, and man, with all other mammals, would perish off the face of the earth. The bird feeds upon the fly, which comes from maggots, nourished by flesh, which again comes from grass; or it takes the caterpillar from the tree upon which alone the caterpillar can feed. Again we come back to the plant: I need not pursue this part of the argument further.

25. Now mark! The potentially-endowed plasm theory, and that of evolution, require in all this no interference of Divine Power. The sequence of events follows the laws implanted in the first plasm. The Creator of that plasm has retired from the scene: there is no Providence in nature.

26. But let me pause here, and ask in all humility, if the whole theory of evolution and Darwinism is not placed out of court by the necessity that an atmosphere should have been created *before* the advent of life upon the globe? Why should the same Power which created the one be denied the power of creating the other? Is the preparation for life to be considered specially creative, and life itself to be perfected without the supervision of the Creator? The theory which allows the Creative Wisdom to exist before the coming of life into the world—exist, too, in all that grandeur, sublimity, and power which could form in an atmosphere the “breath of life”—must indeed be deficient in probability, much less in truth, if it does not follow the same Creator into the great scheme of Life, Death, and Immortality.

27. Following the evolutionist, I must now ask into what animal form or forms was the vegetable first transmuted? Upon this point the evolutionist is silent, for he has floated his theory upon the unknown seas of speculation.

28. In the vegetable world “the plasm” has already worked out wonders without end. It has evolved the thousands of different forms which exist over the globe. It has “adapted” each plant to its peculiar soil and climate; it has provided each plant with a distinct and often widely different mode of propagating its own species. Some of the most beautiful provisions of the kind have been pointed out by Mr. Darwin himself in his admirable work on the *Fertilization of Orchids*.

29. But the "plasm" has now much higher and more complex duties to fulfil. It has to people the air and the water with living beings; it has to evolve creatures with structures so complicated that the highest wisdom and genius of man often fails to unravel or explain them; it has to evolve forms not only in themselves complete but having organs each adapted to its peculiar function, and each organ again more or less dependent upon its fellow; and it is an absolute necessity that they should go on evolving from "blind force to consciousness and will," from the psyche of the plant to the instinct of the animal, and from this to the reasoning mind and immortal soul of man.

30. Such is "Evolution," its duties and responsibilities under the most favourable aspects; it is believed by many excellent and good men, who consider it consistent with religious belief. I need hardly say, however, that such a mode of the origin of species has no basis of proof, nor, in my opinion, of probability even, in its favour. Were it true, it would be merely a mode of creation with the Creator replaced by a *Deus ex machinâ* of human invention. Why should we accord to a God of the imagination that honour which we would thus deny to the God of Nature and Revelation? As Agassiz, the great American naturalist, has well said, the work of creation is not such as a master mind would relegate to a workman—it is work which shows in every step of its progress the guidance of a designing All-Powerful Creator. Mr. St. G. Mivart, in his *Genesis of Species*, remarks, "without a distinct belief in a personal God, it is impossible to have any religion worthy of the name; and no one can at the same time accept the Christian religion and deny the dogma of creation."

31. The two extracts just quoted, however, express widely different phases of thought. Agassiz endeavours to prove, and to my mind he does so conclusively, that creation is personal and direct. Mr. St. George Mivart believes in evolution, with the exception of the soul of man, which he thinks was created when "God breathed into his nostrils the breath of life."

32. But the life and the soul of man are two entirely different and inconvertible terms. The supposition, for it is nothing more, of their identity must also break down, because it necessarily assumes that there was a time when man's corporeal frame existed without a soul, which is equally repugnant to common sense and authority.

33. I now proceed to examine more carefully some of the utterances of Mr. Darwin and his followers as they affect their belief in the evolution theory. The fourth edition of the *Origin of Species* of Mr. Darwin ends thus:—"There is

grandeur in this view of life with its several powers, having been originally breathed by the Creator into a few forms, or into one; and that whilst this planet has gone cycling on according to the fixed laws of gravity, from so simple a beginning, endless forms, most beautiful and most wonderful, have been and are evolved."

34. This passage, even from its apparent clearness and simplicity, has caused many very erroneous notions as to what is Mr. Darwin's real doctrine. Contrast the passage quoted with the following, taken from the Preface to the same work:—"As many more individuals of *each species* are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary, however slightly, in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better *chance* of surviving, and thus be naturally selected."

35. We are now, mark, on Mr. Darwin's own line. Natural selection, as explained by him in the last paragraph, is the corner-stone of his entire theory,—it is the backbone of Darwinism. And yet what are we told? If so and so occurs, then the species will have a better *chance* of surviving. There cannot be here a superintending Creator, for He trusts nothing to chance; neither can creation be thus carried out by law according to the evolution theory; for a Divine law *must* be perfect—unchangeable, irrevocable. It cannot contain within it the elements of chance.

36. At page 64 of the same work Mr. Darwin writes:—"Where many species of a genus have been formed through variation, *circumstances have been favourable to variation*; and hence we might expect that the circumstances would generally be still favourable to variation. On the other hand, if we look at each species as a special act of creation, there is an apparent reason why more varieties should occur in a group having many species than in one having few."

37. But surely a potentially-endowed plasm—or laws implanted in matter by the Creator for the purpose of evolution—would not differ from those which would be the result of special creation? We have, therefore, Mr. Darwin's own word that he does not intend to avail himself of either of the above alternatives.

38. On page 157 of the same work, however, Mr. Darwin states explicitly, "I have hitherto sometimes spoken as if the variations so common and multiform in organic beings under domestication, and in a lesser degree in those in a state of nature, had been due to chance. This, of course, is a wholly incorrect expression, but it serves to acknowledge plainly our

ignorance of the cause of each particular variation." After stating with great care all that is known about the causes, Mr. Darwin fails to establish any law of variation. He comes to the conclusion that "our ignorance of the laws of variation is profound. Not in one case out of a hundred can we pretend to assign any reason why this or that part differs more or less from the same part in the parents;" and he summarizes the questions thus:—"Whatever the cause may be of each slight difference in the offspring from their parents—and a cause for each must exist,—it is the steady accumulation through natural selection of such differences when beneficial to the individual, that gives rise to all the more important modifications of structure by which the innumerable beings on the face of the earth are enabled to struggle with each other, and the best adapted to survive."

39. From the above quotations it is easy to tabulate what Mr. Darwin means.

1. The word "chance" is used instead of saying "we don't know."
2. We are profoundly ignorant of the causes of variation, therefore, to cover our ignorance, he says, "they vary by chance."
3. All variations are governed by the same law.
4. Natural selection is the power by which all such variations are accumulated for the benefit of the creature, and to enable it to be among the "survivals of the fittest."

40. Natural selection, therefore, is the keystone of Darwin's philosophy. But what, I think we may fairly ask, has become of the potentially-endowed plasm? Does it contain "natural selection" among its "laws"? It cannot be, because the imperfection of the power as a means of creation has been proved by Mr. St. George Mivart and admitted by Mr. Darwin, and a Divine law must be supreme, perfect, unchangeable.

41. It is, however, in his latest work, the *Descent of Man*, that Mr. Darwin has most decidedly rejected a Divine guidance and power in creation. The limits of this paper will not allow me to make many quotations.

42. Perhaps the most significant utterance on this point is that in which he argues (vol. i. pp. 66-7) about the probability of religion having its origin in dreams. "It is probable, as Mr. Tyler has clearly shown, that dreams may have first given rise to the notion of spirits," and "the belief in spiritual agencies would easily pass into the belief in the existence of one or more gods." And so, according to Mr. Darwin's views, was religion "evolved."

43. In support of his views he quotes Mr. Herbert Spencer's article in the *Fortnightly Review* of May 1, 1870, p. 538, and then he continues: "No being could experience so complex an emotion (that of religious devotion) until advanced in his intellectual and moral faculties to at least a moderately high level. Nevertheless, we see some distinct approach to this state of mind in the deep love of a dog for its master associated with complete submission, some fear, and perhaps some other feelings."

44. It will not be necessary for me to follow Mr. Darwin over the gulf which separates the animal from man. I need not dwell upon the fruitless effort to prove that reason has been evolved from the lower psychical attributes of brutes, nor need I stay to refute the theory that man's consciousness, his language, his spiritual nature, and his immortality, are the result of "natural selection" and the "survival of the fittest."

45. There is perhaps nothing more astounding in the history of the human mind and the literature of our time than the fact that men of reputation and scholars can be found who hold that a belief in such hypotheses as are included in Darwinism and evolution are consistent with Christianity and the revelation of Holy Scripture.

46. The principal argument used by such men is that Mr. Darwin's critics do not understand Mr. Darwin. But this is a poor subterfuge. The "Darwinian calculus" is by no means a difficult thing to solve. If Mr. Darwin has some *arrière pensée*, which he merely foreshadows in ambiguous language, we shall, no doubt, be enlightened by-and-by. In the meantime we must remember that critics may themselves be deficient in the necessary knowledge to form a sound opinion upon the writings of Mr. Darwin's opponents.

47. Whether this be so or not, there can be no difficulty in comprehension by the meanest capacity of the following passage, which I requote: "It is quite possible, as Mr. Tyler has clearly shown, that dreams may have given rise to the notion of spirits, and the belief in spiritual agencies would easily pass into the belief in the existence of one or more gods."

48. It is childish to tell us that such a passage can be misunderstood, or mistaken for anything but a theory of the origin of religion which it professes to be. Is it possible to hold such opinions and to teach such doctrines consistently with a belief in revelation or of natural theology?

49. With regard to the utterances of Mr. Darwin's followers I will now make some quotations and remarks. How far the evolution of the "formless to the formed; the inorganic to the organic; or blind force to conscious intellect and will," is consistent with a belief in the Creator of the Bible, who,

we are told, created distinctly and separately each division of organic nature, I need not stop to inquire. Neither need I dwell upon a "a self-regulating universe," nor the belief that the world "would not come to chaos if left to law alone."* Such opinions are contradicted over and over again in the Bible, which teaches that "not a sparrow shall fall to the ground" without His knowledge.

50. Mr. Herbert Spencer tells us that special creation, which is the creation of the Bible, is worthless by its "derivation," which is, of course, the Bible; "worthless in its intrinsic incoherence; worthless as absolutely without evidence."

51. Surely such language as this is plain enough to be understood by those who are not included in the mysterious bonds of Darwinism. Mr. Herbert Spencer has written two volumes upon a Biology founded on Darwinism; but he has the candour to tell us he does not believe in the "current theology."

52. In a recent review in *Nature*, July 11, 1872, of a work called the *Martyrdom of Man*, we are told that the author, after working out the evolution of animal and human faculties, goes on to "urge all enlightened men to take part in the great work of demolishing one of those institutions which, once the highest attainable, has now become injurious. *Christianity must be destroyed.*" And he concludes his work in these words: 'But a season of mental anguish is at hand, and through this we must pass in order that our prosperity may rise. *The soul must be sacrificed, the hope in immortality must die.* A sweet and charming illusion must be taken from the human race, as youth and beauty vanish never to return.'

53. As a commentary upon these horrid statements, the reviewer, who is the principal writer in the chief organ of Darwinism, instead of expressing disgust at the publication of such impious trash, contents himself with calling the author's anti-Christianity "fanatical," and advising him to "turn his experience and ability as an ethnologist to the doing of more solid work in some special department of his *science*"!

54. In a paper read before the British Association at Brighton, this year (1872), entitled, "On Aims and Instruments of Scientific Thought," by Professor W. K. Clifford, the author comes to the conclusion that, "By saying that the order of events is reasonable we do not mean that *everything has a purpose*, or that everything can be explained, or that *everything has a cause*, for neither of these is true."

55. Among the arguments by which this "purposeless" and "causeless" theory is arrived at, we find the following:—

* Wallace.

After showing how men come to the conclusion "that the order of nature was reasonable in the sense that everything was adapted to some good end," he continues, "Further consideration, however, has led men out of the conclusion in two different ways." He then attempts to show that the case has been wrongly stated; that wonderful structures can be found that serve no good purpose at all; referring to the useless teeth of whales—the eyes of the mole being perfect in the young and destroyed in the adult—the uselessness of our own external ears—and he continues thus: "The eye, regarded as an optical instrument of human manufacture, was thus described by Helmholtz, the physiologist, who learned physics for the sake of his physiology, and mathematics for the sake of his physics, and is now in the first rank of all three. He said: 'If an optician sent me that as an instrument, I should send it back to him with grave reproaches for the carelessness of his work, and demand the return of my money.'"

56. Professor Clifford's second reason for denying "adaptation to some good end" is that, "both the adaptation and the non-adaptation which occur in organic structures have been *explained*. The scientific thought of Darwin, Herbert Spencer, and Mr. Wallace has described that hitherto unknown process of adaptation as consisting of perfectly well-known and familiar processes."

57. Here we have Darwinism shown to destroy our teleological view of nature, which it is often denied that it does. And this is effected by such weak arguments as the rudiments of teeth in the whale, forgetting the adaptation which replaces the useless organs; the blindness of the mole, which can easily be proved to be untrue; the uselessness of our external ears, which are well known to concentrate the waves of sound; and the scientific arrogance which can see imperfection in one of the most perfect and the most beautiful works of God.*

58. Another effect of Darwinism may be witnessed in the recent attempt by a strong disciple of the school to deprive mankind of the great and inestimable privilege of prayer.

* A friend of mine assures me that if a live mole be confined in a box, although all its efforts are concentrated in the desire to get out at the bottom by burrowing, if a finger is introduced carefully and slowly at the part furthest from the animal, it will immediately make a rush at it. Every one also knows that if the waves of sound are not sufficiently concentrated to suit partially deaf people, they elongate the external ear with their hands, and thus hear more plainly. A celebrated London physician in an address to a public scientific body, said that if he had to make a man he would make him without tonsils, for they are of no use. This statement is absolutely untrue, as the merest tyro in physiology full well knows. This is another instance of "scientific arrogance."

Professor Tyndall and his unknown physician must bear all the consequences of this revolting and mistaken movement. It is impossible to conceive anything more dreadful than the proposition made by these men, founded as it is upon ignorance of the meaning, the objects, and the value of the greatest of all human blessings.

59. If not the direct result of Darwinism, which I believe it to be, this discussion displays at least the utter want of religious feelings among its disciples. Is man to dictate to God? Is man to put God upon his trial? Is the great Omnipotent to be placed in parallelism with the self-glorifying and presumptuous aspirations of scepticism? Alas for the day when the Christian should be deprived of the privilege of praying to his God! It has been well remarked by the editor of the *Sunday Magazine* for October, 1872, "There is something very melancholy in the endeavour, in the name of science, to deprive us of one of our highest privileges. If the views of Tyndall and Galton should be established, the awful dream of John Paul Richter would become nearly a reality. 'I wandered to the farthest verge of creation, and there I saw a socket where an eye should have been, and I heard the shriek of a fatherless world.'"

60. In *Fraser's Magazine* for April, 1872, there is a paper under the signature of L. S., entitled "Darwinism and Divinity." The writer of the article holds the opinion that the doctrine of evolution should appear harmless, because "Every sincere believer ought to hold that religion depends upon certain instincts, whose existence cannot be explained away by any possible account of the mode by which they came into existence."

61. This is a good example of the manner in which religion is treated by the disciples of Darwin. Of course it suits the doctrine to argue that religion depends upon "certain instincts." Having thus begged the question, the writer proceeds:—"A little more straining of a few phrases which have proved themselves sufficiently elastic, and the first obvious difficulty may be removed. The first chapter of Genesis has survived Sir Charles Lyell; it may be stretched sufficiently to include Mr. Darwin."

62. But before this can be done, the writer considers that "a certain change is being brought about by the application of that method of which Darwinism is at present the most conspicuous example. Possibly the change may be of even greater importance. Certainly it is of far too great importance to be more than dimly indicated here. Briefly, it may be described as the substitution of belief in gradual evolution for a belief in spasmodic action and occasional outbursts of creative energy: of the acceptance of the corollary that we must seek

for further explanation of facts or ideas by *tracing their history* instead of accounting for them by some *à priori* method; and this is the adoption of the historical method in all manner of investigations into social, political, and religious problems, which were formerly solved by a much more summary, if not more satisfactory method."

63. The open attack which is here made upon Holy Scripture is unmistakable. I could not have adduced a better example of Darwinism, as it affects religious thought, than by this substitution of an unproved hypothesis for the inspired Word of God.

64. The same writer, a fair example of the Darwinian school and a shining light among those who are constantly expressing their anger because Christian men cannot reconcile their philosophy with Christianity, admits as fully as possible the position which Darwinism holds to religion. His remarks ought to put an end at once and for ever to the claims of those who profess that Christianity and Darwinism are compatible with each other. For example, he thus writes:—" Darwinism does not make it more difficult to believe in a God. But," he continues, "it is true *that it weakens that conception of the Creator* which supposes Him to intervene at stated periods, in order to give an impulse to the machinery. . . . There is another doctrine, which seems to be more nearly affected; and probably, although we seldom give open expression to our fears, it is this tendency which is really the animating cause of the alarm which is obviously felt. *Does not the new theory make it difficult to believe in immortal souls?*"

65. Now all this is written by a man of evident ability, a firm believer in Darwinism, and it is published in a journal edited by the historian Froude. I cannot, therefore, be accused of selecting a partial advocate of the doctrine, but rather one who expresses his own belief in Darwinism, and who is therefore a trustworthy witness of any views as to the effect of " Darwinism upon religious thought."

66. As a further and striking example of the effect of Darwinism upon religious thought, I may refer to the first of a series of "international" scientific works lately published, entitled *The Forms of Water in Clouds, Rivers, and Glaciers*, by Professor Tyndall, a series of works intended for the instruction of the rising generation.

67. Count Rumford, a man of great and original genius, occupied many "pages of his well-known book" in applying to the Design of Providence the law that water when freezing contracts down to 37 degrees, and then suddenly expands down to 32 degrees, the freezing-point.

68. By this beautiful and adaptive law the ice necessarily becomes lighter than water, and so, floating at the top, all the inhabitants of the freezing water are saved from destruction; for if ice were heavier than water it would fall to the bottom, and thus gradually the entire water would be frozen.

69. Professor Tyndall states that Count Rumford's inference is unsound, because he described the property of freezing water as the only instance in nature, while it is now known that iron and bismuth do the same thing; that is to say, they "require more room in the solid crystalline condition than in the adjacent molten condition"; and he remarks, "There is no fish to be taken care of here, still the 'contrivance' is the same." Now, surely this is shallow and inconclusive reasoning. Because the law mentioned obtains when we melt two metals, therefore there is no contrivance when it is applied to all living things in the waters of the world where water freezes? Count Rumford was talking eloquently about the evident design of a Providence. Professor Tyndall thinks that because the law exists where the philosopher can see no contrivance or design—where, in fact, it would be impossible to see either—viz., in the crucible of the laboratory—it cannot be providential or designing when applied to the preservation of myriads of living things; and he concludes his unscientific, unphilosophic, and gratuitously irreligious criticism by remarking: "But both life and its conditions set forth the operations of inscrutable Power. We know not its origin, we know not its end. And the presumption, if not the degradation, rests with those who place upon the throne of the universe a magnified image of themselves, and make its doings a mere colossal imitation of their own."*

70. Of course the philosopher who writes thus does not believe in his Bible. I should be sorry to make such a statement lightly, but I will quote the writer's own words.

"Man himself, they say, has made his appearance in the world since that time of ice (the Glacial period); but of the real period and manner of man's introduction little is professed to be known, since to make them square with science, *new meanings have been found for the beautiful myths and stories in the Bible.*"

71. It certainly appears to me that a philosophy which places the Bible in such terms before the youth of the world must prove most injurious to the healthy settlement of "religious thought," which is at all times in the young susceptible of false impressions. Such philosophers altogether forget that they have to prove that the Bible is untrue. I much question whether

* *Op. cit.*, p. 125; *Op. cit.*, pp. 151-2.

either Mr. Tyndall or Mr. Darwin is capable of such a demonstration. Most certainly the Bible has an infinitely sounder foundation than Darwinism.

72. We are told over and over again by writers that they can hold simultaneously a belief in Darwinism and what Herbert Spencer calls the "current theology." Happy, indeed, are such men. They could not, of course, hold any terms with those who would deprive us of prayer, destroy a belief in the immortality of the soul, write down Christianity like the *Westminster* and other reviews, nor pander to the infidelity and scepticism which is creeping like a serpent through the vitals of society!

73. I contend that I have proved my case that Darwinism, whatever may be its merits as a philosophy, has been most disastrous in its effects upon religious thought; and that the right-minded among its followers are powerless to prevent the effects of such so-called science upon the progress and well-being of mankind.

74. I have a few words to say, in conclusion, upon what I consider is the real position of man in the organic world.

75. One of the greatest biologists of the age has but two or three years ago passed away to his rest. My memory lingers, with a sad and melancholy feeling of pleasure upon the life, the works, the genius, the character of the late Professor Goodsir, of the University of Edinburgh.

76. As a rule, comparisons between men of fame are invidious, for they are too often coloured by the opinions and convictions of him who compares. Few, however, if any, will be found to dispute the fact, that the man who for twenty years and upwards taught the largest anatomical class in the United Kingdom, the zealous and indefatigable worker in Anatomy and Physiology, both human and comparative, the original thinker, the man of genius, the Christian and the philosopher—John Goodsir—was one of the foremost men of his age.

77. For twelve months I had the inestimable pleasure of listening to his eloquent and sound teaching, and therefore I may readily be believed when I acknowledge that I am proud to be a disciple of his school, and a believer in his faith.

78. Now Professor Goodsir maintained, with all the learning and original thought for which his name will be remembered when Darwinism and most of its believers will be forgotten, that man is entirely separated from animals by reason of his spiritual nature, and that he stands alone in the great work of Creation.

79. Morphologically—that is to say, structurally—he is correlated with the animal, and therefore we may freely present the Darwinian with his supernumerary or useless organs. But

just as the animal is corporeally and psychically far higher than the plant, so in his corporeal, psychical, and spiritual nature is man far higher and distinct from the animal. Therefore, says Professor Goodsir, "Man, in virtue of his possession of a spiritual principle, by which alone he is capable of thought and speech, and is impressed with the belief of moral truth and divine agency, stands alone among organized beings of the globe."*

80. And again:—"To my apprehension, man's possession of a spiritual principle entirely excludes him from the scale of mere animal being, even although he possesses an animal body." †

81. But Professor Goodsir does not stop here. He proves to my mind, absolutely without any drawback, that man could never have been evolved, even physically, from the animal. He remarks: "An organism adapted to a spiritual end, and capable of acting in space in the most perfect manner, *must* be more highly developed than one not so adapted." ‡

82. The limits of this paper will not permit me to adduce Professor Goodsir's evidence upon this point. But I must quote him once or twice more. "Why," he asks, "should man alone, of all the living beings on the globe, have been left so unfettered that his welfare should depend on his own choice?" And he continues: "Herein lies the great mystery of humanity, on the existence of which depends that *religiosity* which is characteristic of every form of the human race. The consciousness of untruth and of error, in some form or other, exists in every modification of man; and it is equally certain that all the vicissitudes of human history and all the distress against which man has had to struggle, have been directly due to his tendency to untruth, and his liability to error." §

83. From these extracts it will be observed that a great and a good man did not hesitate to support his scientific investigations by direct references to the records of Revelation. He laid it down as a principle, "that although we are not to look to the revealed record for scientific forms of statement, we are nevertheless, from its character, entitled to assume that whenever statements are made bearing on the intellectual, moral, and religious departments of the economy of man, in their relations to his material economy and conditions of present and future existence, the sense or bearing of these statements will not only be not contradictory, but, on the contrary, confirmatory of the scientific results of human research. On the grounds already

* *Anatomical Memoirs*, vol. i. p. 271.

† *Op. cit.*, p. 275.

‡ *Op. cit.*, p. 276.

§ *Op. cit.*, p. 277.

stated," he continues, "we are bound to guard ourselves against the conscious or unconscious assumption that the development of humanity can be legitimately or safely investigated as an anthropological subject without reference to the primitive condition of man as presented to us in the revealed record."

84. Tried by such a standard, what becomes of the philosophy of Mr. Darwin? Can we reconcile the origin of religion from dreams, with the revelation of Holy Scripture? Can we bring the potentially-endowed plasm—the tendency to vary—the "struggle for existence"—the "survival of the fittest," and the consequent incoming of living beings into the world around us, into unison with Revelation?

85. I maintain that Darwinism in all its forms has been most disastrous to the religious thought of the present age.

The CHAIRMAN.—I trust that all present will unite with me in awarding their cordial thanks to Dr. Bree for his able paper. I shall now be glad to hear any observations upon it, either from members of the Institute or from our visitors.

Rev. W. J. IRONS, D.D.—I have listened with great attention to Dr. Bree's paper; but there is one subject which arises towards its close on which I desire to say a word. It seems by some to be assumed that we are to deal with questions of this kind in the first instance by advancing our own interpretation of the Bible, and then arguing from it as established. Now, it is quite conceivable that propositions held in common by all scientific men, on this subject of Darwinism, may be different from those interpretations of Scripture, and yet be retained with entire reverence for the letter of the Holy Scripture. If we look back through the whole course of religious thought during the last thousand years, we certainly find elements of Darwinism; and people have arrived at the conclusion that the created universe, from the very lowest organism to the highest form of intellect, consists of a series. We need not be startled at this fact, if it be a fact; and if the interpretations we have been accustomed to apply to Holy Scripture may at first seem to be in collision with much that now may have been arrived at, we must not complain if we are called upon to face the matter in a philosophical and truthful spirit. I do not think, for a moment, that Dr. Bree will hesitate to admit what I am thus saying; but I consider the tone of his paper is rather hostile to the notion that we may contemplate these questions by themselves, and leave Holy Scripture to stand entirely upon its own merits. This, however, is my proposition. For my part, I thoroughly believe—and, as a clergyman, I need not insist very strongly upon it—that the Bible is the word of God; but I am quite prepared to let this point stand by itself. Such is my faith in the Bible that I believe it can fully take care of itself, and that we need not be in a state of perpetual fear about it. Then, on the other hand, I am also content to trust in nature, that

is, the laws of God which we come in contact with in this world. I believe that God's laws, in the whole world of nature, are well worth our investigation, and that we ought not to flinch from anything in those laws, or in facts of nature, because they may, in the first instance, seem opposed to the received view of Scripture. We have plenty of time before us, and we can afford to be quite calm about the matter. To be perpetually, as some phrase it, "throwing the Bible at the head of the infidel," I am sure only irritates him, without doing any good to our cause; and although I am quite sure that this is not the intention of the writer of the paper, yet he will, I trust, forgive me if I say that I think it will appear to be his view to many persons who read it. A considerable number of paragraphs in the paper we have heard wind up with the same climax, namely, that "this is quite contrary to the Bible." Now, I do not think that this is exactly the way in which scientific questions ought to be treated. I say, let each question stand on its own basis. If we were here to discuss the connection between a biblical conclusion and a scientific conclusion, we should have to examine very clearly what the biblical conclusion was; and then I think we should all be, to use a common expression, at sixes and sevens, for we should not be quite clear as to what biblical conclusion people were going to put into opposition to a scientific conclusion; therefore I should be glad if this kind of reference to Holy Scripture were kept as much as possible in the background in these discussions. There is nothing at all inconsistent with the laws of God in the statement of His having created all things in series; for there is, undoubtedly, an entire series evidenced both in moral and physical creation; just as in one case we begin with the merest creatures of inorganic, or almost inorganic, existence, and rise from them to the highest organizations; so, in the other, do we begin with the lowest movements of life, perception and instinct, until we arrive at thought and will, and so on; not implying for a moment that the one was derived from the other; but that it pleased Almighty God to give that series of beings in regular order, creation after creation, regulating the one in proportion to, and rising above the other. I do not know whether I am making myself intelligible; but I am anxious to express a feeling which I am sure pervades a large number of intelligent men in London and elsewhere, when I say that there is no need whatever to place Darwinism, or to place any of the present results or proceedings of science, in *a priori* antagonism with revelation. There is quite enough of real antagonism going on without our adding to it in this way. I believe that that awful passage which is quoted in Dr. Bree's paper, wherein an avowal is made, by some persons, of a desire to get rid of Christianity, is by no means an expression of unusual fanaticism. That unhappy feeling is, I believe, spreading, and this is a solemn reality which is not to be confronted by any mere nibbling. I say further, that when we take up a scientific subject, and deal with it in a mixed manner, as though it brought into question at once the truth of the Bible, we are nibbling at the whole matter. (Hear, hear.) That is not what I call going to the root of it. I would advise that the two things should be kept quite distinct. But one thing is quite clear, and that is that this paper has elicited the fact that some

gentlemen who write on scientific subjects are themselves very ignorant of our side ; in fact, that they know nothing about it. (Hear, hear.) What, I ask, would be said of any one who should attempt to give a lecture on a language he had never studied? I once knew, as a matter of fact, of a gentleman who, in mere exuberance of spirits, and, I suppose, because he was in reality very clever, and had a good deal of address, attended a meeting, and passed a whole evening among its friends, to whom he was given out as Professor of Arabic in a celebrated university, without his knowing a word of the language. (Laughter.) He made a few unintelligible remarks, and, although he was among university men and others, he passed off as an Arabic professor. How easy it is for people to acquire character without knowledge. He was that sort of man who could handle a few facts in a most adroit way, and produce an effect upon those who knew nothing, because he knew a little, or pretended to it. It is just in the same way that people of little knowledge talk against the Bible, and we take up their views and objections, and find many of them are of the most childish kind. When we treat them with respect, and place them in antagonism with some solemn scientific theories, we are doing deep injustice to the Bible, and we are also doing an unfair thing to the poor fellows who know nothing about the matter, and whom we treat as if they did. We should try to make them understand that theology is not only a science, but, as we believe it to be, the queen of sciences ; that we are anxious to teach them what is true on our side, and are willing to be taught ourselves what is true on their side, if they will only teach us. Do not, however, let us mix up crudities with the science of theology. There seems to me a little of this in the paper to-night, and without the slightest wish to offend the learned writer, I would so far object to it on the ground I have stated, much as I admire the paper on other grounds. (Hear, hear.)

Admiral HALSTEAD.—I have been much pained by Dr. Irons' remarks, and wish to ask what is to be the effect of infidel teaching—not upon those who are grown up, but on the thinking youth of the country—if those whose duty it is to do so do not endeavour to counteract it in every possible way? (Hear.) I maintain that the danger lies with our youth, and therefore I say it is necessary for us to distinguish between truth and imposture. (Hear.)

Rev. J. H. TITCOMB.—Although I concur with the meeting in thanking the author for having given us much that is very interesting and valuable, and in perfect harmony with our own thoughts as religious men, yet I think that some of the points he has set himself to prove have not been proven ; and that the points which have been proved in the paper lead us to an issue on which there is an inconclusive sequence raised. First of all, in section 12, the author says: "I undertake to prove that a belief in Darwinism and Revelation is incompatible and irreconcilable." Now, I wish it to be understood that I do not in the slightest degree believe in Darwinism, nor do I think it has been at all proved, and many scientific men of the day concur in this judgment. We are not

bound, as a scientific society, to accept it as a thing proved in any sense such as certainly the scientific discoveries of Sir Isaac Newton. Darwinism is a thing which is now on its trial before the scientific world : it is in a period of probation. A great deal may be said for it, and a great deal may also be said against it ; but this is not the question before us. For my own part I heartily wish that this paper had been constructed, as Dr. Irons has suggested, entirely on a scientific basis, and totally irrespective of the bearings of the question upon Scripture ; but that line has not been taken, and the unfortunate part of the paper seems to me to be, that in some measure it proves Darwinism to be consistent with Scripture. Of course I am well aware that this is not intended. Thus in section 17 it is stated that Darwinism necessitates the creation, or the existence, of a vegetable world before the creation of an animal world,—the very statement made in the first chapter of the *Book of Genesis*.

Dr. BREE.—You have misread the passage. In it I state what, in my own belief, must have been the sequence, if evolution were true.

Mr. TITCOMB.—That is the point. Darwinism, properly understood, does take that line. It assumes the precedence of inorganic evolution from molecular atoms ; and (as I understand it) of vegetating evolution also, previous to the evolution of animal life from its first protoplasm. Hence the passage in section 18 of the paper, which seems to say that Darwinism must be wrong, because the vegetable world must have preceded the animal world, is, in my judgment, a *non sequitur* altogether. So far as it may be used as an argument it rather confirms Moses, and puts Darwinism on a scriptural basis ; for the argument here used is that Darwinism, if true, requires us to believe that vegetation was created before animal life.

Dr. BREE.—Allow me to mention that you have misapprehended my meaning. In detailing the views you refer to, I was stating what I considered was essentially necessary for evolution to effect, supposing that doctrine to be true. I pointed out that it must take that line ; but I did not say that was the line taken by the evolutionists. Quite the contrary : they do not believe anything of the kind.

Mr. TITCOMB.—That is a matter of opinion. I believe that if Darwin were here he would say there has been the same amount of matter ever since the first creation, although by the correlation of forces there have been a variety of shapes in which that matter has existed. He would go back to inorganic matter, to molecular atoms scattered throughout the universe, which must have preceded by long ages the first germ of life. The whole theory of modern science, and of the school we are now discussing, seems to me to require this.

Dr. IRONS.—Were those molecular atoms all homogeneous, or was there a great variety of them ?

Mr. TITCOMB.—I believe the Darwinian school hold that there was a great variety ; and the theory of Huxley and Darwin is that they preceded the origin of life.

Dr. IRONS.—Is it their theory that the atoms were all homogeneous? Were they all of the same kind, or was there a great variety?

Mr. TITCOMB.—That would only complicate the question. It does not matter whether they were homogeneous or not.

Dr. BREE.—Darwin does not say anything on the subject. He only speaks of one or more forms of life, and he does not confine himself to vegetable life.

Dr. IRONS.—You say “one or more forms of life”?

Dr. BREE.—I will read Dr. Darwin's words :—“There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms, or into one.” He here alludes to the beginning of things. Nothing can be clearer than these words; and it will be seen that he alludes neither to vegetable nor to any other form of life. He merely says “a few forms.”

The CHAIRMAN.—I must request that the discussion of this paper may not be allowed to descend into a conversation.

Mr. TITCOMB.—I have to thank the chairman for ruling as he has done. Mr. Darwin makes no reference to anything that is not biological, simply because the theory he has to deal with, is from first to last biological, and this accounts for his not referring to the vegetable world, or to the atmosphere, or to the inorganic world, in any of his books. If he were here, I am sure he would allow that the first germ of life was long subsequent to the creation of inorganic matter. On this ground I say that the argument raised against his view as necessitating the fact of the vegetable world having come first, is out of place, and that in this instance Darwinism is rather in harmony with the Word of God than opposed to it. I am not here espousing the doctrines of Darwin, but I like to see justice done even to those with whom I disagree. Another argument that has been raised against Darwin is, that his theory involves the admission that there is no superintending Creator. There can be no doubt that this is unfortunately the tendency of the doctrine he lays down; but the question with which we have to deal is, does it of necessity involve this doctrine? The fact is, that God is actually present sustaining all natural law; and the law of evolution itself cannot in any sense, according to my judgment, be opposed to divine action. There is the idea of persistent volition running throughout and in contact with all the laws of nature by night and by day,—an interpenetration, if I may so speak, of God's Spirit, by which we have God's presence acting in and upon, and working with and about, every department of nature ceaselessly, continuously from the first act of creation to the last. It appears to me that in this way you get the idea of a superintending Creator and providence, and that this is quite consistent with the theory of evolution. It is said, and said very properly, that this doctrine appears to drive God a long way back, and to constitute Him merely one who created a set of laws and certain matter, and then left them to themselves. I grant that this is what Wallace and others, who are free-thinkers, say about it; but I ask whether they have a right to say so? I will take the case of my own church organ, which is rather a large one. The organist sits at some distance from the instrument, nevertheless

by the mechanical means at his disposal, he is constantly evolving all the sounds and notes it is capable of producing. He is far removed from the organ pipes; and yet without his action on them they would not sound. In a similar way, although the action of the Creator may have been at first only such as to impress His omnipotence on that which He was pleased to create, so that it might, by a series of self-developing laws, as they are called, evolve first one form and then another, yet that is no proof that He is not working the whole set of laws throughout, by His omnipotent agency. What I want to point out is this; that the laws of nature cannot act by themselves, or of their own independent motion. There must be an intellectual agency working with and behind those laws, otherwise they would be dead. This paper has called them "blind laws." Well, I have here a short extract from a work by Professor Owen, who says, in a passage to which I am unable at the present moment to give a more particular reference: "Natural evolution, by means of slow physical and organic operations, through long ages, is not the less clearly recognizable as the act of an adaptive mind." Again he says: "The succession of species by continuously operating law is not necessarily a blind operation." Also: "Organisms may be evolved in ordinary succession, stage after stage, towards a foreseen goal, and the broad features of the course may still show the unmistakable impress of Divine volition."—I will now venture to refer to section 35 of the paper we are discussing. The author has made some remarks on chance, which I think are scarcely fair. He takes exception to the use of the word "chance" as implying something in relation to the operation of laws of which we are ignorant. Why, sir, that is the very meaning of the word chance; and I do not think the argument a right one to urge against the term. If I take up some dice, and after rattling them in a box I throw them down, I say the result is a matter of chance; but it is none the less by law that the numbers are thrown because I use that term. I know that it is in accordance with certain laws only, but I am not cognizant of the exact mode of their operation. And so when Darwin enters into the laws of causation, he is the first to confess his own ignorance, in the same way as one is led to say that the dice fall by chance. Even the Scripture chroniclers speak in the same way. They tell us that "By chance there came down a certain priest that way;" meaning that it was by some means inscrutable to them, and which they did not understand. The very fact of their using the word would imply that it was by God's agency, although they speak of it in a human sense, as having been by chance. In the same way although I should say if I were a Darwinian, that natural selection might be brought about by laws which I know nothing of, I should still, as a Christian, hold that those laws are the appointed ends of a superintending Creator. It is on this point that I think the paper is not quite fair to Mr. Darwin. Still less is it fair to Dr. Tyndall. I hold in my hand the October number of the *Contemporary Review*, which contains an article on "Prayer" by Professor Tyndall. The paper we have heard to-night most distinctly asserts that Professor Tyndall denies, and puts out of the

rational of human life or thought, the power and privilege of prayer. The author of this paper says: "Another effect of Darwinism may be witnessed in the recent attempt by a strong disciple of the school to deprive mankind of the great and inestimable privilege of prayer." Now, I take exception to this statement, because all that Professor Tyndall says* is, that there is no place for what he calls "physical prayer;" but he distinguishes between that form of prayer which has for its object the alteration of Nature or Nature's laws, or the asking of anything physical and exceptional from God in reply to prayer, such as a change of the weather or anything of that sort, and other kinds of prayer which do not ask for these things. He says: "It is under this aspect alone that the scientific student, as far as I represent him, has any wish to meddle with prayer. He simply says physical prayer is not the legitimate domain of devotion." This is a very different position from that which is implied in the wholesale statement that he would "deprive mankind of the great and inestimable privilege of prayer." It is not for me to say what Professor Tyndall believes in the secrecy of his own heart; but I like to do justice even to an opponent. To my mind the paper we have listened to proves most distinctly that Darwinism is damaging and dangerous to religious thought; and I was glad to hear Admiral Halstead speak of its effects upon the young, for we can never be too jealous of the effects of new scientific doctrines on the minds of youth. What we, as seniors, may think, is of comparatively little importance: but what the young may think is of the greatest importance. (Hear, hear.) Therefore I allow that in this sense Darwinism is most dangerous, and I think that the arguments in the paper prove it to be dangerous. And yet, even here, there seems to be an inconclusive sequence raised on this proved point. The author of the paper says: "I contend that I have proved my case, that Darwinism, whatever its merits as a philosophy, has been most disastrous in its effects upon religious thought," and the reader is led to conclude that, because its effects are dangerous, therefore it is most objectionable, and ought to be altogether rejected. Of course we all know that if a fire be very strong, it is dangerous to go too near it; but this does not prove that it is wrong to have a fire. And so with regard to Darwinism. Arguing logically, it is possible that it may be true, and yet its effects very bad. Galileo's discoveries gave rise to an immense amount of infidelity; and the same may be said of other great investigators of scientific truths. Indeed, it is the tendency of all science to be deemed in the first instance in conflict with popular theology. The right solution of the difficulty is to keep the two for ever distinct. Science and Scripture will never be out of harmony while the one is rightly interpreted, and the other rightly proved; but in this case one is not proved, and the other, as Dr. Irons has said, may be very divergently interpreted. To my mind the paper we have heard read is a valuable one; but I hold that it is inconsequential, inasmuch as the author does not prove all he undertakes,

* This subject has been fully dealt with by Dr. Irons in the present volume, and by Professor Kirk in the second volume. [Ed.]

and because in what he does prove, he seems to raise an inconsequential sequence.

Rev. W. ARTHUR.—There is one point which has been raised by the last speaker which I think may to some extent be said to have been met. Mr. Titcomb seemed to think that the argument on the 16th section of the paper was that life must have existed antecedently to vegetation. To my mind the argument in the paper is a very different one. It assumes, as Mr. Titcomb has very justly pointed out, just what we have in the Mosaic description, namely, that vegetation preceded animal life. But the argument is not merely that vegetation preceded animal life; but that if animal life came only by evolution, this doctrine “makes it necessary that the vegetable forms of life must have covered the earth with verdure before the evolution of animal life; inasmuch as almost each animal in the world has its own plant, or class of plants, upon which it feeds. Therefore all plants, or the greater part of them, must have gone through their battles and struggles, and been selected and become species before the animals which feed upon them were evolved, or the latter would have been starved.” This is a totally different argument from that which Mr. Titcomb conceived it to be, and goes to prove that the whole flora of the world must have existed before the fauna began to be developed, and I think it is an argument requiring a good deal of consideration. (Hear, hear.) I agree in what has been said as to the desirability of keeping the scientific argument on a strictly scientific ground, and in the assumption that upon all questions between the Bible and science, the Bible will take care of itself. At the same time we ought to be very careful when we assume that, if we admit there is a series in creation, we come very near to development. I believe the two things are totally distinct. I believe with regard to the question of a series ascending from the lowest depths to the highest we yet know of, which is man, that if you fill up the series so completely that you leave no kind of interval whatever, there is nothing in experience alone with which science has to deal which will lead you to ascribe the result to evolution, but that everything in experience absolutely requires us to attribute it to one presiding mind with one great object, which has dealt with each great type so as to advance it endlessly towards innumerable adaptations. For the sake of illustration, if you take the wheel, you see at first the original block wheel, without felines, spokes, or nave; then you come to a wheel with these component parts, then to the tired wheel, the cog-wheel, the bucket-wheel, and so on, developed into almost endless varieties, and in a perfect series. I ask you is it a scientific conclusion that these wheels have developed themselves—that the process of evolution has been going on, and that by a scheme of natural selection the rude block wheel has developed itself into the balance-wheel of a watch? (Hear, hear.) The scientific conclusion is that the wheel has been developed by a mind which, having a type before it, adapted it to the different purposes for which wheels are required. This is the conclusion which experience would suggest, and not the conclusion that Darwinism would favour. I am glad to have heard the strong expressions that have

been used as to the necessity of doing justice to those whom we feel bound to oppose. I am sure that of all, clerical men ought to be the first to do so; but I am convinced that in continually throwing the Bible at the heads of infidels, as it has been phrased, you do not do this. I am certain, however, that on purely scientific grounds any one, looking at the position in which the Bible stands in relation to human history, cannot but feel that, as a man of science, he ought to pause long before knocking his head against that wall; but when he has done so and been brought up, I would then meet him entirely on scientific grounds, and say, "Is the fact so and so, and is this or that inference logical or not?" I believe there is much in the arguments that appear to prove that Darwinism has not made good its propositions, and that in many of its inferences is has been very wild. (Hear, hear.)

Dr. J. A. FRASER.—I wish to ask whether injustice has not been done, probably unintentionally, to another person besides the one already mentioned. I allude to what appears in section 19 of the paper, to the effect that "it has been suggested by a man of great eminence as a physicist, that vegetable life may have been evolved in another planet, and have been thrown on to our earth when such planet broke up, by means of a meteoric stone." Now, has it not been repeatedly stated, not perhaps by the author of the theory himself, but by others for him, that this was intended more as a joke than anything else? I believe it is generally so regarded, even if it has not been specifically stated by the author.

Rev. C. A. ROW.—Dr. Irons has already forestalled the remarks I had intended to have made, and I can only say that I most cordially assent to his observations. I think that there is a defect in the beginning of this paper,—it seems to make Darwinism stand for a great number of opinions entertained by various individuals, instead of the opinions of Darwin himself. The author of the paper tells us this, and it has produced in my mind considerable confusion. I may illustrate the undesirableness of putting the subject in this light, by saying that if we were to speak of the opinions of Socrates as Socraticism, it would be very undesirable to include under that term the opinions of Plato and Aristotle, as well as of the new and old Academies, and of the Cynics and the Stoics. To do this would only lead to endless confusion of thought; and it appears to me that this paper ought to distinguish between the principles of evolution as held by atheists, those held by Darwin, and those entertained by men who believe in Revelation. It is a most undesirable proceeding to lay down the proposition, that a belief in the Darwinian theory is inconsistent with belief in an intelligent Creator. We have already quite enough enemies to oppose, without adding needless ones. I think that in dealing with infidels we ought to follow as closely as we can what is said respecting our Divine Master—"A bruised reed shall He not break, and the smoking flax He shall not quench." I have been informed that Darwin holds a belief in theism. When we consider that there are such a vast number of opponents of revelation, it seems to me in the highest degree unadvisable to represent that

every modern theory of science, of which we may not be able to see the logical conclusion, is necessarily opposed to the belief in a living God. (Hear.) I am not defending the Darwinian theory, be it clearly understood, for as yet it seems to me to be utterly unproved. There is, however, another view to be taken of this subject, and that is, that the theory of development, as distinguished from the special theory of Darwinism, can be made to aid the arguments used for Divine Revelation. Among the great difficulties which meet us, there is that of the exceeding slow growth of Christianity. This is a difficulty that has struck my mind very forcibly, and there is also another difficulty in the slow and gradual development of Revelation itself. There are no two objections which are urged against us more frequently, or more persistently, by unbelievers than these. My reply to these objections is this: "You are bringing as an objection against Christianity, what you hold to be an actual truth respecting the elaboration of creation; you are urging as an argument against my Christianity that which you hold to be an absolute law of creation in the evolution of this world; and therefore if God Almighty be the actual Creator of this globe, if He has elaborated by slow and gradual processes this earth and all that it contains, I am fully entitled to expect that Revelation will follow the same law of slow and gradual evolution, and therefore that Christianity must require a considerable period before it commands the assent of the entire human race." (Hear, hear.)

Mr. I. T. PRICHARD.—I wish to make one or two remarks in reference to this discussion; and the first is with regard to what has been said by Dr. Irons, and endorsed by one or two speakers who have followed him; namely, that we ought to avoid, as much as possible, throwing the Bible at the heads of opponents. Now, I feel bound to take exception to that remark, because I do not think that it is a tendency on our part, or on the part of those who discuss matters of this kind on our side, to throw the Bible at the heads of our opponents. On the contrary, it is we who have the Bible thrown at our heads by those who oppose us. (Hear, hear.) Without entering into a discussion of the paper, of which I beg to express my humble and deep admiration, I would simply suggest that in cases of this kind it is not we who are the assailants, but our opponents of the scientific sceptical world, if I may use the term without intending it in any offensive sense. I do not see how such a theory as the Darwinian, with the conclusions it professes to lay before us—conclusions which affect, necessarily, the question of the origin of man—can be started without assailing the belief we have in the Bible, and it is in this sense only that I mean the Bible is thrown at our heads, and we are acting on the defensive, and not at all upon the offensive. To this extent, therefore, I differ from the remarks of Dr. Irons, and one or two others by whom they have been approved. It is a matter of regret to me that we labour under one disadvantage in this Society—if I may be allowed to point out a fault in our organization—and that is that unfortunately our discussions are sometimes all on one side. (Hear.) I was in great hopes that we should have had some here to-night who would have stood up as the advocates of the Darwinian theory; but unfortunately that has not been the

case. Had the Darwinians come forward, I should have been prepared to meet them on scientific grounds ; but as they have not appeared, I think it is hardly worth while to take up the time of the meeting by answering arguments which they might be supposed to have brought forward.

Rev. C. GRAHAM.—I desire to say that I go with Dr. Bree in the arguments he has brought before us this evening. Mr. Darwin, in the general summary in his work on the *Descent of Man*, says that he who is not content to look like a savage at the phenomena of nature, cannot any longer believe that man is the work of a separate creation. Now, are we to hide from ourselves the fact that the Bible is most distinct on this subject—that it is distinctly stated that God said “Let us make man in our image, after our likeness,” and that it is clearly set forth that “in the image of God created He him ; male and female created He them” ? And are we also to conceal from ourselves this fact, that the Bible most distinctly sets forth that the grasses, the herbs, the fruit-trees and the whole flora of the world were created after their kind—[*leminehu*—] each after its kind. Any Hebrew scholar will know that *min* means “form,” “species,” or “kind.” We have it not merely in *Genesis*, but also in the 11th of *Leviticus*, where, in the mention made of the creatures that are clean, and that are fit to be used by Israel as food, you have it continually repeated, each “after his kind,” and it is not merely *leminehu*—or each after its kind—but *leminehim*, all brought together, and each created after its kind. I take it that it is quite within the province of this Society to show what such supposed science really is—for it is not science, and I think that some of the greatest scientific men here are quite ready to agree with me. Are we not to come out distinctly and boldly in defence of the Bible ? If I am mistaken about my view of separate creations, I am quite willing to be corrected by Dr. Irons, or by any one else competent to do so ; but as I have read my Bible, and looked into the originals, and as I have studied theology, I have been taught, and have learnt from my Bible distinct creations. (Hear.) But Mr. Darwin says he has destroyed this, and glories in the fact. I believe that Darwinism is subversive of truth, as it is disclosed in natural and revealed religion. There is not a distinguishing feature in Revelation that Darwinism does not contradict. Perhaps I may be permitted to say a word or two on the psychological aspect of the subject. Man has a conscience ; he has an instinct which impels him to judge the moral qualities of his actions and thoughts, and I ask, will you find that instinct which enables him to do this, which condemns or approves, which gives pleasure or inflicts pain, in any inferior creature ? Dr. Bree has shown that animals must have been developed from vegetables, if the Darwinian theory be correct. I ask, will you get a conscience in a vegetable—will you find in any portion of the vegetable kingdom a moral nature, or an ethical nature, or the apprehension of a God ? Mr. Darwin’s designation of conscience is a most unfortunate one. He develops conscience from an instinct, and from associated feelings ; but he has no reference to any Divine standard of truth—he makes no reference in what he says of conscience to a God. He has, in fact, no apprehension of conscience

rightly understood. The very idea of conscience implies a reference to, and a comparison between, our actions and a Divine standard—a reference to something objective and outside man. Take man's ethical nature. Is there one single principle of an ethical nature in an inferior animal? Here we have not to reason about a dog; you will have to go lower down; you must go to the jelly-fish and the vegetable, and in that case, with regard to a God, where can the notion be drawn from? How is it developed? Can we know God in His nature and character, and His claims on us, and what it is necessary to do to meet those claims, without a revelation? But everything is developed. Our religious nature, our knowledge, our conscience, our ethical and moral natures are all developed; but if you have no principle from which to develop conscience, how can you get conscience, or a moral nature? Mr. Darwin almost concedes what I am saying, and yet he holds to his theory. He almost tells you in so many words that the theory is untenable, and yet he clings to it, and he considers us "savages" if we do not agree with what he says. Why, sir, this is not science.

Rev. J. JAMES.—It was publicly stated at Leeds not long since, and the statement has not been contradicted, that the French Academy has declined to permit the nomination of Mr. Darwin as a candidate for admission thereto, on the ground that his public works were unscientific in their psychological character. I wish to ask whether there is any foundation for this statement?

Dr. BREE.—Mr. Darwin is stated to have been proposed for election by the French Academy three times, and to have been rejected each time. I believe this was entirely on the ground that his work is not scientific.

Mr. T. W. MASTERMAN.—If I have rightly understood the theory of evolution, it starts from this basis, that many things are created not "very good," but very imperfect; that they become in process of time, by development, "very good," and that if they have not already attained to perfection, they will shortly arrive at that state. It is also maintained that there are some things which were created "very good;" but which have, in process of time, deteriorated, and less useful for the purposes for which they were first designed. This being a part of the theory of evolution, I contend that the author of the paper is quite right in stating that the advocates of that theory cannot consistently believe in eternal God, who is the God of nature, as well as of revelation, and not a mere fancied God of man's creation. I consider that Dr. Bree is right in linking together all the arguments that he has used to defend revelation, and it seems to me that in every paper, read before this Society, taking up questions of this kind, we ought, and must, refer to revelation, or we shall fail to carry out some of the great objects for which we are associated. I agree also in the remark made by one of the speakers at the other end of the room, when he said it is not we who take up the Bible for the purpose of throwing it at other men's heads, but rather our opponents who take it up, and we who stand on the defensive. I think it a glorious thing that this Society contends for a belief in the God of Revelation, and all that is given to us in the Inspired volume. (Hear.) I consider Dr.

Bree has succeeded in showing that Darwinism may tend to an attack on religious thought, and I have been surprised to hear some members take Mr. Darwin's side.

THE HON. SECRETARY.—I think they merely stated what they conceived to be Mr. Darwin's views, in order that those views might be made known in the absence of Mr. Darwin's own friends, several of whom were supplied with copies of Dr. Bree's paper, and invited to attend this meeting; unfortunately they have failed to put in an appearance, which is to be regretted, because it has rather damped the interest which might otherwise have attached to the discussion. It may interest many present if I relate the substance of a conversation I had the other day with Dr. Parker, the President of the Microscopical Society. He showed me the results of a large number of experiments which he and Professor Huxley have been making, and stated that up to the present time their labours at South Kensington had failed to prove the connection between man and the rest of creation—in fact there was, he said, no point at which they appeared to join. He added :—

“ We can classify, and have classified, the whole of the animal kingdom that we are acquainted with. We have put all the different animals into their separate places, and we have constantly got hold of man, and tried to put him into his place; but he would fit nowhere. There is such an immeasurable gulf between him, with all his attributes, and the rest of creation, and everything tends to prove that he must have been a separate creation.” (Hear, hear.)

I give these as being as near as possible the *ipsissima verba* of Dr. Parker, than whom, I think, there is not a much higher authority in England. With regard to the remarks to the effect that Sir William Thompson had said, or had allowed others to say for him, that his theory of vegetation coming to us from another planet, by means of meteoric stones, was only a joke,—I fear I must remark that this is the only excuse which a number of his friends, and some newspapers, have been able to make for his having, as a man of science, put forward such a theory. (Hear, hear.)

DR. BREE.—I do not think we have any cause to regret that no professed Darwinian is present, for I am sure that if there had been, he could not have stated the arguments in favour of Mr. Darwin's theories more ably, or more pointedly, than one or two of the speakers we have heard. With regard to Sir William Thompson's meteoric theory being a joke on his part, those who say this must remember that the theory was propounded in his Address before the British Association, with just as much gravity as characterized the assertion of Dr. Hooker at Norwich, that almost all the philosophers of the world were Darwinians. Sir William Thompson is a great physicist; but Dr. Lionel Beale expressly states, in his *Life Theories* and *Religious Thought*, that in his opinion that part of Darwinism which includes the evolution of living beings by physical laws, is utterly opposed to every principle of religion; and, therefore, I am astonished when I hear it stated that the doctrine of evolution is consistent with the Bible. Had I possessed the time, I

should have gone into the Biblical question myself ; but have only made one slight quotation. I have a right, however, to assume that all here have a perfect knowledge of the Bible and a fair knowledge of Darwinism. I say, therefore, that it is impossible to speak of Darwinism without mixing up the views of Darwin with those of his followers, because he has adopted many of the views of the latter. With regard to Dr. Irons' remarks, I think we have a right to take the Bible as proved to be true, and to refer to it as a truthful record of all that we believe and advance on its authority, and I scarcely think investigation will show that the principles of Darwinism may be held consistently with certain interpretations of the Bible ; but no interpretation would support the theory of the evolution of man from a monkey, or the origin of religion from dreams. In regard to this, let us not forget the remark of the reviewer in *Fraser's Magazine*, who states " that as the first chapter of *Genesis* has survived Sir Charles Lyell, it may be stretched sufficiently to include Mr. Darwin." If we are to go upon these grounds, it is of little use for us to argue the question. In order to discuss it properly, we must have two distinct bases to go upon ; we must understand Darwinism, and we must understand the Bible, and, if we are to have different interpretations of the Bible, I think there is an end of the discussion. Dr. Irons said he believed that the Bible was the word of God, and that it would take care of itself. True ; but few are aware of the extent to which infidel notions are being actively spread, and this is often done by bringing forward human inventions and unproved hypotheses, such as, in my opinion, are those of Mr. Darwin. My object in bringing the subject forward has been, to point out a few facts showing the language used by learned men of great ability ; men such as Mr. Huxley, who has been made secretary of the Royal Society,—a first-rate man no doubt, but holding very extreme views, who states that he believes the world arose from a cosmical cloud of matter, and that if you were to suppose an intelligence like ours existed in the beginning, that intelligence could have foretold, knowing the power of molecular forces, the whole evolution of the world as it now is !—an argument that renders it necessary first to assume that which is impossible, and then argue from it. With regard to the objection made by a clergyman as to the introduction of Scripture, I think if we were to keep Scripture out, the necessity for these discussions would cease. The whole argument against Darwinism is that an unproved hypothesis is sapping the very foundations of Religion, and I, for one, will never cease to agitate this question on scientific grounds. Again, a speaker has said that we are throwing the Bible too freely at the heads of our opponents. I do not think so. The fact is that we are simply Christians desirous of preserving our belief in the Bible, and who do not want to believe that which one man of great ability has made fashionable. I am old enough to remember the days of Tom Paine and Voltaire, and poor Lawrence, the surgeon ; they were driven out of society, and yet none of them went to the lengths to which Darwin and others in our own day have gone. In the one case, men who expressed these peculiar views were hunted out of the world ; in the other, we are told that we should receive the strange doctrines we hear

propounded, because their authors are scientific men. Mr. Titcomb says we are not bound to accept Mr. Darwin at present; but that he believes some portions of Darwinism are consistent with Religion. Now, I believe that Darwinism must be taken as a whole, and that it has yet to be reconciled with the records of the Bible; hence I cannot agree with him. He argued that we were not bound to accept Darwinism as proved, and adduced the observations made in the paper as indicative that the order of evolution, commencing first with vegetative, and then with animal life, was in accordance with the Mosaic theory. But I did not for a moment contend that my line of evolution was that which would be accepted by the evolutionist, but merely that it was the line which I considered the exigencies of his case *required* him to adopt, and it was intended by me as an argument against evolution. Suppose that the world was covered with verdure by means of the potentiality with which the first germ was endowed, there would be myriads upon myriads of spots on the earth where the power to vary into an animal ought to be evolved, which would throw the whole matter into an absurd position. Mr. Titcomb spoke of infinite molecules existing *before* the first germ of life came into being. Granted; but is it even probable that the Creator would have taken some of these molecules—converted them into living matter—endowing them with a potentiality by which they would be evolved in myriads upon myriads of years into all the living world we see around us! Surely, such a mode of creation is not consistent with the teachings of the Bible? He further asks “Does Darwinism of necessity imply that there is no Providence in Nature?” I think it does. If the disciple of Mr. Darwin, or the evolutionist, were to put an exterior power as the cause of the changes which they say are produced by “blind force,” there would be an end to one of the strongest objections to the theory. But then why use the terms “Natural selection,” “variation,” “struggle for existence,” “survival of fittest”? These elements of evolution are incompatible with an external Divine power, which Mr. Titcomb will admit is the doctrine of the Bible. Where, in such a case, would be the necessity for elaborate works to prove that the “blind forces” of nature are sufficient to evolve a living being? or that the world is “self-regulative” and self-adjusting? The opinion cannot be entertained for a moment. The same speaker has objected to my applying the word “chance” to Mr. Darwin’s description of the mode by which variations caused “struggles for existence.” But I gave Mr. Darwin’s explanation, which purely removed the expression to that of “ignorance” of the cause of variation. If “chance” means “ignorance,” what does Mr. Darwin mean by the struggles for existence where the strong overcome the weak and survive as the fittest? Mr. Titcomb will perceive that the only alternative left is that God arranged that His creatures should be evolved from the lowest to the highest by *creating* the strong on purpose to subdue the *weak*, which is not, I think, a belief consistent with the teachings of Scripture. With regard to the objections to my strictures upon Professor Tyndall’s project for trusting the efficacy

of prayer, I think that they are answered in the quotation I gave from an eminent clergyman, whose opinion upon the subject is exactly like that formed by myself. The same speaker has also said, that I endeavoured to show that *because* Darwinism was injurious to religious thought, I seemed to infer that Darwinism is therefore not true, and he quoted geology as an instance of being true although it had been denounced as being opposed to Scripture. I do not think I am open to the first charge, as I endeavoured to show that Darwinism had no foundation, and then, by pretty conclusive evidence, to prove that it had been injurious to religious thought. With regard to another speaker's argument about Geology, I do not see that it applies to my own. Geology may be reconciled by some with different interpretations of Scripture,—Darwinism never can. Geology may seem to some incompatible with the narrative of Moses; but Darwinism affects Religion and the existence of a God of any kind. The facts of Geology are true and not irreconcilable with Scripture: Darwinism is not only untrue,—but as a theory it is inconsistent and irreconcilable with Scripture; while some of the strongest arguments against it are furnished by Geology itself. The Rev. Mr. Row mentioned he had heard that Mr. Darwin was a Theist; but he will grant that even the doctrines of a Theist cannot be placed on the same level as those which teach of a Saviour. He added that it was highly undesirable to represent every phase of science as opposed to a belief in God. Certainly, and most assuredly I agree with him. But if an unproved theory is raised by scientific men to a high pillar in the archives of science—if we are told that this crude hypothesis is one of the three great means by which science has *been advanced* during the last twenty-five years—and if such a crude unproved hypothesis strikes at the root of revelation and religion—I am sure he will grant that it is desirable to expose both the fallacies of the doctrine and its anti-religious teachings. The same speaker seems to think that God may have created the world consistently with evolution; but he has to prove that such a belief is consistent and true.

The Meeting was then adjourned.

INTERMEDIATE MEETING, JANUARY 20, 1873.

MR. CHARLES BROOKE, F.R.S., VICE-PRESIDENT, IN THE CHAIR.

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

MEMBERS :—

The Rev. T. L. Kingsbury, M.A., Eston Royal, Pewsey.

The Venerable T. Stanton, M.A. (Archdeacon of Wiltshire), Burbage, Marlborough.

The Rev. C. H. Turner, M.A. (Chaplain to the Lord Bishop of London), London House.

Philip Vernon Smith, Esq., M.A., Barrister-at-Law, Fellow of King's College, Cambridge, 4, Stone Buildings, Lincoln's Inn.

Samuel Smith, Esq., Liverpool.

F. Wright, Esq., 68, High Street, Kensington, W.

ASSOCIATE :—

C. D. Lawrence, Esq., B.A. C. C. Oxon., Merrow, Guildford.

A paper on "Language," by the Rev. E. Marriner, M.A., was then read by the Author; a discussion followed, in which the Revs. J. B. Heard, Robinson Thornton, D.D., C. Graham, T. M. Gorman, and J. H. Titcomb, the Chairman, Mr. I. T. Prichard, and Captain F. Petrie took part; the Rev. E. Marriner having replied, the Meeting was then adjourned.

ORDINARY MEETING, FEBRUARY 3, 1873.

MR. ALEXANDER MCARTHUR IN THE CHAIR.

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

MEMBERS :—

The Rev. William Carus, M.A. (Canon of Winchester, and late Senior Fellow of Trinity College, Cambridge), The Close, Winchester.
Edmund H. Currie, Esq., St. Leonard's Street, Bromley, S.E.

ASSOCIATES :—

The Rev. Marsham Argles, M.A. (Canon Residentiary of Peterborough), Barnack Rectory, Stamford.
The Rev. G. W. Danks, Gainsborough.
The Rev. H. G. Tomkins, Park Lodge, Weston-super-Mare.
Sydney Turner Klein, Esq., 24, Belsize Park.
Miss S. H. Carruthers, Cisanello, Pisa, Italy.

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

“Transactions of the Royal United Service Institution.” Part 69.

From the Institution.

The following paper was then read by the Author :—

REMARKS ON SOME OF THE CURRENT PRINCIPLES OF HISTORICAL CRITICISM. By the Rev. C. A. Row, M.A., &c.

THE subject to which I am about to draw your attention is one which has not hitherto been considered in this Institute. Yet its claims on our attention are strong; for not only are the principles on which historical criticism is based of a strictly philosophical character, but more than any other subject which is discussed in this room, they have a direct bearing on Revelation. As Christianity is an historical revelation, the investigation of the claims of its facts and documents to be received as historical comes strictly within the limits of this science; its relation to religion is therefore more direct than that of any other.

I have assumed that a science of historical criticism ought to exist. It may be defined as the science which discriminates between fact and fiction in the history of the past. If there be no such science, we can have no certain grounds for knowing what is true or false in the events of history, and past experience would be rendered worthless as a guide to the future. No less dangerous is the introduction into it of false principles, by which whole regions of fact are consigned to the domains of fiction. The most dangerous attacks on Christianity have originated in false principles of historical criticism.

I. One of the most important questions connected with this subject is the limit which ought to be assigned to what Professor Tyndall has designated the principle of philosophical imagination; or, to speak in the language of this science, the principle of historical conjecture. I put the case thus: if facts are deficient, or their evidence or interpretation uncertain, to what extent are we at liberty to supply the deficiency by the use of a supposed power of historical divination. You are aware that this principle has of late years claimed the right of reigning over a wide range of subjects, and pronouncing on them with dogmatical authority. Not only has it claimed the right of interpreting the mythical and semi-mythical periods of history with a boundless license of imagination, but within the historical period, where facts are separated from each other by an unknown void, many writers of history claim to possess the power of erecting a solid bridge of fact over the interval which separates the one from the other. I fully admit that it is both the right and the duty of those who engage in these inquiries to employ all the resources of reason in endeavouring to separate the true from the false in the history of the past; but by this process there is no little danger that a number of mere conceptions which are merely subjective should become metamorphosed into objective facts.

I am far from wishing to deny the use of philosophical imagination or historical conjecture, as long as they are kept within the limits which a sound philosophy will assign them. Without imagination all discovery is impossible; but, like all other good gifts, it requires to be carefully watched, lest it should intrude itself beyond its legitimate province. Its duty is to act as the pioneer of reasoning, not to supply its place. Its unguarded use is far more dangerous in history than in science. Scientific analysis can subject its conjectures to a rigid verification; and they have no right to plant themselves as facts on the solid earth until they have passed through this process. But as history treats only of the past, conjecture is incapable of verification, except by analogy; its conclusions, therefore,

cannot pass beyond the regions of the probable; and however high their probability, they must be carefully distinguished from ascertained facts.

There is no employment more easy and delightful than, when facts are wanting, to supply their place by the aid of the imagination. The labour of doing so does not require us to move out of our easy-chairs. When facts are wanting to sustain theories, all may be made easy by boldly inventing them. Hence the attractiveness to many minds of the mythical and semi-mythical periods of history, and of fable and fiction generally. Their interpretation gives a boundless scope to the imagination. Mr. Cox, in his work on the Aryan mythology, has carried this principle to a point beyond which it is impossible to advance. I have little doubt that, with the aid of the machinery employed by him,—viz., the effects of the solar orb, the scenery of our globe, light and darkness, the alternations of cloud in every form, &c.—that it is possible to resolve every fiction,—nay, every event in life,—into a solar myth, provided one is gifted with a fair share of imaginative power. Similar is the mode in which whole schools of mystics have in all ages handled the Bible, and made it say everything or nothing at their pleasure. Are such plays of the imagination entitled to rank as rational convictions? When two facts are separated from each other, the connecting links of which have passed away, there are many conceivable theories by which they may be united; and a powerful imagination, unrestrained by reason, can see analogies in everything. Minds of this order require to have it constantly reiterated to them, that to prove a theory possible is not to prove it probable; and to prove a theory probable does not convert it into a fact.

The tendency of many gifted minds in the present day to erect a magnificent historical theory on a very few uncertain facts is very remarkable. Formerly it was too much the habit of theologians to compose histories out of a few uncertain traditions. Grave philosophers and historians seem ready to adopt the practice which theologians are now disposed to abandon. To a certain order of mind the act of groping in the darkness of the past has the same charm which climbing to the most dangerous heights of the Alps has to others. Probably, one day the history of the human race for the last fifty millions of years will be reconstructed by the aid of a few archæological remains; and the gradual steps by which man has emerged from an inarticulate animal into an articulate one will be clearly pointed out. I heartily commend every effort to extract out of the memorials of the past every particle of truth which they will yield by any legitimate exercise of reason; but facts which

have perished can seldom be revived by the imagination. Two events may have been united together in twenty different ways. It is necessary to speak on this point very plainly, for the most serious consequences are constantly resulting from a use of it, which can be made to rest on no rational principle.

On the other hand, let us not close our eyes to the danger of fictions getting into history. This is so great, and numbers of writers have been so credulous, that a thorough sifting of the evidence on which historical facts rest is absolutely required. Even in ordinary life, no small number of events get currently reported as facts which a careful inquiry proves to have been fictions. It is impossible to deny that there is a considerable principle of mendacity in man. Both national, party, and sectarian feelings have led to the gravest *suppressiones veri* and *suggestiones falsi*. If a history of the late German and French war was composed from exclusively French sources of information, it would contain a large mythic element. In proportion as history rests on one-sided evidences of the character I have referred to, it is liable to suspicion.

It is impossible to deny that the science of historical criticism has done us good service. It has banished multitudes of supposed facts into the regions of fictions; and the world is always benefited by getting rid of a falsehood. An immense mass of fiction had succeeded in introducing itself into history. Those of us who can remember when Rollin was the great authority for ancient history are in a position to estimate the greatness of the change which historical criticism has effected. In those days history consisted of fact and fiction in nearly equal proportions. Little effort was made to test the evidence on which it rested. Authors who lived five hundred years after events were referred to as equal authorities to those who were contemporaneous. The utmost which criticism ventured to do was, either to eliminate the supernatural or to rationalize it down to the limits of the possible.

There is still a great tendency to think that an event is proved to be true if we can adduce the authority of an ancient writer for it. The whole value of such a person's testimony depends on the interval of time which separates him from the fact which he professes to record. If he lived beyond the period of reasonable historical tradition, he is no better an authority for an event than a writer of modern date, unless it can be shown that he had before him historical materials which have since perished. One constantly hears authorities quoted to prove the truth of facts who lived hundreds of years after them. I have heard, for example, Josephus adduced as an authority

for an event which occurred more than one thousand years before his time. If he had no definite historical materials before him, his authority because he lived 1,800 years ago would be valueless. If the world should last another thousand years, writers of the present day may be then ancient authorities, and some will probably think their testimony valuable for some fact connected with the battle of Hastings. Against this fallacy we cannot be too closely on our guard.

A considerable portion of the blame must be laid on the ancient historians themselves. History was viewed by them too much as a work of art. Style held the first place; the separation of fact from fiction the second. Hence the facility with which they composed speeches, and put them into the mouths of others. Even the accurate Thucydides, as you know, did not escape from this evil habit, though he candidly owns that his speeches are his own composition. The same spirit has led some of them to give us lively descriptions of battles for which it is evident they could have had no authority but their own inventive powers. Hardly an ancient historian exists who applied the principles of criticism to events which occurred before the period of written contemporaneous documents. Livy's preface well exhibits the careless spirit with which they generally treated the events of early history.

Great, also, is the debt which modern history owes to the growth of the critical spirit. Partisan writers, and writers who drew their information from second-rate authorities, had succeeded in stereotyping their own views of it. We have now arrived at the conclusion, that history which is not based on a comparison of original authorities, and a careful sifting of evidence, is valueless. The extent to which documentary evidence has been adduced is one of the most striking improvements which the spirit of modern times has introduced into this study. If hero-worship has sometimes too much characterized it, it has certainly demolished a multitude of idols.

Of the critical school of ancient history Niebuhr may be regarded as the founder, although several earlier writers had prepared the way by calling attention to its uncertainty. Prior to his labours the general views of it were hopelessly indistinct, and the value of the authorities, on which it rested, had never been tested. Certain positions may be considered to be now firmly established. 1. That all secular history, to entitle it to the name, must be founded on contemporaneous testimony of some sort, and that alleged facts, which cannot be discovered to rest on such testimony, are unworthy of credit. 2. That the assertions of no writer, however ancient, are trustworthy evidence for events which occurred centuries before his birth,

unless it can be shown that he was in possession of materials of an historical character, and was not drawing from mere myths and legends. 3. That before it is possible to arrive at historical truth, the testimony of ancient writers must be carefully weighed, their sources of information ascertained, and their prejudices allowed for. 4. That the history of most ancient nations, prior to the birth of contemporaneous literature, consists of two portions; one in which the events are entirely mythic and legendary, and another in which a certain number of historical facts are intermixed with myths and legends. 5. That even in those periods in which the historical element largely predominates, myths and legends occasionally intrude themselves. It is remarkable that, even in these modern times of journalism, we have narrowly escaped from the introduction of at least one great myth into history. I allude to Barrère's mendacious fiction of the sinking of the *Vengeur* in Earl Howe's victory. It was even commemorated by a modern model of the sinking ship. The great majority of French writers have reported it as an historical fact. Alison, Carlyle, and I know not what other English historians, followed suit. It had all but taken the rank of an unquestionable fact, when it was found to have been an audacious falsehood. The gradual discovery of authentic documents proves that this is no solitary case in the history of the first French Revolution. If such fictions can all but enter history in modern times, with all their superior advantages of testing the accuracy of events, what must be the probability that they have frequently done so in ancient times, when none of our machinery existed for the diffusion of information? I need hardly say that the application of sound critical principles to the history of the first French Revolution is rendering the position of many a demigod on his pedestal extremely precarious.

The critical method of Niebuhr consisted of two portions; one of which was destructive, having for its object the elimination of fiction from history; the other constructive. The destructive method was based on the great principle, that nothing can be accepted as an historical fact for which some form of contemporaneous testimony cannot be adduced. This is unquestionably sound. What constitutes such testimony I shall inquire presently. Applied to the history of Rome, it proved that by far the larger proportion of the events prior to the capture of the city by the Gauls rested on no trustworthy historical foundation; and that the same was true with respect to the earlier portions of Grecian history; and that even for a considerable period afterwards myths and legends are largely intermixed with facts. In one word, the period of

trustworthy history only begins within a moderate number of years before the birth of a contemporaneous historical literature.

It will be seen that these principles admit of being applied to history generally, and cannot be limited to these special cases. We cannot but admit as a general fact that the early history of nations contains a mythic element, for which historical testimony is wanting. Prosaic writers have mistaken poetry for history, and represented its creations as historical facts. In the case of many of the Oriental nations the art of writing was in use in a very early period, and its employment for recording historical events rests on unquestionable evidence. Hence the period of their credible history extends up to a much earlier date than that of the Occidental races. But in nearly all of these myth precedes history; races of Gods and heroes that of ordinary men. The question, therefore, becomes of the greatest importance. Have we any means of separating the grains of historic truth from the mass of myths and legends in what they are intrusted?

It is not my purpose to enter on the regions of pure mythology, or to inquire whether by any possible application of reason an historical element can be extracted from it. It is evident that attempts to assign an origin to the innumerable myths of the ancient world must rest in no small degree on conjectures which admit of no verification. I am far from denying that the study of comparative mythology may lead to some historical results. My immediate concern is with the semi-historical periods of history. Do they admit of a reconstruction which rests on a basis of reliable evidence, or must we be content to leave them in the disjointed state in which they have been handed down to us? Niebuhr considered that he had discovered a constructive method applicable to this period of history. After the fictions had been destroyed, he held that there remained a certain number of disjointed historic facts. He considered that the intervals which separated these facts could be filled up by the aid of a faculty which he called that of historic divination, but what may be more truly called conjecture, aided by reasonings from analogy. He used as an illustration of this faculty the power which a man who has lived in a dark chamber can acquire, by means of habit, of seeing objects in it, which are invisible to those who have just entered from the light. The analogy, however, fails in one most important particular in its application to the obscure regions of history. We can verify the assertions of the man who reports objects which he sees in the dark chamber, but although a man may see much more deeply than we can into the obscurities of history, we never can verify the

truth or falsehood of his assertions. We must take his *ipse dixit*.

On such a principle he attempted to reconstruct considerable portions of early Roman history. These reconstructions, although they were assented to when they were first propounded by a large number of eminent men—among others by Dr. Arnold—have since fallen into considerable discredit. Others thought that they had an equal right to propound theories as facts, and very discordant ones were the result, for which probable evidence could be adduced. The great work of Sir G. C. Lewis may be considered to have given them their death-blow. He has proved that a large portion of early Roman story is destitute of an adequate attestation, and that where facts are wanting the attempt to supply them by analogies and conjectures is an utter failure.

The reason of this is plain. The number of possible events by which they may be united together is indefinite. It is impossible to reason out by analogy what must have been the course of events, unless human actions are due to necessary causes. At least, in our present state of knowledge, human passions and human actions do not follow so necessary a law as that of gravitation; and until they do, to reconstruct lost events can only be a matter of probable guess-work, except in a limited number of cases. Niebuhr thought that he could divine the changes through which the Roman constitution must have passed, and the influences at work which actuated the agents in them. Let us test his position, and suppose that certain portions of English history have perished in a similar manner; how hopeless would be the work of reconstruction. Would it be possible to reconstruct the events or causes by which the Parliaments of Edward I. were connected with the Witenagemote; or if the memory of the events of the reign of Henry VIII. had been obliterated from history, to reconstruct the immediate causes which produced the Reformation; or if those of the reign of Elizabeth had undergone the same fate, those which have given its peculiar aspect to the Church of England.

But the principle is still active in various other branches of historical inquiry, especially in those which have even a remote connection with Revelation. Of this numerous works which you well know, and which I therefore need not name, are striking instances. I will offer a few observations on one which is rarely referred to in this room,—*Ewald's History of Israel*. This work is a most singular instance of learning and ingenuity, united with audacity, of which its respected author seems supremely unconscious. I fully concede the right of the his-

torian to subject the historical books of the Bible to the severest principles of criticism, for they belong to history, and as I have said, it is the function of this science to discriminate fact from fiction. I have no immediate concern with that portion of this work which denies the Mosaic authorship of the Pentateuch, but with some of its reconstructive principles. We will assume, therefore, for the purposes of argument, that the Pentateuch was not written by Moses, and that it is a composite work, which a late writer has reduced into its present form, out of several original authorities. Ewald, by the aid of conjectural criticism, not only asserts his ability to determine the exact number of these authorities, but to assign each passage to its respective author. But his boldness does not stop here. After a lapse of over three thousand years, he attempts to reconstruct *the history, which he considers these authorities to have misunderstood. The audacity with which he uses the principle of historical conjecture is almost sublime, and it seems never to have occurred to him that its validity is questionable. As far as I have read this work, I have failed to discover any rational principles by which the greater portion of the enormous mass of ingenious conjecture which it contains can be verified, or any proof given that they are veritable facts, except the author's own opinion that he possesses a deep power of vision by which he is capable of seeing into the obscurities of the past. I cannot conceive that a person can be convinced by its perusal that the positions taken by its author are proved, unless he has come to it with a predisposition to accept them. Similar attempts are made from time to time to reconstruct the life of our Lord, and are widely applied to subjects most closely connected with revelation. Do they rest on a rational foundation? Let the plain truth be boldly spoken. These and similar reconstructions are novels, and not histories.

Let me guard myself from the danger of being misunderstood. The foregoing observations are meant only to apply to the principle of historical conjecture. I by no means wish to imply that there is not a legitimate use of reason on this subject, or that we cannot by its aid infer the presence of a fact for which we are not in possession of direct evidence. We constantly do so in the daily affairs of life; and what is legitimate in these is legitimate in history.

I will conclude this portion of my subject in the words of Sir G. C. Lewis,—“The main cause of the great multiplicity and wide divergency of opinion is, the defective methods which have been adopted. Instead of applying those tests of credibility, which are constantly applied to modern history, they attempt to guide their judgment by the indications of internal

evidence, and assume that the truth can be discovered by an occult faculty of historical divination. . . . The consequence is, that ingenuity and labour can produce nothing but hypothesis and conjectures, which may be supported by analogies, and may sometimes appear specious and attractive, but can never rest on a solid foundation of proof. There will be, therefore, a series of conjectural histories. Each successive writer will reject all or some of the guesses of his predecessor, and will propose some new hypothesis of his own. . . . History will perpetually revolve in the same hopeless circle." I think that the general principles contained in this passage are not only applicable to history, but may be usefully applied to a wide range of philosophical, theological, and scientific speculation.

II. If the only secure foundation of history is contemporaneous testimony, or a something which may be taken as truly representing it, it becomes a most important question to determine, for what number of years prior to the birth of a contemporaneous historical literature can we be said to possess a trustworthy historical tradition?

According to the opinion of Sir I. Newton, the transmission of historical events by a trustworthy tradition extends only a little beyond 100 years, anterior to the existence of contemporaneous documents. We may assume that the period of a man's trustworthy historical recollections extend from about ten or twelve years of age to about eighty, if our faculties continue entire. The cases of prolonged life beyond this period are so rare that they may safely be left out of the calculation. It may be urged that ten is too early an age for a trustworthy recollection of historical events. It will be so, unless they are striking. Speaking from my own experience, I have a most distinct recollection of the chief events of the battle of Navarino, which took place when I was eleven years of age. I am confident that I have not read a description of the battle since, yet I could at this moment describe its chief events from recollection. There is one event which happened one or two years earlier, of which my recollection is no less vivid, and of some of the scenes of which I could give an accurate description,—the ravages of the great November gale which inflicted a greater amount of mischief on the west coast of England than any within the recollection of the present generation. I can see many of its scenes at this moment before my eyes, and think that I shall continue to do so as long as I live. Among the earliest political events of which I have a distinct recollection are the sudden illness of the Earl of Liverpool, which dissolved the ministry; the great commercial panic of 1824; the death of the Emperor Alexander; and, earliest of all, the coronation of George IV.: but of these,

though I remember the facts, I have no recollection of the details. Assuming, therefore, that a man's personal recollections may extend over this interval of time, we may add to them what he may have learned from his father or his grandfather, and this will bring us a little over the period I have stated. But as few men attain the age of eighty, some abatement must be made from the influence which old men can exercise in preserving a traditionary recollection of events.

I am aware that there are exceptional cases on the other side. I think that I have read that the grandfather of the late Marquess of Lansdowne had conversed with a person whose father had stood on the same scaffold as King Charles I. It is unquestionable that such prolonged historical recollections occasionally occur; but they are so few that they can exercise little influence on the transmission of accurate oral traditions. They are, however, valuable in particular instances. Thus Irenæus tells us that as a boy he had heard Polycarp describe things which he had heard from the apostle John, and that his recollection of his interviews with Polycarp was of a most lively character, considerably exceeding in vividness that of many subsequent events. In such cases an accurate traditional transmission of events could be extended over 160 years; but we must remember that such cases are extremely rare. Their chief value is when the last link in the chain is himself an author. In this particular case, it affords a singular attestation to the genuineness of St. John's Gospel, for it is hardly conceivable that a man situate as Irenæus was could have been imposed on by a forgery which had only been in existence ten or fifteen years before he wrote.

We have the means of estimating in a highly civilized community the period of time within which oral tradition becomes an untrustworthy vehicle of transmitting accurate historical information. The little states of Greece must have formed favourable examples of the power of tradition to transmit accurate historical knowledge. The smallness of the number of the citizens must have imparted to each individual a far livelier interest in political events than is at present felt by the members of modern states. Hence we should expect that traditions of the past would deeply impress themselves on the public recollection. Thucydides tells us that the Athenians of his day, while they possessed a general historic recollection of the tyranny of Pisistratus and his sons, had fallen into a popular error as to some of the material facts. The general belief was that Hipparchus, who was killed by Harmodius and Aristogiton, was the eldest son, and had succeeded his father in the tyranny; whereas his eldest son and successor was Hippias. Historical

recollection, therefore, had become confused at Athens within a period a little over a century respecting a most important event in its history. It is easy to explain how the error originated, because Hipparchus was killed by Harmodius and Aristogiton, and Hippias continued to reign four years after his death; but the fact of the error proves that there is considerable danger that fictions should get into histories which are only transmitted orally. Another fiction had also become current on the same subject. A popular song represented Harmodius and Aristogiton as the liberators of their country, and statues had been erected to them in that capacity; whereas the fact was that they killed Hipparchus as an act of private revenge; that the tyranny lasted four years longer, and was dissolved by the interference of the Lacedæmonians, who acted under entirely different motives, namely, a false oracle, obtained by the exertion of influence on the Delphian priests. Such falsifications of history are frequently due to political partisanship. A few tolerably accurate accounts of events which occurred 140 years before the birth of Herodotus and Thucydides, reached these historians; but there were favourable circumstances which kept the recollection of them fresh in the popular mind.

These considerations prove that, as a general rule, it is impossible to trust tradition for the accurate transmission of facts for a period much exceeding a century; it speedily becomes confused when the chief actors are dead. The utmost which it can effect is the transmission of general statements; but in minor details, it becomes hopelessly inexact. After a considerable lapse of time, even these require corroborating testimony for their substantiation. Great was the interest which was excited in the minds of the mass of our population by the great French war; but the knowledge of its events is rapidly dying out, and that which remains is chiefly preserved by books. If an historian were to attempt to write an account of it from popular reminiscences, it would be one mass of inaccuracies. Yet thousands of our grandfathers fought and perished in it. Still more dim is the recollection of more distant events in the popular mind. Any knowledge of the battle of Beachy-head has perished from the recollections of the inhabitants of the neighbouring coasts. Hardly a recollection remains at Barnet of anything connected with the battle. A monument points out the spot where it is said to have been fought; still there is much doubt as to the precise locality. If it is true that a mound, three miles off, on which I stood a few months since, contains beneath it a large number of the remains of the fallen warriors, it must have been spread over a wide extent of

neighbouring country; but on these points all local knowledge has perished.

If popular recollection of distant events is very imperfect, even when it is aided by the existence of an historical literature, it is a much more uncertain vehicle for the transmission of facts, when it is forced to rely on its own unaided resources. In fact, events transmitted orally become speedily varied, coloured, and exaggerated. This is particularly the case with respect to numbers, even when the events are recent. I can well recollect the surprise with which I first learned the numbers which were engaged at Waterloo, compared with the popular exaggerations of them. We may lay it down as a general rule that popular conceptions of numbers are nearly always exaggerated, and when handed down to us by mere tradition grossly so. Hence, the high numbers so generally found in ancient writers. When we take into consideration that the hosts of Xerxes, after they had passed the Straits of Thermopylæ, could have derived their subsistence only from supplies which must have been transported by sea, it is evident that the accounts which have been handed down as to the numbers of the army and the camp-followers are unworthy of credit. In fact, the mode in which they were said to have been ascertained was the roughest possible. The late war proves that the numbers of armies on paper and of those which took the field differ widely. Ancient writers have given the numbers of the Persian force which fought at Marathon as varying from 100,000 to 600,000 men. We have a solid fact by which to test the truth of this report. The whole was conveyed across the Ægean in 600 trireme galleys, the ordinary crew of one of which consisted of 200 sailors and thirty marines. For these the space on board was so limited, that whenever a favourable opportunity presented itself, they took their meals on land. You are aware that the accounts handed down of the earliest portions of Roman history are filled with minute specifications of numbers. If these accounts of the numbers which fell in battle are worthy of credit, the inhabitants of that portion of Italy must have been more prolific than mice. One army is no sooner slaughtered than another is in the field, and this year after year.

But it will be more satisfactory to test the value of oral tradition as an accurate reporter of events, not through the remote past, but by the recollections of the times in which we live. Let us take an instance very favourable for the transmission of traditional historical recollections,—the inhabitants of a great naval port. Everything in such a place would tend to keep alive the knowledge of events, the *esprit de corps* of a constant succession of seamen, the interest felt by the whole population in their actions, and the ships which would help to

keep alive the memory of their past history. I have lived for many years in the vicinity of such a town, and therefore I can form a judgment of the degree in which traditionary history can be accurately transmitted.

Let us take a period of twenty-eight years after the close of the great French war. Would it have been possible for an historian to write an accurate history of it from oral tradition? I take this particular time, because it constitutes the interval which separates the composition of St. Paul's four chief Epistles, from the Resurrection. If we add to these the twenty-two years of the war, the whole interval will be greater than that which separates the composition of the latest of the synoptic Gospels from our Lord's public ministry. I have no hesitation in affirming that, at the time I have mentioned it would have been possible to have composed a generally correct history of all the chief battles from the local traditions of the place, although there would have been considerable variations in minor details, which would have afforded a number of specious objections for critics, who were anxious to invalidate it. They were habitually talked of in all ordinary society, and the chief events were thoroughly known. At the time I speak of, there was probably not a boatman in the harbour who could not give an account, more or less accurate, of the different actions in which each ship had been engaged, which he had heard talked of, over and over again, among his friends and acquaintances. These narratives were of an essentially popular character, and the accounts of them in books and newspapers had nothing to do with their formation. The only changes which they had undergone were those natural ones which came from the desire of individuals to exaggerate their own importance. While such numbers of men who were personally present in them were alive, it would have been impossible to have introduced into this kind of oral history any number of mythical or legendary traditions affecting their general character, without the danger of certain refutation. I have taken this example, because it seems to me to present a strong parallel to the position of the Christian Church for the fifty years which followed the Resurrection.

But in proportion as those who were present in them have died off, the popular interest has become less vivid, and the knowledge of them less accurate. A general fading of them from the popular recollection has now taken place. A very inconsiderable number of persons are now alive who took part in any of them. To get accurate knowledge, it would now be necessary to institute careful inquiries of what men had heard from their fathers, and their grandfathers. Still a certain amount of accurate informa-

tion might be obtained from a careful sifting of different family traditions. Multitudes still survive who have heard from their fathers and their grandfathers accounts of the events, though the living interest in them is gone. That knowledge is still sufficiently accurate to render the introduction of a large mass of legendary matter impossible.

The Christian Church of the first century must have been in a still more favourable position to preserve a traditionary history of the life of its founder, than that which I have just considered. It alone, of all the corporate bodies which have ever existed, drew its life from a personal history. Destitute of a knowledge of this life, it must have lost all cohesion. The necessity of its position compelled its members to preserve a recollection of the actions attributed to Jesus Christ. They must have formed an essential portion of its organized instruction, for Christianity is founded on them. It possessed many of the essential characteristics of a close corporation. Such bodies have the means of handing down a knowledge of events, of which popular ones without organization are destitute. Nor was the transmission of them entirely oral; for we know that memoranda existed prior to the composition of the Gospels. The most far-going critics of the Sceptical school do not venture to assign to the synoptic Gospels a later date than from sixty-five to eighty years after the events which they record. This interval, as I have shown, lies within the limit of accurate historical recollection, and is one far too short for a story which excited the profoundest interest, to get buried beneath a mass of legendary inventions.

Let us now ascend a little higher. I have heard, when a boy, a minute description from one who was an actual witness of an event nearly a century old,—the appearance of the combined French and Spanish fleet off Plymouth, during the American War of Independence, and of the terror which it occasioned. Many persons must be still living who have heard similar accounts from their grandfathers. If I survive twenty-five years, an accurate description of an event 120 years old could be handed down by oral tradition; and this, under favourable circumstances, might be extended to 130 years. But how far does this tradition still live in the popular mind? The knowledge of the mere fact still remains; but that of its details is no longer the subject of popular recollection. Still the materials of history exist, supposing them to be properly used.

But the power of transmission is increased when events are commemorated by monuments; but even these are far from being necessary evidences of truth. Even here, after a lapse of time, legendary additions grow up around them, of which many remarkable instances might be adduced. In some cases,

when the occasion of the erection of a monument has been forgotten, a wholly legendary one has been invented. We are painfully aware that the presence of innumerable relics is no necessary voucher for the truth of the stories connected with them.

The account given by Philo and Josephus of the mode in which the Septuagint version was effected is a most striking instance of the imperfection of oral tradition as an accurate reporter of facts after a considerable lapse of time. A period of 280 years had sufficed to encrust an historical fact with such a mass of fictions, that it is now impossible to disentangle the facts from the fictions. One might have expected that the position of the Alexandrian Jews would have been favourable to the transmission of the knowledge of the precise circumstances connected with the formation of this version. But the story, as handed down by Philo and Josephus, not only contradicts the phenomena of the version itself, but the facts of history as known from other sources, and, I think, is believed by no critic at the present day. What is more remarkable is, that a certain number of huts were shown at Alexandria as memorials of the fiction.

III. I must now offer a few observations on that canon of historical criticism which summarily excludes all miraculous events from the region of history, and banishes them into that of mythology. To what extent is it valid? How far does the occurrence of miraculous events invalidate the whole context in which they occur? This is a question with which the historical inquirer cannot help grappling. Stories of the kind are scattered over the whole period from the mythic ages to the recent alleged miraculous events in France. During some portions of time such alleged occurrences are very rare; at others they abound.

It will be unnecessary for me to examine the validity of the principle enunciated by Hume. This has been most successfully handled in a work recently published by a former member of this Institute.* I shall only offer a few observations connected with the general question, which are suggested by common sense.

If all miraculous narratives are to be rejected simply on the ground that no testimony can establish them, because they form no portion of our previous experience, then it is evident that all extraordinary events, nay, that every event which has not been included in past experience, must share the same fate. It is impossible to lay down a line which shall accurately discriminate between events which are extraordinary and those which are miraculous. I am ready to admit that certain miraculous events belong to an order which, with our present knowledge,

* Warrington,—*Can I believe a Miracle?*

it is impossible to connect with any natural process. But these shade off by insensible stages into others, which have a close resemblance to extraordinary occurrences in nature. I feel, therefore, unable to dispute Butler's general position, that to a higher order of intelligences all supernatural occurrences may seem natural. It is unquestionable that extraordinary occurrences not unfrequently happen, which lie quite as much outside past experience as strictly supernatural events. Of these one mentioned by Mr. Warington, the production of ice within an inch of a most intense heat, is a striking illustration. Such an event would have been unquestionably pronounced incredible in past times. It is evident, therefore, that any canon of criticism which would render the whole class of extraordinary events and fresh experiences incredible, cannot be maintained, and would render all enlargement of our experience impossible.

Still, however, as a fact we do summarily reject the great mass of the supernatural events recorded in history, without troubling ourselves to inquire into the attestation on which they rest. We also all feel that the evidence which we should require to accept an extraordinary event, whether it be supernatural or natural, is far greater than that which we should require for an ordinary fact. Thus I should at once credit a person who told me that he had seen a man walk across London Bridge; but if one hundred persons were to assert that they had seen one walk across the Thames, I should receive the statement, if meant to be the assertion of a literal fact, with no inconsiderable incredulity.

Let us take a few instances of the manner in which we summarily reject miraculous stories, without inquiring into the degree of their attestation. Probably every one in the room has thus rejected the recent miracles in France, or has referred them to mental phenomena. I would not spend an hour to inquire into the alleged miracles of spiritualism (of course, I am aware that the spiritualist would not allow that they were miracles), except from a desire to expose a great delusion. Most of us treat with similar contempt the narratives of the great witch mania, though thousands of people were sentenced to death on evidence which satisfied both judges and juries. I cannot help treating in a similar manner the innumerable miraculous stories of the Middle Ages, though a few of them rest on an attestation on which I would believe an ordinary fact. To go to an earlier period. There can be no doubt that Livy's History of the Punic Wars is in the main historically true; yet, year by year, in the midst of his historical narratives, we have reports of a set of prodigies made to the

Senate, and accepted by that body of practical men as true ; at any rate they ordered them to be expiated at the public expense. Some of them may be explained by the action of natural causes, and the power of an excited imagination. Others cannot be referred to these, as, for instance, when the Senate repeatedly accepted as a fact, that a cow had brought forth a lamb. It seems to me that it would be unjust to assume that every member of the Roman Senate was a knave, when he professed to accept such stories as true, although it is unquestionable that the Roman religion was repeatedly worked for State purposes, just as it would be equally so to make a similar charge against Bishop Jewell and other eminent men, for accepting the stories of witchcraft. Yet there is not a person in this room who would hesitate to reject such a fact as untrue, without troubling himself to inquire into the evidence on which it is alleged to rest. One thing respecting all such stories is certain. Not one of them was ever pretended to have been brought to attest a revelation, and they all belong to a belief in occult and magical powers in nature. Another class of prodigies was of frequent occurrence in the ancient world ; and I think was not unknown in the Middle Ages ; as, for instance, the sudden bursting of a brazen statue of a god into a profuse perspiration. Such an event may possibly be explained by peculiar atmospherical phenomena ; but to the general fact that brazen statues can burst into perspirations, every one of us will refuse to give credence, even when reported to us as supernatural events. I feel justified in rejecting in an equally summary manner the whole of the miraculous stories attributed to St. Anthony, and the monkish miracles. Nor does even the assertion of St. Bernard that he performed miracles enable me to accept the fact that he really did so.

Is there any rational principle which we can establish for thus dealing with historical testimony, or are we in such matters to submit to the sole guidance of caprice ? Why do I refuse to accept as a fact that a cow brought forth a lamb, although such an event has been substantiated by numerous decrees of the Roman Senate, and without hesitation accept as true an event of a very extraordinary character resting on the same authority, that the consul Varro, whose recklessness occasioned the terrific and all but fatal defeat at Cannæ, instead of being executed, or even censured, received public thanks for not having despaired of the safety of the republic ? This latter event was as contrary to prior experience as that a cow should bring forth a lamb.

The following considerations will help us to the solution of this difficulty. From whatever cause it may occur, mankind are firm believers in the permanence of the natural order of

events. This I believe to be strictly true, even in times when the legendary spirit is most widely prevalent, notwithstanding the assertions of the critics of the Gospels, that there were times when the belief that there is a permanent order of nature did not exist. There never was a time when men went to bed with the expectation that they might possibly see the sun rise tomorrow in the west. But the visible order of nature is the order of phenomena, and nothing else; and while men contemplate events as phenomena, and nothing more, it is impossible to believe in supernatural occurrences. The possibility of a supernatural occurrence depends on our belief as to whether there be a supernatural being. If the mind accepts his existence, the whole question is dependent on two considerations, whether it is in accordance with the known character of the supernatural being, to have caused such an event, and the existence of adequate testimony that he has done so. A supernatural being must have a character, and his actions can only be in conformity with that character. Whenever, therefore, I read of a supernatural event which contradicts my conceptions of the Divine character, I at once reject it, and assume that it is either a misrepresented natural phenomenon or a fiction. According to my own conception of that character, I apprehend that all interferences with the existing order of nature must be of a very rare occurrence, as if it were otherwise, it would nullify the purposes of the Divine government. Others, who have different views of this subject, are capable of admitting as true events which I cannot. We act precisely in the same manner in the common events of life. If a person were to come into this room, and assert that five hours ago he had seen our worthy chairman exhibiting Punch and Judy in the Strand, we should refuse to believe him; but if he affirmed that he had simply seen him walking there, we should give the fullest credit to the assertion. The question of the agreement of alleged facts with the character of the agent is an important portion of the evidence on which we accept them as true. I cannot believe that the Governor of the Universe ever caused a cow to bring forth a lamb, under the circumstances recorded by Livy; but I can accept as a fact that Varro was thanked after the battle of Cannæ, because it was in conformity with the general character of the Roman people. If, however, such an event had been reported of a community of Negroes, the individuals comprising which had recently been slaves, I should pronounce it a myth.

No self-acting rule can be laid down on this subject. Each man's belief in the reality of a supernatural event must vary with his opinions of the character of God. It must never be forgotten that it is not a question of what God can do, but of

what He will do, and what His character leads Him to do. This seems like a truism; but the consequences of the practical disregard of the caution are lamentable, and it is one which is frequently disregarded by persons who attempt to defend revelation. We reject the great mass of supernatural occurrences with which certain portions of history are flooded, because, in the great majority of cases, they have no adequate attestation; but where the evidence for them is as strong as that on which we would accept an ordinary event, we reject them from their repugnance to the Divine character, or because they were not performed for the purpose of attesting a divine commission. In one word, we do not believe that God will work miracles of this description. It is on these grounds that I feel myself compelled to reject the alleged miracle at the conversion of Constantine, which is one of the best attested of this kind. It seems to me that the miracle in question is contrary to the character of Him who wrought the miracles in the Gospels; and that it is possible, without accusing either Eusebius or Constantine of deliberate falsehood, to explain it on the principle of peculiar physical phenomena acting on a highly excited state of the imagination.

The above considerations render it evident that the presence of a single mythological or a miraculous story does not justify us in rejecting the entire context in which it occurs. Some of them can be accounted for by mistakes as to physical phenomena; a still larger number can be referred to mental causes. Yet their presence unquestionably shakes our confidence in the judgment of the person who reports them. When, however, they occur in large numbers, the case is different. They naturally produce great suspicion of the truth of the facts with which they are connected. In prehistoric ages they are the result of the play of poetic imagination. Still, however, it is impossible to lay down a general rule which will render unnecessary careful rational inquiry as to the degree in which the presence of a mythic element invalidates a fact otherwise credible.

IV. I cannot conclude this paper without offering a few remarks on literary forgeries, and the rules of criticism applied to them. In this department of criticism conjecture has been invoked to a degree which no rational principles will justify. It frequently happens that writers who have a particular theory to maintain, pronounce a book or a passage to be a forgery, or assert that an author has misrepresented a fact, for no other reason than that it opposes their own views; and then seek for a number of reasons to render the assertion plausible. Thus, because the facts referred to in Pliny's letter to Trajan, and in Tacitus's description of the Neronian persecution, are not agreeable

to certain persons, the charge of forgery has been insinuated against the letter of Pliny, and Tacitus has been charged with having ignorantly applied to the Christians what was true only of the Jews. A similar process has been applied to several other important documents connected with early Christian history.

It is unquestionable that the practice of forging writings in the names of men of high reputation was very common in ancient times, and opinion seems to have attached but little criminality to the act. Of this the vast number of forged works known to have been once in existence is sufficient evidence. Whether our morality in connection with this subject be improved in modern times may be difficult to determine, because the probability of detection, which in the ancient world was small, in the modern world is great. I have often been disposed to question whether all these forgeries were put forth with the express purposes of deception. Perhaps some of them might have resembled many classes of modern fictitious writings, and the knowledge that the writer composed it as a fiction has perished. Still, however, many of these writings must have been composed with the direct purpose of deception. We may judge of the hardihood with which it was practised from the fact that St. Paul thought it necessary to take precautions against letters being forged in his name in his lifetime. Let it be observed that this habit was far from being confined to matters connected with religion.

Happily, however, the forgers of the ancient world were great bunglers in their art. They set all matters of history and probability at defiance. They freely put opinions into the mouths of authors which were only broached long after they were dead. Their powers of throwing themselves into the feelings and ideas of past times were of the meanest possible kind. They had not among them a single Daniel Defoe. Not one of them has succeeded in effectually personating a character. To speak generally, a small amount of critical acumen is all that is necessary to detect a large number of the forgeries of the ancient world. This consideration is sufficient to prove that the off-hand manner of pronouncing this or that work spurious because forgeries were common, is one which is entirely unwarrantable. It is hardly possible to find a forged work attributed to a known author which contains a successful imitation of his style. I need hardly say that there are certain indications of truthfulness derived from minute acquaintance with facts, customs, localities, and opinions which the most successful writer of modern fiction would be unable successfully to imitate.

It is an important question how far from differences of style we are entitled to infer differences of authorship. The style of

many persons presents as wide a difference as their faces; and the assertion is generally true that a man's mental characteristics, if he has any, display themselves in his style. Thus it is impossible to mistake between Johnson and Macaulay, Hume and Gibbon, Plato and Aristotle, Cicero and Demosthenes; and we are safe in pronouncing that the minds which produced the one set of writings could not have produced the other. The style of the sacred writers is no less widely distinguished from that of their contemporaries and successors, and from one another. The imitation of St. Paul's style would, I think, have been impossible; and we may assert with the strongest confidence that those who composed the spurious gospels could not have composed the canonical ones. Writers of distinctive individuality can hardly fail to impress that individuality on their pages; and it is hardly possible for a man of a different order of mind to imitate it. It seems to me unquestionable that such divergencies of style prove differences of authorship.

But large numbers of modern critics carry this principle beyond all legitimate bounds in inferring from minute differences of style differences of authorship. It is a certain fact that authors do not conceive at all times alike, and that within certain limits their mode of writing varies, not only in conformity with the subject-matter of their compositions, but with the different periods of their life. Criticism founded on minute points of style is of very little value except when supported by strong external evidence.

I have noticed this subject because it is one on which modern criticism exercises the most unlimited license with respect to the Sacred writings. Different portions of them are boldly pronounced spurious on account of minute differences of style. Of this the last edition of Dr. Davidson's *Introduction to the New Testament* forms the most striking illustration. Admitting, as he does, that the external testimony that the fourth Gospel and the first epistle by St. John were composed by the same author is exceedingly strong, he boldly denies that the epistle was composed by the author of the gospel, on the ground of certain minute differences of style which it requires critical eyes of a high magnifying power even to perceive. This species of criticism can, however, be brought to a test of direct verification, and when thus tested it utterly fails. Let books which have been indubitably written by the same author be subjected to the same process, and far greater divergencies will be found in them. No difference of style, therefore, will avail to prove difference of authorship which is not capable of undergoing this test. What is compatible with sameness in the one case cannot be incompatible with it in the other.

The length of this paper now requires me to bring it to a close. The whole subject consists of a number of very minute particulars, and extends over an extremely wide field. It is therefore impossible to treat it with strict scientific accuracy in a short paper. My object has been to bring before you a few important principles which are of the highest importance with respect to historic truth in general, and to revelation in particular. I have found it wholly impossible in the limits assigned to me to treat them in an exhaustive manner. Criticism will only rest on a solid foundation as long as it applies to history the same principles as those which we daily apply to common life. All historical evidence rests on the same foundation. A principle which I would refuse to act on as my guide in life I am fully entitled to reject as a guide in history. What in the one case conducts to practical truth will conduct to the same result in the other.

The CHAIRMAN.—I think it speaks well for the interest taken in this Institute, when, considering the state of the weather, we see so large an attendance; but I am sure we are amply repaid, and shall unanimously accord a vote of thanks to Mr. Row. It is now open for any one to offer remarks upon the paper.

Rev. G. CURREY, D.D.—The paper which has been read, embraces so large a number of topics, that it is not possible to attempt to discuss them all. I would, however, observe that there seem to be three subjects which are quite distinct,—so distinct, indeed, that one almost regrets their being treated together in the same paper. These three subjects are, first, the nature of the evidence required for common historical facts; secondly, of the acceptance of miracles on such evidence; and, thirdly, the detection of forged documents. I will make a few remarks upon these various points in the inverse order. First, referring to the method of detecting forged documents by an examination into their style. There can be but little doubt that differences of style form fair subjects for examination, and that we may properly draw conclusions from them with regard to authorship. On the other hand, this may also be said, that such work has sometimes been recklessly and carelessly done, and persons have arrived at hasty conclusions, which they have too readily assumed to be facts. One point may be specially noticed with regard to those documents with which we are most nearly concerned, namely, those which relate to the revelation of our religion,—and I think Mr. Row will agree with me here—that it is not safe to rely mainly upon the internal style, although it is often a valuable corroboration of external evidence. We base our acceptance of the documents upon external evidence, furnished by the careful consideration and adoption of documents by those early assemblies and councils which considered the subject at a time when they were able to collect together the traditions of past ages; and thus, in accepting such documents as the work

of the persons to whom they are ascribed, we are accepting the testimony which has been recorded in early ages, but which was only recorded then as being the result of still earlier information and tradition. In that way any one who examines the documents must approach that examination with regard to the corroboration of evidence, and not as seeking the evidence in the documents themselves. Indeed, it seems to me that the great cause why many critics have gone wrong is, their thinking that they had to consider whether a book was or was not the work of a particular author, from the examination of its internal evidence simply, without considering what has been declared by the voice of the Church through the aid of traditional history. They take up a document with what they profess to be pure indifference, although they often are, in fact, warped by a desire to find out that it is to be ascribed to some other than the reputed author. They rely entirely upon the small indications which they are able to glean from a writer's style ; and naturally, when people give their close attention to style, they are apt to exaggerate the importance of the arguments founded upon it, and so are led astray. The great point is, that these subjects have been carefully examined in times when there were many means of coming to a correct conclusion, and we are bound not to reject the information which then existed and which was thus made available. This is entirely in agreement with Mr. Row's view. With regard to the next point, the question of miracles, there is a great deal in this paper with which we must all agree. In the earlier part of Mr. Row's remarks on the subject of miracles, there was a parallelism drawn between extraordinary and miraculous events, and that parallelism was based on an incidental remark of Bishop Butler's, in his Analogy, in which he passingly compares miracles to such extraordinary occurrences as comets and the like, they not being so well understood then as they are now. I have always myself thought that this illustration of Bishop Butler's was not a happy one. It appears that anything like a comparison between an extraordinary and a miraculous occurrence fails altogether ; the two things are entirely different. If we proved that anything which we now call a miracle were capable of being reduced to some general law with which men were not acquainted at the time of its occurrence, directly it comes under that general law it ceases to be a miracle altogether. It is of the essence of a miracle that it should be the interruption of some general law. I think, therefore, that any comparison whatever on this point fails altogether, because, so far from making a miracle appear credible as a miracle, it rather detracts from the peculiar authority with which we wish to invest it. The consideration of a miracle seems to me to rest simply upon this ground : Is the order of nature due to the effective will of a personal God, who wonderfully upholds and superintends the same ? If a personal God superintends and upholds the law of nature, there can be no *à priori* difficulty in supposing that the same God who ordained the law should at certain times suspend it ; and if we once arrive at that, it follows that a belief in miracles is only a necessary, natural consequence of a belief in the existence of a personal God. When once we accept that, we not only have

no difficulty in believing in a miracle, but such a belief is most in accordance with our belief in a personal God. Hence we have only to consider what end miracles are intended to serve, and our moral nature and reason easily recognize the fact that there have been certain purposes for which it is in accordance with our belief in a personal God that He should have interrupted the order and course of nature. This seems to me to lay aside altogether the supposed resemblance between extraordinary occurrences and miracles. As to the other point on which the main purpose of the paper rests, namely, the consideration of the nature of historical evidence, and the province of the historian, I must fairly say that I differ from Mr. Row, if I rightly apprehend his arguments. In fact, I think that the views enunciated in this part of the paper leave us in a most hopeless condition; for if we lay aside altogether the use of conjecture and hypothesis, we lay aside the noblest province of the historian. It is true that history is not a mathematical science, and we have not the same means of verification that we have in such a science. But it seems to me to be the duty of the historian, as well as of the mathematician, to make use of hypothesis, in order to bring together isolated phenomena or isolated facts under one general theory. Work of that description, as illustrated in the department of history, is particularly exemplified in the case of the great historian whose labours have recently been undervalued by some authors, and, among others, by the author of this paper—I refer to Niebuhr. When Niebuhr first began to write his history, he was vehemently assailed for believing too little, but, of late years, the attack has been directed against him on the ground that he believed too much, and those things which he accepted as facts and truths, he has been assailed for accepting at all; and it has been said that many, if not most of the supposed facts which he has picked out from legendary history, are of no value at all. Some indeed go so far as to maintain that hypothesis itself is not within the province of the historian. But this would destroy one of the great charms of the study of history. It is true that a hypothesis may be wrong, and that Niebuhr may have made mistakes; but it does not follow that the method is wrong, and that his labours were in vain. Because he made some mistakes, it does not follow that he had not a great work to perform, and that he did not perform it. Let us consider what he did. In striking out that noble hypothesis with regard to the Roman Constitution, which runs through his whole work, he has thrown altogether a new light on the history of the Roman Commonwealth, though probably, in his ardour for that hypothesis, he may have laid stress on small matters, and unduly pressed them to support his theory and plan. Some of the details may be shown to be errors; but is his great hypothesis an error?—that hypothesis according to which he demonstrated the relations of the commonalty of Rome to the Patrician houses—a perfectly new idea, that still remains as a possession for future historians and students: Niebuhr's main points are, I think, established beyond doubt, but, of course, it is possible for a man to rise up and put forward another hypothesis; and when that is done we must examine it, and see which is most likely to be true. Even in science, and in the present

day, there are persons who have advanced a hypothesis, which they say is superior to the Newtonian theory. It does not follow, however, that the Newtonian theory is false. It is said that there are no verifications in the case of history, as there are in the case of science. It is true, as I remarked before, that there are not "the same exact means of verification," but still there are verifications of no inconsiderable weight with regard to history. Is not Niebuhr's system a system full of verifications? All through his works you find him labouring on the same plan, bringing this fact and that fact together, and showing how they bear upon his theory, and then he says: "This is my hypothesis. See how thoroughly the facts support it. It falls in with this fact, solves that difficulty, and so on." In much the same way Newton struck out the theory of gravitation. It flashed across him suddenly, as these things do, but before he propounded it to the world he tried it on this planet and on that planet, by this observation and that, and then he said: "See how all these observations concur and bear out the theory." The same thing, therefore, goes on in the same way in both cases, though there is this difference, that the province of history is less exact than that of science. Niebuhr followed this method with regard to the whole construction of the Roman Commonwealth and the growth of the Roman constitution, and then his learning enabled him to bring in a vast series of facts, observations, and events, all of which, by means of his hypothesis, he made to work harmoniously together. If we do not allow the historian the use of hypothesis in examining ancient history, or even in examining modern history,—because even that must be constructed upon some hypothesis or other—if we do not allow the use of hypothesis, I ask, what does history become?—a mere chronicle of bare facts, which is really useless until it is moulded into form and life by the historian, who makes it not a mere chronology, but a history. That is my view of history, and it seems to differ from that of Mr. Row. With regard to the consideration as to what period of time may be necessary for the details of a particular story to be lost or to become inexact, I do not think it is necessary to go into that question. We know that, in regard to most events, great differences and inaccuracies arise in a very short time, but does that really matter? History is concerned, not with small details, but with great facts. It does not signify what was the precise number of the army of Xerxes—that is a matter of the smallest moment, and so is the number of guns that were fired at the battle of Navarino; but there still remains the substratum of the great events, and of the causes which led to those events, and the examination of those causes, and their connection with future events, is perfectly within the province of the historian at a long distance of time afterwards, and he is enabled to carry on his investigation with as much accuracy, and sometimes with even more accuracy, than if he had lived at a time nearer to the occurrence of the events themselves. At a distance of time he has before him the actions of nations and peoples, and their laws and constitutions, and various other things which enable him to compare one thing with another in a better way, and to have a larger field of comparison; and in that way he is more capable of judging motives and actions than a man who lived

nearer, in point of time, to the events which have to be investigated. This, then, is the province of the historian, to trace causes and feelings and motives; and if he be man of genius, he may be able to do so correctly. It is not because it is difficult to do it correctly, that therefore he must abandon the attempt altogether. This question of the province of the historian seems to me to be very important with regard to our understanding the nature of past events. In the present day some people are too apt to reduce history to a mere string of dates, which would make it a very barren study of little importance. After all, the person who is able to form a great hypothesis, and to show a great principle running through the history which he presents to us, not only interests us much more than one who does not proceed in this way, but he probably does us much more good. There may be a good deal of error mixed up with his hypothesis, but at the same time he seizes great facts and principles, and feelings, and these principles and feelings recur over and over again. It has often been said that history repeats itself. No doubt it is difficult to compare the acts and laws of nations; but still they are capable of comparison, and when compared, there is to be found a certain amount of uniformity among them, which gives room for analogy. It is by the use of analogy that the great historian is enabled to seize, and, as Niebuhr has said, to divine and see through actions and details which, to the less endowed mind, might appear dry and barren. Let me now say a word with regard to a great work which has been treated somewhat summarily by Mr. Row—I mean Ewald's *History of Israel*. I allow that the term "audacity" is not by any means too strong to apply to Ewald, a man who is most reckless in his conjectures, and who is constantly setting aside the miraculous, and reducing everything to natural causes. All this is perfectly true; but when we look into that work, and pass over to other parts of it, where we have more in common with the author, we see how great a contribution it is, not only to the literary world, but also to the man who studies Scripture, and wishes to understand its meaning. Why is this? Because Ewald has seized upon certain events, and has connected them together by hypotheses. In some cases the hypothesis is rash and unsustained, but in many it appears to be true; and it is the existence of such hypotheses, where they are true, which gives interest to the work, and throws a new light on different facts which otherwise might appear to be unconnected. We know very well that Ewald dealt with the question of the authorship of Deuteronomy in a very reckless manner; but if we pass from that, and look at those portions of his book in which he comes to that period of history about which we really have a better understanding, and more to guide us,—I mean the latter part of the history of the Kings of Israel and Judah,—any one who reads this portion of Ewald's work will allow that he has thrown a marvellous light on the Scripture history, not only in reference to the political circumstances of the people, but also to the progress of religious feeling; especially has he shown the growth of the longing for the Messiah, which became stronger and stronger among the Jews at the time when they were about to be separated from their native land, and when, on a foreign soil, they looked back with

regret to what was past, and in that way had awakened in them the thought and hope of better and higher things. No doubt it is true that Ewald in a very large measure regards this feeling as of natural growth, but at the same time it is perfectly true that God works by natural feelings and causes; and although I fully believe that in that growth of the desire and hope for the Messianic kingdom, there was the direct operation and guidance of the Spirit of God acting upon the people, especially through the prophets; yet at the same time I believe that God was pleased to act upon His people not only by the prophetic voice, but also by the whole government and dispensation to which they were subjected. Not only did the voices of Isaiah, Jeremiah, and Ezekiel awake a sense of expectation of the coming Messiah in the people; not only did those voices keep alive the hope in their breasts, but every circumstance in the natural life of the people was so ordered by God as to lead up to the same end, just in the same way that their marvellous dispersion throughout the whole world enabled them to be missionaries and messengers to spread a knowledge of the true God, and prepare the way for the advent of Christ. In that dispersion, which, as commonly viewed, seems to be simply a punishment for their sins, we see God's providence working for the diffusion of a particular knowledge throughout the world; and so, in the other instance, we see how their circumstances and government, their intercourse with foreign nations, and so on, were all directing their hopes and thoughts towards a Messiah. Thus, a great historian like Ewald seizes upon the facts before him in a simple narrative form, and shows how he can connect them together by means of a hypothesis. We see how he works in the true province of the historian and throws light upon his subject we see how he shows that all those points, which we formerly regarded as a mere summary of facts, have, to a person who reads them aright, a bearing, a purpose, and a moral, which they do not possess for any one less informed. Such is the service which Ewald has rendered to the study of the history of Scripture, and for that I think every student should be deeply grateful. But I mention this merely as an illustration of what I wish specially to maintain, that so far from its being beyond the province of the historian to bridge over gaps, and bring together isolated facts, by means of hypothesis and conjecture, it is, in my opinion, essentially within his province so to do. He may do it ill or well—it is a difficult work, in which many a man will fail, but not on that account is it less the right method to pursue. It is the true way by which alone we can derive real benefit from the study of ancient records and legends. It is just as much the business of the historian thus to connect together isolated facts, as it is the business of the jeweller to take up pearls and string them together so as to produce a graceful ornament. (Cheers.)

Rev. J. H. TITCOMB.—I am sure we have all heard with very great pleasure what has fallen from Dr. Currey, and are glad to welcome him as a new member and speaker in this Institute, the meetings of which we trust he will often adorn. But I feel that, in a friendly way, I must defend this paper from some of the remarks which Dr. Currey has made. If he will allow me

to say so, it strikes me that Dr. Currey is far more in accord with Mr. Row than he himself imagines. Mr. Row, as I conceive, does not object *in toto* to a reasonable amount of conjecture.

Mr. Row.—I have expressly said so.

Mr. TITCOMB.—What Mr. Row objects to is that excessive amount of conjecture which hardly belongs to the regions of truth. Then, if I caught Dr. Currey's observations aright, it strikes me that he has to some extent substituted the genius of interpretation for the genius of conjecture—the defence he has taken up is rather the defence of the genius of interpretation than the defence of the genius of conjecture. For example, in reference to Ewald's celebrated book, the remarks which Dr. Currey made about the feelings which the author of that work gives expression to,—however brilliant, however truthful, however full of genius,—seem to belong not to the genius of conjecture, but to the genius of interpretation, and I take it that that is the function of the historian in the most prominent degree. But that, unfortunately, was not the function of Niebuhr; his was, first, the destructive principle, and then the constructive, based upon conjecture and not upon interpretation. Then I think Dr. Currey was scarcely fair to Mr. Row in reference to the comparison drawn between extraordinary facts and miracles. If Dr. Currey will look at the third division of the paper, he will see that no such comparison is really instituted; Mr. Row simply goes upon this basis, that Hume, having said that no amount of evidence would justify a belief in a miracle because it was too extraordinary, such a course would lead to the rejection of any extraordinary fact hitherto unknown, for it would be utterly incredible, simply because, not having been seen before, it could not be credited. Mr. Row then goes on to show, in answer to Hume, that extraordinary facts, such as the one mentioned in Mr. Warrington's book, with reference to the formation of ice near the most intense heat, upset Hume's reasoning, inasmuch as their truth can be clearly proved, notwithstanding that they are entirely outside all previous experience. That is not a comparison instituted between extraordinary facts and miracles, as if they were parallel, but the observations are introductory to a more general and philosophic consideration of the miraculous element in history. But though I have thus far defended Mr. Row, I must venture to qualify my remarks by differing strongly from what he says three pages further on :—

“Whenever, therefore, I read of a supernatural event which contradicts my conceptions of the Divine character, I at once reject it, and assume that it is either a misrepresented natural phenomenon or a fiction. According to my own conception of that character, I apprehend that all interferences with the existing order of nature must be of a very rare occurrence, as, if it were otherwise, it would nullify the purposes of the Divine government.

* * * * *

“We reject the great mass of supernatural occurrences with which certain portions of history are flooded, because, in the great majority of cases, they have no adequate attestation; but where the evidence for them is as strong

as that on which we would accept an ordinary event, we reject them from their repugnance to the Divine character, or because they were not performed for the purpose of attesting a Divine commission."

Now it seems to me much more wise, and much more rational, and much more safe ground, at all events, for the Christian to take up, to say, "I shall not believe in any event as of a miraculous nature, because it is not given to attest a Divine revelation," than it would be to say, "I will not believe it, because it does not square with my conceptions of the Divine character." In the latter case, you merely reduce the evidence of a miracle to your own subjective feelings, and your own self-consciousness, and one man may greatly differ from another in that respect. In reducing it in that way to natural subjective feelings and self-consciousness, you remove it in a great degree from that sacred ground of belief on which it is desirable that it should rest. The only safe ground to go upon is that all miracles are antecedently incredible, unless they are sent by a Divine Creator, to attest a Divine revelation. That takes from the region of history all absurd so-called miracles; and it is upon that ground that I should reject the miracle of Constantine and the Popish miracles, like those that are alleged to have occurred in France lately. All miracles that do not come as the attestation of a Divine revelation, I take to be without any *locus standi*. And now let me say one or two words on the last part of the paper, where we have a criticism upon the forgery of documents. Some remarks are there made by Mr. Row on the authorship of the Gospel of St. John as compared with St. John's first epistle, and the difference in the style of the two works. Let me add a remark in relation to St. John's Gospel as placed side by side with the Revelations of St. John. The divergences between those two works are much greater than the divergences between the Gospel and the Epistle; in fact, the Epistle stands as intermediate in style between the other two, the Book of Revelations being rugged and full of Hebraisms, and quite distinct from the more polished Greek of the Gospel. It is upon this that the modern school of critics say that internal evidence shows the two works could not have been written by the same author, and that the Revelations are St. John's genuine work, and the Gospel a forgery. How are we to answer that? The author of the paper and Dr. Currey very properly say that the mere question of internal evidence is not enough, and that we must look to external facts to throw light upon the style. Now there is one external fact which, I think, will clearly explain the whole thing. St. John, to whom Greek was not a native language, when living at Patmos, wrote in Greek; and naturally there were at first archaisms and Hebraisms in his style, when writing in a tongue not his own, just as the style in our writing would be very indifferent indeed if we wrote in French. But after a time—the Gospel being a very much later composition—St. John became more familiar with Greek, and obtained that knowledge of the language which any one will get by experience in a country; and thus he was enabled to write the Gospel in much purer Greek. This is an explanation of the variety in style which allows the two documents to proceed from the

same pen. I wish Mr. Row had had time enough to make a few remarks upon another branch of the subject,—I mean the question of the criticism of history, in relation to discrepancies, because that is a very important point. We know there are many apparent discrepancies in Scripture ; and how far any rational kind of criticism would make the book historical, although it seems to some to contain discrepancies, would form in itself very interesting matter for a paper. There always are discrepancies, more or less, in contemporary accounts. During the late war, for instance, the correspondents of the *Standard* and of the *Daily News* sent very different accounts of what took place, according to the side from which they wrote. Both accounts were, no doubt, in the main correct ; but there were discrepancies, although those discrepancies did not make the accounts unhistorical. In conclusion, I may, perhaps, be allowed to express my strong conviction that Mr. Row's paper is a very valuable contribution to our proceedings. (Cheers.)

Mr. I. T. PRITCHARD.—I must say that I agree with what Mr. Titcomb has said with reference to Dr. Currey's remarks on the province of the historian. If I understand Mr. Row rightly, he intends to find fault with, or to throw doubt upon, statements which historians have recorded, and to show us how careful we ought to be in accepting them as facts ; and that we ought not to receive them unless they are supported by good authority and by collateral testimony. Now, I will mention two illustrations of this view. Take, for instance, the question of biographical as distinguished from political history—I mean that portion of history which deals with the lives of great men. A discussion took place only a year or two ago, upon certain incidents connected with Lord Byron's life, and it was very instructive from one point of view. Here was a case in which a man had moved in society, and was very well known, and certain facts had taken place within the cognizance of a number of people living at the time of the discussion ; and yet, as that discussion went on, no single fact was brought forward which was not contradicted by some person who had very good grounds upon which to form an opinion. This was a case in which a prominent man had passed from society, almost within our own recollection, and yet it was impossible to get at the truth relating to his life. With such a case before us, how can we trust to any historian for obtaining a correct view of such a man as Henry VIII. or any one of earlier date ? As to the statements of historians with reference to such events as the number of men slain in a particular battle, and matters of that kind, I should like to offer another illustration within my own experience, which brought to my mind the same idea which Mr. Row has expressed. It was an incident that happened to me in one of our great Indian battles during the recent wars. We all know how apt reports are to magnify the numbers of those who are killed in battle, and on one occasion—at the battle of Goojerat, which broke down the military power of the Sikh nation, and laid the Punjaub at our feet,—it was my fortune to be present. The battle went on from early morning to midday, and it was magnificently conducted. Towards the afternoon we got into the enemy's camp, which was then deserted, and in the evening we

pitched our own camp on that ground. It was commonly said amongst us that thousands of the enemy had been killed ; and in discussing the matter with my brother-officers I mentioned my disbelief in such an enormous slaughter ; for I had passed over the field, and was altogether incredulous. I agreed to go out next morning with a brother-officer, to count the bodies of the killed, in order to ascertain the strict truth. Accordingly, we set out, and rode over the whole field, as far as we could tell ; over all those places where the hardest fighting had taken place and the greatest slaughter. We carefully counted every dead body belonging to the enemy, and there were not more than 250 of them. After that I was much impressed with the necessity of receiving with the utmost caution the statements of history as to the number of men killed in battle. I have only one other remark to make, and that is with reference to historical criticism as applied to the Holy Scriptures. I may not, perhaps, echo the views of any of those here present, but I will state my own belief. With regard to miracles and the question of extraordinary phenomena, I adopt most heartily the remarks of Mr. Titcomb, which appear to me to bear out the line of argument contained in that excellent book of Mr. Warrington's. But I do not believe that any historical criticism whatever will convince a human being of the truth of the Scriptures. I believe that spiritual things are only to be spiritually discerned, and that they are not to be discerned by means of historical criticism. You may bring all your knowledge of science, and of language, to illustrate the meaning of Scripture, but it will not convince a man of the truth of Scripture if he be not otherwise convinced. The only thing that will convince a man of that truth is the operation of the Spirit of God, which is only to be gained by prayer. (Cheers.)

Mr. J. ALLEN.—I should like to ask this question : If the Scriptures reveal to us an evil spirit, who has wrought miracles, and shown signs and wonders, to deceive if possible even the elect, and if the Scriptures also show us cases of witchcraft, should we reject as miraculous all seemingly miraculous events which we know cannot proceed from God ?

Mr. H. CADMAN JONES.—To my mind it is hardly putting the matter on a perfectly satisfactory ground, to say that a miracle is to be believed in only when it is worked to attest a Divine commission. The question is purely a question of evidence—is there evidence enough on which to believe it ? No doubt a person who believes in a God, and who believes that it is consistent with His character that He should send a revelation, will have little difficulty in believing that He should send a miracle in order to authenticate His message to man, that being the only conceivable means by which the Divine message can be authenticated ; for although the internal evidence of a divine mission is the strongest of all, to those who feel it, and those who have once received revelation, and who have seen how worthy it is of God, have but little need of external evidence ; still you can give no answer to those who ask for a reason for their belief, unless you can appeal to some external evidence. Less evidence, therefore, would be required in such a case, as to an alleged miracle of such a nature that it could not be regarded

as the work of a Divine power to attest a divine mission, I should say, that it would be no conclusive reason for disbelieving it, that we could not say it was wrought by some beneficent power. It is clear that there have been miracles wrought by Satanic agency; and if there is sufficient evidence to authenticate a miracle, we must believe it in the same way that we believe anything else which is attested by sufficient evidence, however improbable *à priori* it may be. Improbability is no sufficient ground for disbelieving a thing. If we say it is, we must hold that the man who had lived all his life in the East was right when he regarded the European as an impostor because he declared that he had walked across a lake which had become solid. We can easily conceive that no miracle would be more difficult of reception than that, to a man living in the tropics, who had never before heard of ice. Yet in that case we know that the man who disbelieved was wrong. It is a familiar fact to us that water does freeze; and therefore, however improbable the thing might appear to him, we know the Oriental was quite wrong in refusing belief on account of its antecedent improbability. As, however extraordinary a thing may be, we must believe it if attested by sufficient evidence; therefore, the most malevolent miracle, which could not possibly have been worked by divine power, is to be credited if it be supported by sufficient evidence. The question is one of evidence, and nothing else; but before we can say that religion is to be believed if it is attested by miracles, there comes in the question, "What is the nature of the message which the person who worked the miracle brings?" I should by no means say that a religion attested by the most numerous and remarkable miracles was to be accepted as from above, if it were one which was totally unworthy of the character of the Supreme Creator. We cannot pronounce it impossible that the devil might work miracles to attest a revelation, to lead man to misery and destruction. Whether miracles come from above or below, they must be judged by the character of the message which they are given to authenticate; and whether they have come from below or above, the fact as to whether they have taken place or not must be judged by the ordinary rules of evidence which we apply to anything else. Their miraculous nature shows, not that they were worked by a divine power, but only that they were worked by a supernatural power, and what that power is must be judged of from the nature of the message which the worker brings.

Rev. J. W. BUCKLEY.—I quite agree with the last speaker, that we must judge these matters by the ordinary rules of evidence; but would he be kind enough to point out where Satanic agency has ever wrought a miracle? Our Saviour speaks of "false Christs," who "shall show great signs and wonders; inasmuch that, if it were possible, they shall deceive the very elect;" and St. Paul writes of one "whose coming is after the working of Satan, with all power and signs and lying wonders." But these texts seem actually to go to this very fact, that such things as Mr. Row refers to are not true miracles.

Mr. JONES.—The magicians of Pharaoh's time did the same things as Moses.

Mr. BUCKLEY.—There is no clear proof that that was a miracle at all on their part.

Mr. R. W. DIBDEN.—There is the witch of Endor.

Mr. BUCKLEY.—I cannot see—and I speak with great reverence—that God did not Himself permit that. There are a great many difficulties connected with the question; but I cannot find any distinct and clear evidence of the devil having wrought an undoubted miracle, such as, in our idea, would be an interference with the ordinary laws of nature. I cannot find anything that the devil has ever done which comes up to my conception of a distinct miracle.*

Rev. T. M. GORMAN.—I am much surprised at the criticism which Mr. Buckley has uttered with regard to the witch of Endor. Let us consider what were the chief points in relation to that event. Saul was commanded under pain of death not to consult the witch; but when the Lord did not answer him, he did so. Is it possible for any one to believe that God would cause Samuel, His prophet, to present a being from the other world to break the Lord's own command? That would be aiding in the breaking of His own command. The witch, by enchantments well known and constantly exercised in those days, did cause a spirit to rise, and that touches the whole question with regard to the working of miracles.

Mr. Row.—I have not very much to say in reply to the discussion which has taken place to-night. My object in writing this paper was to carry out a suggestion made by Dr. Thornton, that there was one subject upon which we had never touched, but which seriously affected the interests of Christianity; I mean the question of historical criticism: consequently I wrote this paper, which goes over a wide space, but which of course cannot be supposed to treat the subject completely or exhaustively. The whole of the paper has been written in view of many of the attacks made upon Christianity. I have not mentioned them, because I wanted to produce a philosophical paper; but any person who is well acquainted with modern controversies, will see that there is hardly any portion of the paper which has not a distinct bearing upon them. As to what has fallen from Dr. Currey, I think he supposes that we are more at issue than is really the case. In fact, he has mistaken the passage in Butler to which I alluded. I do not deny that I had the passage he refers to, in my mind; but the one to which I specially referred was that in which he expresses his opinion, that to a higher order of intelligence than man, miracles may seem to be brought about by God in a natural order; in one word, that which appears to be the distinction between the natural and the miraculous, may, in the eyes of a higher order of intelligence, form one great comprehensive whole. I alluded also to similar views to those maintained in the Duke of Argyll's *Reign of Law*, and in Mr. Warington's book, which latter work I have heard

* Most commentators consider the events detailed in St. Matthew, xii. 24 *et seq.*, to support a view similar to that enunciated by Mr. Buckley. [ED.]

stigmatized by some unwise defenders of revelation, as destroying the essence of a miracle. It is against the hasty adoption of such theories that I was desirous of uttering a caution. All that I intended to assert is, not that I adopt these positions as indubitably established truths, but that I am unable to dispute the general position, that to a higher order of intelligence all supernatural occurrences may seem natural. Any one may see from the context that by the word "supernatural" I mean miraculous. When I speak of the difficulty of discriminating between certain supernatural events and some events deemed miraculous, I mean that there are certain events where it is very difficult, if not impossible, to draw a line accurately discriminating to which order they belong. We all know that wonderful cures have been effected in certain classes of nervous complaints. Many of these have been pronounced miraculous. But in many cases they are now known to have resulted from purely natural causes. We are as yet profoundly ignorant of the power and action of the mind on the nervous system, and its influence on the body. But while there is a numerous class of events of this description, which it is impossible, with only our present knowledge, to say whether they belong to the miraculous or the natural, there is another class of events, such as the resurrection of a body unquestionably dead, the restoring of a man born blind by a word, or of an amputated limb, &c., which can only belong to an order which is unquestionably miraculous. These latter are the only ones which I conceive capable of affording an adequate attestation to a revelation. The others may be miraculous, but from the deficiency of our knowledge as to whether they are so or not, they are inadequate to furnish us with a sufficient attestation; I think it most important that we should keep this distinction steadily in view. Dr. Currey's remarks relate to a question quite different from the one I was considering. With respect to those points in the first portion of the paper, on which I am at issue with Dr. Currey, the only question is,—what is the degree of evidence which entitles a fact to be esteemed as resting on a secure historical foundation? What I contend for is, that "the philosophic imagination" cannot convert events, whose attestation is imperfect, into historical facts; or, where a large number of facts have perished, that it is unable to erect a substantial bridge over the empty space. If any large number of the received facts of history are of this description, I am very sorry for it; but all I can say is, "so much the worse for them." I by no means intended to assert that the principle of historical conjecture has no place in history or criticism. All that I am desirous of doing is to reduce it to its proper level. But at present, to borrow language from a celebrated resolution of the House of Commons, "Its influence is too great, is increasing, and ought to be diminished." I am far from wishing to undervalue the labours of Niebuhr, whose writings I have read with the profoundest interest. I once as firmly believed in them as Dr. Currey. But I have renounced a belief in a large portion of his reconstructive conjectures, for the simple and obvious reason that they lack evidence, and the vacant spaces of history may be bridged over by other conjectures equally plausible. When two, three, or four theories will equally account for the same fact, we cannot

assume that any one of them is the true account of it. I cannot relate a more striking illustration of this than Niebuhr's theories on the Decemviral legislation. What the real facts were we have no real historical evidence, all knowledge of them has perished ; and I contend that it is impossible by mere analogical conjectures to recreate the facts which have perished. These principles are abundantly applicable to many attempts of sceptics to set forth new lives of Jesus Christ. I am quite sure that if our Gospels are not trustworthy, their conjecturers are much less so. If the real facts have perished, as they say they have, I defy them to reconstruct a true history out of a few detached hints, by the power of philosophical conjecture. I am far from wishing to apply the principles of abstract or mathematical science, to history, or its evidence ; what I wish to apply to them is the common sense by which we conduct our daily lives. If the processes which I would apply to history destroy any of the *charms* of the study, I am very sorry for it, for I am intensely fond of it. But my love of history prompts me to utter a warm protest against any theory which tends to convert it into a novel or a fiction. I am far from wishing to reduce history to a mere string of dates or events. Let the philosophic mind exert its utmost powers in rearranging, and if you like, reconstructing, the past from any adequate data ; but let the distinction be kept clear as to what are facts and what are conjectures. I do not think that there is any real disagreement between Dr. Currey and myself respecting Ewald's history. We are indebted to Ewald for showing that the Old Testament contains a mass of substantial history, and that vulgar assertions that its narratives are fictions, are absurd. In dealing with the principle of conjecture, I could not help expressing my admiration that this great writer could have brought himself into the belief, that, if the Pentateuch is a mass of fragments, it is possible now, in this nineteenth century of the Christian era, and after the complete destruction of the whole mass of Jewish literature so frequently alluded to in the Old Testament, to pick out each separate fragment, and confidently to assign it to its respective author. This is philosophic conjecture gone mad : and it is deeply to be lamented that the presence of things of this description in this great writer's works has a tendency to persuade his readers that many of his most unquestionable facts rest on an equally sandy foundation. I am aware that the subject is not without its difficulties, when we adduce the character of the agent as a portion of the test of the truth of a fact. Still, when I survey the range of history, and the multitudes of lying miracles which have been invented, I cannot avoid taking refuge in the great principle, that whatever contradicts all our great conceptions of the character of God must be regarded as incredible. My moral convictions are the firmest portions of my beliefs ; and I am sure that "the same fountain cannot send forth fresh water and salt." To revert to the example which I have taken. It is, in my view, inconsistent with the moral character of the Creator to believe that He caused a cow to bring forth a lamb under the circumstances mentioned by Livy. This would cause me to reject it, despite of fifty decrees of the Roman Senate, while I could trust one of them for the truth of an ordinary

fact. The whole question of demoniacal agency is one so large as to require a separate paper entirely devoted to it. I shall only say with respect to the narrative of the witch of Endor, that there is nothing in the narrative which affirms that Saul saw Samuel, but much which implies the contrary. In one passage the magicians of Egypt are expressly stated to have done so by their enchantments and failed. I see nothing in these events which is not fully paralleled by many well-authenticated acts performed by the conjurors of modern Egypt and India. In fact, I have read of accounts much more wonderful. I think that no one believes that these latter are Satanic. The language of the sacred historian describes them as they appeared to the popular eye. I see no intimation on the face of the history that these acts were performed by the power of the devil. The admission that the devil has wrought real miracles is a very serious one, but it is impossible to discuss it at this time of the evening. I have only to thank you for your attention to the paper and the discussion.

The Meeting was then adjourned.

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 δίδταξας.

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 C₄, 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 O₄, 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 O₄, 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.

ORDINARY MEETING, MARCH 3, 1873.

MR. CHARLES BROOKE, F.R.S., VICE-PRESIDENT, IN THE CHAIR.

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

MEMBERS :—David Howard, Esq., F.C.S., Stamford Hill ; Theodore Howard, Esq., Bickley, near Chislehurst ; William Dillwoth Howard, Esq., Tottenham.

After which, the following paper was read by the Author :—

THE LAW OF CREATION; UNITY OF PLAN; VARIETY OF FORM. By the REV. G. W. WELDON, M.A. Cantab.

IF I venture to bespeak the indulgence of this meeting, I do so on the plea of the frank admission of my own comparative ignorance and felt insufficiency to deal with a subject which affords scope for inexhaustible inquiry.

2. On some points relating to natural philosophy, a man may speak without incurring the charge of presumption ; but the vain attempt sometimes made to dissect the mighty mind of God as it appears in His manifold works of wisdom from all eternity, leads to conclusions as contrary to revelation as to common sense. On such a subject, even if finite minds were competent for the task, we can only reason in so far forth as the *proven* facts of science, and the unequivocal testimony of Scripture seem as it were to lead us by the hand.

3. With regard to the immediate topic under review, allow me, by way of apology, for selecting one so comprehensive in its application, to observe that anything advanced in this paper is necessarily elementary and suggestive.

4. However feebly the subject may be handled by me, still it is hoped that the thoughts herein expressed may serve, if ever so little, to augment the brilliant and varied evidence which ever waits on the Divine workmanship "to justify the ways of God to man." If unhappily it should fail in this respect, it possesses at least the merits of having supplied to my own mind arguments for an unclouded belief in the coincidence of a unity of design between the author of the Bible and the

Almighty Architect of the universe. The great Master-BUILDER's plan is as evident in the Works as in the Word of God. Both present as it were a family likeness, which is fitted to illustrate and be illustrated by each other. The same agency in short is at work in the kingdom of Nature as in that of Grace. There are many striking analogies between them. The same loving-kindness, surrounded by equal difficulties—the same unity of purpose, emerging from apparent confusion—the same admirable adjustment of adequate means to merciful and noble purposes.

5. But, after all, how little is man* (even the most accomplished man of science) able to comprehend of the laws of the Great Creator? How true are the words of the ancient Patriarch, who having given some sublime illustrations of creative skill and power, says, "Lo! these are parts of His ways, but who can understand the thunder of His power."

6. On entering the august Temple of Nature we are reminded at every step of the Infinite and the Unsearchable. Hence a childlike spirit of inquiry, and an unaffected acknowledgment of our own incapacity to deal with the eternal laws of the Almighty are the most suitable dispositions for creatures "who were born but yesterday and know nothing."†

7. We are at best only learners and seekers after truth rather than persons really possessed of it.‡ Science and its professors, instead of dogmatizing on insufficient or, as it often happens, inaccurate data, should remember that they are dealing with Divine attributes. In the eloquent and appropriate words of Hooker it may be said—"Dangerous it were for the feeble brain of man to wade far into the doings of the Most High, whom, although to know be life and joy to make mention of His name, yet our soundest knowledge is to know that we know Him, not as, indeed, He is, neither can know Him; and our safest eloquence concerning Him is our silence when we confess without confession that His glory is inexplicable, His greatness above our capacity and reach. He is above, and we upon earth; therefore it behoveth our words to be wary and few."§

8. No one can doubt for a moment the vast body of evidence which glares upon us from the brilliant firmament with which God has surrounded His works and His Word. Eternity will not exhaust the study of it, since it will unfold facts ever new, ever abounding in inexhaustible variety. But yet, even here

* Job xxvi. 14.

† Job viii. 9.

‡ Pythagoras.

§ Hooker's *Eccles. Pol.*, book i. 200.

below, in this the infancy of our being, there are some little portions of light which *twinkle*, as it were, from the analogy between the inspired history of religion and the Divine workmanship in our planet.

This is the subject to which, this evening, I would desire to direct your attention. The main scope of the argument lies in the compass of two words taken from one of Lord Bacon's Essays. The closing words of his *Thema Cœli* are "*Mobilem Constantiam*," which Dr. Whewell, in an article in the *Edinburgh Review* October, 1857, translates, "a constancy that includes motion." Mr Leslie Ellis,* to whose critical acumen we are indebted for rescuing from the chronic inaccuracy of successive editions of Bacon's works this word "*Mobilem*," which blundering transcribers had written "*Nobilem*," renders the words simply "variable constancy." With a view to brevity and the formation of a suggestive mnemonic, I have ventured to mould them into the modified form of—Unity in Variety.

II.—A GENERAL STATEMENT OF THE ARGUMENT.

9. The more closely we examine the Creations of God—the remains of past ages, or the living forms of our own—the more clearly we shall perceive that *the plan is Unity, and the form Variety*,—the one indicating the same Almighty mind, the other that boundless benevolence which knows no rest till in every possible combination it has produced every conceivable form of beauty, existence, and enjoyment. When we look at the works of Creation around us, or read the history of Redemption in the Bible, the first thing that strikes us is the variety of forms in the one, and the diversity of modes of worship in the other. But when we come to examine things more closely—when the eye of Science is directed to the works of the Creator, and the eye of Faith to that of the Saviour—when we strip off the superficial covering, we find that these diversities are only apparent. The groundwork is simple and uniform throughout both. The external variations are adapted to the different conditions of existence in the one instance, and to the varying circumstances of God's people in the other. And

* Ellis and Spedding's edition of Bacon's Works.

thus we arrive at the interesting and important principle of Unity of plan and purpose emerging from apparent contradiction and confusion.

On observing the framework of Creation, we are astonished at the endless diversity of forms and existences of which it is composed. No two things appear to be exactly alike—no two leaves; no two drops of water; no two flowers; no two faces of either man or beast, are in all respects coincident.

10. The productions of Nature are so dissimilar that we might almost fancy that they were created by different orders of beings. But when we view them attentively; when we become better acquainted with their structure, their functions, and their movements, it appears perfectly plain that they were all formed upon the same plan, subjected to the same laws, and have emanated from the same Almighty mind. For example: nothing can at first sight appear more dissimilar than those shining little points called “planets” which wander through the starry sky, and the huge, dark, solid, and apparently immovable mass of matter on which we reside. They are so dissimilar that for thousands of years no person suspected any resemblance between them; but it is now ascertained beyond dispute that they are constructed in the same manner, subjected to the same laws—similar in their nature, their functions, and their movements; thus proving that they have proceeded from the same Almighty hand.

11. The earth and the planets are both globular bodies. They are both illuminated by the same great light. They both turn round upon themselves, producing day and night. They are both carried round the sun; thus making years, which differ only in length. Their axes are inclined to the plane of the orbit in which they move, and consequently they have their springs, their summers, their autumns, and their winters. Some of them, we know, enjoy the same advantages from their atmosphere that we do, and, were we nearer to these bodies, we should undoubtedly perceive many other points of similarity. This tends to supply an illustration of Unity of plan and purpose, emerging, from what at first sight, appears to be irreconcilable diversity and confusion. In our own globe the case is still clearer. New countries are continually being discovered, but the old laws of Nature are always found in them. We meet new plants and animals, but always possessing the same general properties and formed upon the same general mode. We never get amongst such original or totally different modes of existence, as to indicate that we are come into the province of a different Creator, or under the direction of a different will. In fact the same order of things attends us wherever we

go. The stone falls, the sun shines, the air moves, the tides flow, the blood circulates, and in its vast and quiet solemnity the vaulted sky hangs over us. In fact wherever we stand in the glorious creation of God, we see such a general resemblance emerging from apparent diversity, and expressing such uniformity of plan, that we are compelled to acknowledge the same Divine footprints in every corner of Creation.

THE ARGUMENT FROM COMPARATIVE ANATOMY.

12. The inspection and comparison of animated beings gives additional strength to this conclusion. Of all large terrestrial animals, however different in form, the structure is very much alike—their natural functions and passions nearly the same—their vital organs nearly the same in substance, shape, and office. Digestion, nutrition, circulation, and secretion go on in a similar manner, and the solid groundwork or skeleton is plainly made upon the same general model. For example, scarcely anything can appear more unlike than the wing of the bat, the hoof of the horse, the paddle of the whale, and the human hand. But when the integuments are stripped off, when the number and order of the solid parts are examined, when they are subjected to the view of Comparative Anatomy, they are found to consist of the bones of the human hand arranged in precisely the same order, and merely lengthened, expanded, or otherwise modified, to suit the flying, swimming, or pounding motions of the several creatures, and the elements to which they belong. And this law of Unity of plan prevails not less universally throughout the various races of extinct creatures, whose fossil remains are found embedded in the earth. The harmony of structure and design is so complete, that from the character of a single limb, or, even of a single tooth, or bone, the Comparative Anatomist is able to determine the size and proportions of the other bones—the external form and figure of the body—the food, habits, and mode of life of creatures that have long ceased to exist upon the surface of the planet. In a word—whether we discover new countries, or penetrate into distant ages—whether we examine the sparkling heavens, or the mass of matter on which we reside—in every part we find stamped upon the framework of Creation, a Unity of plan and purpose, emerging from apparent diversity and confusion—indicating the same Almighty Creator, and unconsciously illustrating the simple but comprehensive truth of UNITY IN VARIETY.

III.—THE APPLICATION OF THESE PRINCIPLES TO A PARTICULAR CASE.

THE ANALOGY BETWEEN THE INSPIRED HISTORY OF RELIGION AND THE DIVINE WORKMANSHIP IN OUR PLANET.

13. One of the leading objections to the written Revelation of God, is, the careless and confused manner in which its materials appear to be thrown together. There is, it is said by objectors, an absence of that order and regularity which we expect in a literary composition intended to instruct and improve us. We have Psalms, Proverbs, Types, Prophecies, Letters, Laws, Canticles, things mean and things excellent, written by different men of different ages and countries. All these productions are piled upon each other with little or no connection—with a total disregard of that dramatic unity which constitutes the charm of human poetry and prose. Is it possible that the Lord Almighty can be the Author of such a patchwork compilation? Is it possible that He, the God of order and of beauty, from whom we might expect simplicity and elegance in their purest forms, can be the editor of so loose and disjointed a work as this?

14. Now, the way to deal with this objection is to take some acknowledged work of the Creator, and see whether we can discover a family resemblance between its structure and that of the Bible. The crust of the earth on which we reside is, indisputably, the work of the Creator, and it is just such a mass of irregular and dislocated confusion. Its surface is broken up without the slightest regard to what we choose to call *order*. The strata of which it is composed do not lie over each other in concentric circles like the coats of an onion. They have been plainly fractured by disturbing forces, and piled upon each other like pieces of ice which had been jumbled together by a storm, and then frozen together a second time. There are cracks, and slips, and displacements. The richest jewels are embedded in the coarsest materials, and the whole surface is shattered and shoved into every conceivable angle of inclination. Let us now see what the science of the earth tells us of an arrangement, which, superficially considered, appears like that of the Bible to be unsightly disorder. "We shall form a better estimate (says Dr. Buckland) of the wisdom of the confused and complex disposition of the materials of the earth, if we consider the inconvenience that might have attended other

arrangements, smoother and more simple, than those which actually exist. Had the earth's crust presented one unvaried mass of crystal, or granite, or limestone, or had they lain over each other in regular folds like the coats of an onion, only one of these coats could have been within the reach of the inhabitants. And the varied intermixture of sand, and clay, and mould, and limestone, which constitute the soil of agriculture, and are so necessary to the beauty, fertility, and habitability of the field, would have had no place whatever upon its surface. Again, there would be no reservoirs of water admitted through the pores of the earth, sheltered and purified for the use of man. The water that fell being retained under the sun would be soon evaporated; and the rivers not being fed by springs, would rush at once into the sea, and leave their channels dry. Again, the inestimable treasures of salt, and coal, and iron, confined as they are to rocks of unusual thickness, would have been wholly inaccessible, and we should have been destitute of the essential element of industry and civilization. Yes, it is the very disordered condition of its crust which covers the earth with food and verdure, that gives us access to its hidden treasures, and renders it the convenient and delightful habitation of man and the multitude of animated beings with which it is crowded; and he must be blind, indeed, who refuses to recognize the wise foresight and benevolent intention of Him whose works are so manifold, and who, it is justly said, "in wisdom has made them all." So speaks Geology of the crust of the earth on which we live. Now, the similar structure of the Bible promotes spiritual industry, forces us into contact with every portion of its surface, and is one of the sources of that inexhaustible fulness and freshness which distinguish it from every other book. If the Bible were constructed with epic or dramatic regularity, like the poems of Homer or Milton, it would consist of a simple moral and a simple set of characters, easily found, and very soon exhausted. The parts of striking beauty and interest would be known and remembered; the rest would be neglected and forgotten. Here the Truth of God is scattered through the independent productions of men of different ages and countries, giving force to their testimony, because it shows the impossibility of collusion. It is brought into contact with every variety of character and condition; and thus, instead of a simple moral, we have lessons of instruction, wide as our nature, and numerous as our spiritual wants. Here, as elsewhere, the jewels are embedded in coarser and less valuable materials; and as we know where we may find the precious stone which is suited to the spiritual exigency of the moment, we are, therefore, habitually brought into contact with every portion of that Word which the

Lord Almighty has constructed to make us wise unto salvation. Thus the endless number of connections in which the Truth of God is placed in the Bible, and the aptness with which it never fails to meet our spiritual wants and wishes, gives to "its green pastures and its still waters" that peculiar character of life and freshness which renders it another, and yet still the same. Now, if it be so—if it be plain that God in His works does not confine Himself to what *we* call regularity; if His Word be constructed not like the clipped and bordered garden, but with something of the wild luxuriance which distinguishes the works of Nature; if its materials be thrown together with the careless grandeur in which the stars are sprinkled over the firmament, or the flowers over the enamelled field; if it does really resemble the crust of the earth, not only in the apparent disorder, but in the wise foresight, the benevolent intention, and the wonderful and magnificent result—then its peculiar structure, coupled with this result, is so far from being an objection, that it is hardly possible to conceive a more beautiful or decisive proof of its Divine origin.

THE ARCHETYPE AND ITS MODIFICATIONS.

15. It has been well observed by Professor Owen, that "of the nature of the creative acts by which the successive races of animals were called into being, we are ignorant. But this we know, that as the evidence of unity of plan testifies to the oneness of the Creator, so the modifications of the plan for different modes of existence, illustrate the beneficence of the Designer."*

16. In the natural history of the vertebrate animals there is evidence of a common typical structure. That is to say, we have a skeleton, which is, as it were, the model after which all other skeletons have been formed; some presenting a nearer, and some a more remote resemblance to the perfect type. *An original standard with many modifications is the great law of Creation.* The human face is a remarkable instance of this. Our limited faculties can hardly comprehend how, in such a narrow compass, such a variety of modifications, such diversity of lines and lineaments could possibly exist. One can hardly realize

* Orr's *Circle of the Sciences*, No. 2.

the fact, that a Cherokee Indian—a Soudan Negro—a native Australian—a Mongol Tartar, and an Anglo-Saxon can all be descended from a common parentage. And yet, when we come to examine things more closely, there is no greater difficulty in believing in the unity of the human race, than in the variations of plants and flowers, propagated from the same seed-capsule, as seen especially in the case of orchids, to which I shall refer in the sequel. We are distinctly told that, “by the Sons of Noah were the nations divided in the earth after the flood.” It would require a considerable amount of the most unimpeachable testimony to set aside this plain declaration of Scripture. As yet; nothing approaching to reliable evidence has been adduced to negative the Mosaic record.

17. The present manifold variety of the human family appears, at first sight, to present irreconcilable difficulties and confusion; yet, that confusion is merely *the unknown intermixture of laws*, and if we were in a position to understand the whole of the case, the problem that all human creatures now living have descended from a single pair, and from a common type, might not seem so difficult of solution. That the fact is so, we simply believe, not only from the declaration of Scripture, but from the analogy of Nature.

18. The great Archetype of creative skill on earth is—*Man*. During the long succession of ages that preceded him, all the creatures that existed upon the globe were gradually coming nearer and nearer to the perfect type which, in the counsels of the Most High, was to wind up the series when man appeared. The four ages of Nature may be classified as follows:—

1. The Reign of Fishes.
2. The Reign of Reptiles.
3. The Reign of Mammals.
4. The Reign of Man.

19. During the first age, *Fishes* were the masters of creation. Then the air-breathing animals were very few. During the second age *Reptiles* assume the chief place and authority over the other classes. The air-breathing animals were more numerous. During the third age terrestrial animals of colossal dimensions abound, and then the *Mammals* obtain the mastery, and occupy the most prominent position. Finally, comes the chief work of the great Master-Builder, the most perfect of all created beings on this earth—for whom all the others were merely preparing the way—*MAN!* All the creatures that came before man were so many symbols, as it were, of the future model after which by anticipation they were already

formed. Man, in fact, was the consummation of the vertebrate type. "It is evident that there is a manifest progress in the succession of beings on the surface of the earth. This progress consists in an increasing similarity to the living fauna, and among the vertebrata, especially in their increasing resemblance to man. But this connection is not the consequence of a direct lineage between the fauna of different ages. There is nothing like parental descent connecting them. The fishes of the Palæozoic age are in no respect the ancestors of the reptiles of the Secondary age, nor does man descend from the mammals which preceded him in the Tertiary age. The link by which they are connected is of a higher and immaterial nature; and their connection is to be sought in the view of the Creator Himself, whose aim in forming the earth, in allowing it to undergo the successive changes which Geology has pointed out, and in creating successively all the different types of animals which have passed away, was to introduce Man upon its surface. Man is the end towards which all the animal creation has tended, from the first appearance of the first Palæozoic fishes."*

20. The succession of animals on the surface of the globe, and their distribution, opens up to us a wonderful and magnificent idea of the Divine workmanship. Thousands of years before that plan was developed, the minutest details of it were foreseen, and, in some instances, announced. He, who alone can see the end from the beginning, and in whose sight a thousand years are as one day, is alone capable of understanding or explaining the necessary relation of each part to the whole, and the special ends which they fulfil. For example—the vast stores of coal, granite, marble, salt, iron, silver, and gold, thousands of years ago were laid up in the bowels of the earth, and remained there until the proper moment had arrived for their utilization. Those inexhaustible provisions for the necessities of man, and for the development of his inventive and intellectual faculties, clearly betoken the providence of God ages before the appearance of the human race upon the earth.

21. The creation of man was not an afterthought. It was one of the facts fixed in the counsels of the Most High, from all eternity. And when the time came round in the revolution of ages, for the entrance of man upon his predestined habitation, he found that everything had been settled for him in advance. No person can look into these arrangements without seeing the clearest indications of design. "The recognition of

* Agassiz and Gould's *Comparative Anatomy*, sections 689, 690.

an ideal exemplar in the vertebrated animals proves that the knowledge of such a being as Man must have existed before Man appeared; for the Divine mind which planned the archetype also foreknew all its modifications."*

22. This working up to an exemplar by anticipation is beautifully illustrated by the whole arrangement of embryonic existence. Here we find the circulation of the blood carried on by an arrangement adapted to the peculiar circumstances of the case. At birth the pulmonic and systemic circulations begin to operate for the first time, but all the machinery for their efficient working had been carefully anticipated.

23. The first breath of atmospheric air closes, or ought to close, the foramen ovale which for ever draws an impassable boundary between the pre-existing and the present life.

24. Thus we see that the pulmonary and respiratory processes were all prepared by anticipation, and that, at a time when it would have been impossible to use them without instant destruction to life. On this smaller but exquisitely wonderful adaptation we have the same unity of plan and variety of form in the mysterious origin of animated beings as compared with the protracted preparation of the globe itself for the reception of the human race, and its tributary dependants. Everything here, as in other respects, had been pre-arranged with far-seeing accuracy, and, when the appointed hour had come, the predestined occupant of the earth found everything ready to his hand, according to the position of the creature and the exigency of the period.

But there is something more than mere adaptation. We have also intimations of such a unity of plan, on which the whole of nature is constructed, as suggests the notion of some pre-existing idea, as it were, in the mind of the Creator, of which we trace the reflection in the works of His hand. In each division of animals there exists a definite type, the essentials of which are never violated, even when it seems in a manner incompatible with the habits of particular animals—the necessary conformity being obtained in such cases not by a departure from the type, but by a comparatively slight modification of some parts of the organization, in a way quite consistent with its general character. The organic creation is obviously constructed upon a great systematic plan—not like an overgrown village in which the houses are scattered about without any order, every man having built according to his own fancy—but rather like a well-planned town, with houses in

* Professor Owen.

regular streets, in each of which a certain uniformity prevails; while the streets themselves are arranged according to that particular order which the founder of the city had previously anticipated and designed.*

THE PHILOSOPHY OF LAMARCK AND HIS DISCIPLES.

25. Wise and merciful forethought, which provides an adaptation of means to meet the wants of the creature, is a truth pencilled with light through every department of the Divine handiwork.

This universal principle, so beautifully illustrative of the ever-present superintendence of God over His works, produces an ardency of expectation in His creatures which enables us to believe everything not incredible, and to hope for everything not impossible. Therefore intelligent believers in the Divine authority of the Bible are of all men the most Catholic in their recognition of scientific progress and the least dogmatical upon the unsolved problems of creation. For they know that there are difficulties as far above reason as reason is above instinct, and also that He who in the riches of transcendent wisdom arranged the Divine history of the Bible has also arranged the constitution and the course of Nature. We may therefore look calmly on the discoveries of modern science, for it must be evident that truth can never be opposed to truth. So that the facts of Natural Philosophy, instead of being opposed to the truth of Scripture, must of necessity be proofs and illustrations of each other, and of the variegated goodness of God, and, in coming from our minds, form kindred portions of one great whole.

26. The only limit to our belief is the impossible. This is that border-land where the war of words begins. Yet even here we are not left to blind conjecture. Wanton fate does not sport with the universe as the disciples of Lamarck would lead us to suppose. From facts already known we can make progress towards facts yet unknown, but as finite creatures we are gently and mercifully reminded at almost every stage of our inquiry that the infinite and unknowable is immeasurably above our reach, and lies in the boundless horizon beyond us. For want of this modest deference to the will of

* Ogilvie on the *Principles of Organic Architecture*.

our Great Creator some men have rushed desperately to conclusions, unworthy of true science, dishonouring to our Almighty Maker, and at variance with common sense.

27. The philosopher Lamarck and his more modern disciples in the Darwinian school of thought, undertake to account for the origin of things in Nature. Setting aside the plain statements of the Bible, which represent God not only as the Great Creator, but as the eternal Distributor of all things, they tell us that the laws of Nature are in themselves executive, wholly irrespective of the Almighty, except, perhaps, in the creation of the original plasm. The Divine Being is thus excluded from His works, and this, I need hardly say, reduces Him to a kind of moral nonentity! Thus the Creator (if even acknowledged to be such) is placed in solitary grandeur, according to the philosophy of Epicurus, looking down as it were at the progressive development of His plan, from the potentially endowed plasm in the far, far distant past, till it assumes, after countless and ill-shapen transmutations, His own Divine image and likeness! This theory runs directly counter to the principle of unity of design, traceable in all the works of God. It is, in fact, the deification of Matter.

28. But let us apply the principles to a particular case. Lamarck endeavours to account for the extreme length of the neck of the giraffe, from the fact that it is a creature of circumstances. He tells us (how far back he does not say) that originally the length of its neck was not greater than that of the elephant. But the giraffe having to obtain its subsistence from the leaves of trees, high up out of ordinary reach, saw indeed the tempting morsel but knew not how to seize it. It was this that suggested to the animal a series of vigorous and well-directed jerks, until in time the vertebræ became gradually extended. Each succeeding race of giraffes left to its immediate posterity a legacy of elongation, till in the lapse of ages we find this creature of circumstances the architect of its own fortunes.

29. In like manner it is said that water-fowl originally were not endowed with web feet. They were like the common hen, but being creatures of circumstances, and having to seek their food among the reedy banks of lakes and ponds, the instinct of self-preservation evolved those necessary movements of the feet and legs, which in process of time terminated in the production of web. Now there is not a single particle of proof for all this. It is based simply on conjecture, and we are asked to accept it as the best conceived idea of the origin of the present state of things in the world around us, so far as it relates to the analogy between plan and form.

30. Not less incredible, and equally unsupported by facts, is the theory of evolution, as propounded by Mr. Darwin, but in which he was preceded by Lamarck. A little nomad becomes a monkey—a monkey develops into an ape, and the ape into a man! The wonder to my mind is why the principle should have failed to operate for so many thousands of years. Was it only a limited liability? If not, why should we not now see instances of this progressive development?

31. There are at least two facts fatal, in my opinion, to this theory. One is the Deluge, of which we have lately received proof on testimony irrespective of Scripture. The other is the fact that the world will one day be burned up by the agency of fire. This, of course, is a matter of faith, resting solely on Divine testimony.

32. The difference between special creation and the theory of evolution is just this. A belief in the supernatural is essential to the narrative of Scripture; a belief in the fortuitous course of atoms operating by inherent power, and will, and wisdom, is essential to the acceptance of evolution by natural selection. The statements of the Bible are founded on the fact that God is the Almighty Sovereign of His creatures—that He can alone create, and He alone destroy—that He is the present mover as well as the original maker, and that through every corner of the universe "He giveth [that is, *is giving*] to all life, and breath, and all things." (Acts xvii. 25.)

Mr. Darwin and Lamarck withdraw the Creator from the constant superintendence of His own laws, the execution being vested in the laws themselves.

33. There can be no doubt that the love and wisdom of God are displayed by what we call laws, but to suppose that they possess intrinsic powers of action irrespective of the constant vigilance of the Lawgiver is a form of materialism unworthy even of the dim lights of Pagan philosophy. It has been eloquently observed by Professor Balfour, that "we cannot but honour the man, who, by his genius and talent, has been enabled to develop one of the great laws of Nature, and who feels, and acknowledges that he has been the humble instrument to lift the veil, to a certain extent, which conceals the working of the Almighty; but we have no sympathy with that discoverer in science, who, puffed up with intellectual superiority, puts the laws which he has elucidated *in the place of the Creator*, whose personality had ever-working Omnipresence he ignores."*

* *Manual of Botany.*

34. The destruction of a whole genus, as in the case of the Ammonite, is also a difficulty in the progressive theory. It is an undoubted fact that there was a period when the Ammonite and the Nautilus co-existed. In the earliest formations the Ammonite is found side by side with the Nautilus, up to the chalk. Not a single specimen of that genus has ever been since found in deposits which overlie the chalk. How can this total extinction be accounted for in the Darwinian and Lamarckian philosophy? It is in point of fact an unsolved problem, which no human mind can explain, or possibly in the present state understand.

We believe that all creatures on earth at the present time have never varied in their general features, and that they are to-day what they have ever been since their original creation. The first giraffe had a neck as long as those now living, and the first wild duck had its feet webbed just as those of the present day. That they were otherwise formed remains to be proved. All things continue as they have been since the creation of the world, allowance being made for such external changes as take place from climate, food, domesticity, and such-like.

THE PRINCIPAL VARIETIES OF MANKIND.

35. Such varieties as those of the Negro—the North American Indian, and the Anglo-Saxon seem difficult of explanation under ordinary circumstances. But I do not see anything more perplexing than in the facts connected with the history of orchids. From the same seed-capsule great varieties of plants are produced. It is peculiarly deserving of notice that on the very same plants, you will find two totally different sets of flowers. This is a serious difficulty on the Darwinian principle.

36. The question of colour or pigment, as in the case of the black man or the red man, is one about which physiologists as yet know little or nothing. It is well understood that very remarkable changes are effected by food. For example, if a pig fed on madder for six or seven weeks be killed at the end of that time, it will be found that his bones have become pink.

There are hundreds of questions involved in this variety of the human species with which we should be thoroughly acquainted before we presume to deny the Scriptural account of the origin of man. Nothing that I have yet read upon the

subject has in the least shaken my faith in the traditional and inspired narrative about Adam and Eve.

37. Nothing perhaps ever went nearer to disturb my mind on this subject than a month's ramble amongst the Digger Indians of California. Whatever may have been the experience of Mr. Darwin among the Fuegians, I can probably say it could not have been productive of more painful imaginings than mine among the Indians of California. A well-grown gorilla would present less repulsive features and a more pleasing, because a more consistent, bearing. Instinct unfettered makes the brute natural, whereas reason dethroned makes the man brutal. It deforms and degrades him, because it is a deviation from a natural law. Human creatures of the finest form who from to-day should begin to live, as those Indians do, on acorns and earth-worms cooked in the roughest fashion, would not long retain traces of noble mien; and in a few generations it is not too much to affirm that the race would undergo changes which, from our inexperience we can hardly conceive. That the Digger Indian should be a fellow-creature sprung from a common ancestor—a man and a brother—is certainly a humiliating fact in the history of moral and physical degradation. But it can furnish no argument against the unity of the human race. It is the penalty of deviation from the original model, and gives proof that some disturbing force has marred the great masterpiece of creative skill. It is a well-known fact that physical degradation is intimately connected with moral degeneracy.

38. This gradual departure from the standard of moral rectitude may go on increasing from age to age till man has lost almost every vestige of his high origin. It is not necessary to trace the Fuegian savage from some primordial plasm, in order to account for the low type of his moral and physical nature. In our own country we have specimens of the human brute to my mind quite as loathsome as the lowest forms of heathenism. All that I contend for is, that amid the varieties of the human species, there is a unity of plan which links men together in a common brotherhood, however distasteful it may be for us to recognize our poor relations. One temperature of blood throughout the earth, 98°—an uniform system of circulation—the same sets of muscles, veins, and arteries—the same convolutions of the brain—the same span of life—the same processes of decay, and the same sad symbol of weakness and corruption presented by the mystery of death. In many other respects the family likeness is easily traced, and the resemblance of man to man, though isolated from each other by sea and land, is only too obvious. The plan is Unity, the form is Variety.

ARGUMENT FROM BOTANY.

39. The argument of Unity amid almost endless Variety finds an appropriate and interesting illustration in the science of Botany. Here the connection between plan and form is replete with many and striking coincidences.

From the Lichen on the Alpine summits, to the despised weed of the same order on the coral reef—from the parasitic fungus, visible only by means of high microscopic power, to the enormous parasite * in the Indian Archipelago—from the sweet-scented vernal grass “in the dewy paths of meadows,” to the tree-like branching bamboo of tropical climes, there are many varieties in form but only one plan. No man, at first sight, could believe it possible that the common meadow-grass and the sugar-cane are members of the same family. And yet the fact is so. The varieties in the order of grasses (*Gramineæ*), however apparently dissimilar in form, are all alike in their general features.

40. Of the three hundred and twenty genera, including three thousand eight hundred and fifty species, whatever variety may exist as to the number and form of the different sets of bracts, and the nature of the fruit, there is only one arrangement throughout the entire family, which gives to it that unity of plan, whereby they are recognized as belonging to the same order. Wheat, oats, barley, rye, rice, maize, Guinea-corn, millet, &c. &c., which supply “green herb for the service of man,” and the rye-grass, meadow-grass, sweet vernal-grass, cocks-foot grass, Timothy-grass, and countless grasses besides, which “give food for the cattle,” are all members of one wide-spread family. They present the same peculiarities of organization and structure, however separated by continents and centuries. And, that which holds true with regard to the variety of the family of grasses, is equally true in the case of the other orders. There is the same Variety of form, the same Unity of plan.

 THE CONSTITUTION OF THE HUMAN MIND.

41. Difficult as it is to see two human faces that exactly resemble each other, it is far more difficult to find two human minds that see everything in the same light.

“Facies non omnibus una,
Nec diversa tamen”—*Ovid, Met.*, b. ii. 13.

* *Rafflesia*,

The varieties of our mental structure are boundless, and these varieties give a peculiar shape and colour to our opinions. We cannot induce men to think alike on everything. They will not consent to suppress their sentiments. That this does, indeed, arise from the nature and the free action of the human mind, is evident from the fact that it takes place in every department of knowledge. In science, in literature, in law, in morals, in medicine, in politics, even in the theory of light itself, there are little *undulations* of opinion, producing differences and debate. In the substance of these things all reflecting minds are agreed, but, in the execution and the details, there is room for a variety of opinion, and a variety of opinion takes place. There are hundreds of questions left under the guidance of general principles and regulations; and it were absurd to suppose that men of every age and caste and character should all embody those principles without variation in their colour or their form.

THE POSITIONS WHICH THE BIBLE OCCUPIES AS AN AUTHORITY ON NATURAL SCIENCE.

42. I cannot draw my subject to a close without noticing the position which the Bible occupies in the conflict of opinion between rival schools of philosophy.

There is a quiet scepticism among the disciples of one party in regard to the literal teaching of Scripture on the subject of natural science. It may be well to remember that the Bible was not written to teach us the motions of the stars, or the natural history of our planet, or the rules of criticism, or the details of history. It was written to teach us "the one thing needful." And so intent is its real author upon this its real object, that while the meanest and minutest circumstance connected with that "one thing" is fully and freely noticed—the mighty monarchs and the splendid empires of the surrounding world are passed in almost total silence by, unless when their edges happen to come in contact with the history of God's glory and man's salvation, after which they sink back into the obscurity out of which they had emerged for a moment. The main object of the Divine Author of the Bible was not to write a book on Natural Science, but to place man's peace, and hope, and holiness, in every stage of its growth, distinctly before his eyes. And this He has done in the most brilliant evidence that ever was presented to the mind of man.

43. Another mistake into which persons are sometimes apt to fall in reference to the Bible is to imagine that the expressions applied to the works of Creation are to be taken in their strictly literal meaning. Now, it should be remembered, that the language of the Bible is not the language of science, but of *common sense*. And we need not go far to account for this. For, if it were written in the technical phraseology of physical science, there would be very few comparatively to whom its language would be intelligible. Take, for instance, the descriptions of the sun, when it is said to "rise" and "set," or, as in the case of Joshua, where it is said miraculously to "stand still." These words convey to every human creature on the surface of the globe the very same idea. Whether he be a New Zealander, or an inhabitant of Labrador, or of England, or of the Caucasus, all are agreed on the fact, which appeals directly to their senses; and for all practical purposes this is quite sufficient. But if the real state of the case were scientifically put before them, it is not too much to affirm that, with few exceptions, as in the case of learned men, all the rest of the world could not possibly understand, much less believe, the facts when clothed in the garb of science. This was not the object of the Bible, and hence the sacred writers adopted the current phraseology, and in the current popular meaning, whenever they had occasion to allude to natural phenomena.

44. To make known the One and all-sufficient Atonement for the sins of a world in wickedness was the *primary* object of the Bible. Hence Natural Science does not form any direct department of Revealed Truth. Beyond certain general statements in reference to the formation of *Man* and *Matter*, we have no special information to guide us on the subject.

CONCLUDING REMARKS.

45. The application of the principle of Unity in Variety is as extensive as the creation of God. We have pointed out its existence in the constitution of the human mind—in the structure of the body—in the formation of our globe—in comparative anatomy—physiology—botany, and if the time and place permitted, we could also show the same principle existing in the various modes of Christian worship, and the different administrations of religion. The principle is as generous as it is ennobling. It shows us the ever-present working of an Infinite Mind. It exhibits the unwearied benevolence of the Great Creator, and the boundless horizon of

His immeasurable glory. The subject is worthy of a better fate than it has met with at my hands. But by way of excuse I may say in the words of Lord Bacon, "These things have I in all sincerity and simplicity set down * * * * and that without any art and insinuation * * Notwithstanding I trust that what hath been said shall find a correspondence in their minds which are not embarked in partiality, and which love the whole better than a part; wherefore I am not out of hope that it may do good; at the least I shall not repent myself of the meditation."*

The CHAIRMAN.—I am sure all will join with me in returning sincere thanks to Mr. Weldon for his very excellent paper. (Cheers.) It is now open for any present to offer remarks thereon.

Rev. G. CURREY, D.D.—I am quite sure that no one can have heard Mr. Weldon's paper without being struck with the great force and beauty of its language, and the manner in which it has commended its arguments by the skilfulness with which they have been put. (Hear, hear.) I am certain it must have given all present as much pleasure to listen to it as it has afforded me, and I beg to express my sincere thanks to the author for having set forth the truths he has put before us, in so very able and attractive a form. In offering a few remarks upon the paper, I desire, however, rather to draw attention to those points on which I think something might be supplied, than to continue to commend what is so well worthy of our commendation. In the general argument employed by the writer of the paper I, for my part, thoroughly concur. There was one point to which I would draw attention in the portion of the paper that deals with the principal varieties of mankind. It seemed to me that there was some difficulty with regard to the statement, that the objection to the notion of the present varieties of man being traceable to one pair, is answered by a method of degeneration which accounts for the alterations that have taken place as compared with the original type. The point which requires the greatest amount of attention and care in prosecuting an investigation with respect to the varieties of mankind, is, not so much the question of degeneration, as the marked and distinctive character of each variety. It is not simply that we find there are men who have fallen into a state into which we may suppose their savage or peculiar mode of life has brought them, so that they are now very far removed from the highest type seen in other places, as it is, that we are brought into contact with distinct varieties, each of them capable either of development to a higher state, or of a corresponding degradation to a lower state. It will be enough to refer to the three great distinctive varieties, as Cuvier defined them—the Caucasian, the Mongolian, and the Ethiopian or Negro. There are, as is well known, in-

* Bacon,

dividuals belonging to the Negro type, who have attained to a very considerable degree of superiority over other portions of the same race, while there are others who, on the contrary, have sunk very low. The same remark may be applied to the other races. The difficulty to my mind is that, from whatever point of view we regard them, whether as improving or the reverse, these varieties are always clearly and distinctly marked, and have been able to preserve these characteristics, and this distinctiveness, through so many successive generations. When we go into our museums and see what is depicted on the ancient monuments and sarcophagi of Egypt, we find that the same type of the negro and the same types of other peoples were in existence thousands of years ago, as those which are met with at the present day. (Hear, hear.) I have no doubt myself, and I think that the evidence from all sources proves, with sufficient clearness, that all these varieties have descended from one pair;* but the difficulty is how this marked variation has taken place, and why it is that, having taken place, it should continue with so much constancy, spread as the different varieties are all over the world, and preserving throughout so much uniformity in variety. This uniform variety of distinctive Types has been scarcely touched upon in this paper. Of course the writer could not, within the limits assigned him, have gone into all the details connected with the numerous subjects he has touched upon, but in hearing him mention the variety of forms in which the human race is found, I had rather hoped to have heard something with regard to these fixed lines of division—this definite and persistently maintained subdivision of the human species, which enables us to see this or that type prevailing uniformly, age after age, in various countries. Throughout the different varieties, and in every case where we find either higher excellence, or positive degradation, there is in each type the same uniformity, constant and unchanged. More accurate and extended observation has found other types besides those which I have already mentioned. Through many generations, many thousands of years, these types have continued; and so far as we can look back,—so far as the evidence of monuments goes,—we find no trace of the variation becoming less marked; on the contrary, it is as much marked on the very oldest monuments of Egypt as it is in the present day. Now, although I wish it to be understood that I am not in the least doubting the fact of our common derivation from a single pair, I cannot help seeing that this is an argument, so far as it goes, in favour of there having been a separate origin, in the same way as we use the argument against the Darwinian theory, that we cannot see any traces of change from the giraffe to the cow. I think the fact I have pointed out requires a good deal of consideration. One thing to which it points, is the great antiquity of man. It seems to me that when we look at the length of time during which no variation has taken place in the several types of humanity, the evidence thus furnished does

* This conclusion is also Professor Huxley's. [ED.]

open our eyes to the necessity of allowing a far longer period to have intervened since the original creation of man than is usually assigned ; at any rate, I can see no other way of accounting for the circumstance I have pointed out. We know, with regard to the chronology of the Bible, that the period which has been deduced from it is not at all probable, and it is a somewhat unfortunate circumstance that we should have been taught that which has been commonly accepted in reference to the Bible chronology, because many people have made it a matter of faith to such an extent that they seem to think we are destroying the Bible itself if we throw aside this chronology. Nevertheless, this is a conclusion to which the long-preserved variety of type among mankind seems to necessarily point—viz., that man has existed for a very much longer period of years than can be ascertained from any system of chronology with which I am acquainted. I thought it might be interesting to the meeting to open up some subject of this kind which had not been specially discussed in the paper ; and I would suggest, for the consideration of its author, the definite lines in which the variations of mankind have taken place, and been so long preserved. I may add that I did not quite understand what was said on the subject of botany. In speaking of grasses, such as wheat and the different varieties of grain, being of the same family, I did not understand whether the author used the word family in the same way as when he speaks of the different varieties of mankind being of one family, or whether he supposes that each of these varieties is what may be termed a distinct creation.

Mr. WELDON.—I meant in the ordinary sense of order.

Dr. CURREY.—But it would seem to be put in the same way, as we have different varieties of the human race, all coming from one species, so, by analogy, we might suppose that all the varieties of grasses came from one stock. This has not been really touched upon, and it is not necessary that it should be determined at all. I have, perhaps, said enough to lead to open up some points of interesting discussion ; and I would direct especial attention to that part which strikes me as being especially interesting—viz., the question as to the varieties of mankind ; the definite lines in which those variations have been maintained ; and the long period during which they have occupied precisely the same lines and no others. This seems to me to be a different kind of variety from the variety which arises from individual degeneration.

Rev. C. A. Row.—There have been few papers read in this room to which I have felt able to give a more cordial approval than to the one we have heard to-night. In fact, there is only one sentence in it with which I dissent as conveying what I conceive to be an untrue statement of fact ; and that is the passage respecting the testimony to the historical character of the Deluge, supposed to be derived from the recently-discovered stone inscription. After reading the accounts of that discovery as they have been published in the newspapers, I cannot see that it affords *historical* testimony to the occurrence of the flood. To me it seems to prove that

there was, at the time the inscription was written, a universal tradition that a deluge had taken place ; but when you come to read the inscription carefully, you will find that the story of the deluge is placed among the category of myths. The point therefore is, that the whole account, so far as its historical value is concerned, is based upon the testimony afforded by a number of myths. All that the inscription shows is, that there was a story prevalent at the time it was recorded, which bears a certain analogy to the narrative in the Scripture. This is the only portion of the paper to which I take exception. I should however say, that if there be any other failing in the paper it is its excessive brevity. I am afraid the author must have been induced to make the paper so short, by the strong clamour which usually prevails against long sermons and lengthy papers. One point that has produced a feeling of regret in my mind is, that the author did not carry out, at greater length, the analogies which exist between the gradual development of creation and revelation. I think that if this were done, carefully and well, by some man of enlarged mind, it might be made a point of Christian evidence, as important as any that can be obtained. The principle is here affirmed clearly enough, and it is a matter of regret to me, that the author has not enlarged his paper to double its present length, and pointed out the various analogies which exist in the Bible, and which, to my mind, contain the fullest proof that the Author of the one order of things, is the Author of the other. (Hear.) I shall not attempt to repair this omission, because I am well assured that no one could do this properly in an extemporaneous address. It could only be done pen in hand, for on such a subject it is important that nothing should be said that has not been fully considered. I will, however, draw attention to a few points, without endeavouring to treat them definitely, or distinctly. The paper draws attention to the fact that there is an enormous variety in creation—that creation is, to use a very expressive phrase, “many-sided”; and in the same manner the Bible is many-sided, and I should have been very glad to have seen this many-sidedness of the one, paralleled directly by the many-sidedness of the other, in which case the paper would have possessed the highest value. Let us take an example or two of this many-sidedness. I will refer to § 18 of the paper, where the writer treats of the fourfold reign of fishes, reptiles, mammals, and man. This is the order of creation. Let us see whether there is any similar order in the Bible. I assert that there is. In the Bible you have various forms of revelation, passing through a succession of phases beginning with the Patriarchal dispensation, going on to the Mosaic and Prophetic dispensations, and finally culminating in the Gospels. Here, at any rate, you have an analogy between the mode of working of God in creation, and of God in revelation. Let us take, again, another remarkable circumstance alluded to in the paper—viz., the great variety of view which the human mind takes of various subjects. We see precisely the same fact in nature and revelation, from one end to the other. Take what must strike every reader of the New Testament. Fully admitting that there is a oneness

of type running through revelation, yet it so falls on men of diverse characters, that we do not all of us see it alike. We have in the New Testament itself three or four most striking instances of this. There can be no doubt that the Christianity which is taught by St. Paul, St. James, St. John, and St. Peter, possesses the same spirit which runs through their teaching; nevertheless, it would be vain to deny that there is a great variety contained in that unity. It is impossible to avoid seeing that some of these writers seem to view Christianity from a somewhat different point of view. This paper brings before us the many-sidedness of creation and revelation, and the folly of taking very narrow views of divine revelation—of supposing that our own limited ideas afford the only adequate mode of considering revelation. As Dr. Currey has well and ably pointed out, in respect to the general varieties of mankind, we may see that Christianity, speaking from a historical point of view, is applied in many forms, and thus is suited to every variety of the human mind. Admitting that the human mind appears in an immense variety of aspects, and starts with different modes of conception, it seems plain that Christianity has been modified—and in saying this I desire to include the whole Bible—so as to adapt it to all the various phases of the human mind. Let us take, for example, Germanic Christianity, and by this I mean that type of Christianity which the great German writers have accepted; and we see one grand type of Christianity. Another type of Christianity is that which has been accepted by the Greek writers, and it is of a very different kind from that I have just mentioned. There is another type of Christianity which has been accepted by the Celtic writers, and this is very different from either of the other two. I do not know whether I might not greatly enlarge upon this topic; but at any rate, what I have said will serve to draw attention to this great fact, that as creation is many-sided, and may be viewed in so many different aspects, and under so many different characters, so, in the same way, Christianity and revelation are also many-sided, and as wide as man himself. Therefore, it seems to me that it has been a great mistake to look upon this subject from too limited a point of view. We have been too apt to set up our own creed as the only right view of things, and to put down everybody else's creed as wrong; and in doing this, I think we have been guilty of overlooking the wide foundation of natural and revealed religion. There are one or two passages in the paper to which I will draw attention as containing points on which I most entirely agree with the author. In § 32 he says, "The statements of the Bible are founded on the fact that God is the Almighty Sovereign of His creatures; that He can alone create, and He alone destroy." This is a great and profound truth, and one which we are often tempted to ignore. We are, I think, too often in the habit of laying it down that many of the peculiar structures of the animal creation have resulted, not from the act of the Divine Being, but from the fall of man. It seems to me that this is a very dangerous assumption. I fully admit that there are certain forms of animal life, the peculiarities of which one cannot but wonder at exceedingly, and which, looking at them in the

abstract, one would not have referred to the Creator, but which we might be disposed to trace to an entirely opposite source ; and in precisely the same way, we find in the Word of God things which, if also viewed in the abstract, we should not have thought could have proceeded from the Almighty mind. In fact, it seems to me, that as far as creation is concerned, it is very much a question as to what mode the Creator has adopted in His creative acts. We know that even in these days the Creator may, in some degree, be said to be creating, as, for example, when He heals a wound. If any of us had a leg cut off, we know that the wound would heal ; the flesh and skin would grow over the place of amputation, and in process of time the part would be well and sound. How, it may be asked, does the Creator act in this? Why, by an instrumentality no one would ever have expected. The only power He uses is that which is afforded by an artery or a number of arteries—at least, this is the only visible power at work, and by its means He effects the wonders we so frequently witness. So, in the same manner, He may apply a mode of evolution as the mode of His creation, as He does in creating each individual man and woman. The only thing we have to do, is to believe that the Creator is not separate from the law ; but is operating in 'it, and ceaselessly engaged in the work of creation by His boundless power and His mighty providence. (Hear.) But when we are told that creatures develop themselves by a process of self-evolution, we are asked to believe what seems to be the most extraordinary fallacy that ever could have been conceived by the mind of man. It is certainly a great tax on our credulity when we are asked to accept the theory that the giraffe, by a series of self-evolutions, governed by a particular set of laws, which exist, and are entirely apart from the power of the Lawgiver, has been enabled to elongate his neck to the extent he has attained, and, to my mind, the proposition is so irrational that I think it impossible seriously to entertain it. And yet I cannot see but that the great and Almighty Creator may act by any law He pleases, and in such a manner that we may have no conception as to what is the law by which He does the work of creation. I regard the paper we have heard to-night as a valuable one, inasmuch as it has drawn our attention to these enlarged views of Christian revelation, and to its many-sidedness. The more we study, the more we shall find that as it is in the Christian revelation, so is it also in the natural creation of Almighty God, and *vice versa*. If we can show that the one is the counterpart of the other, I hold that we shall have got rid of every possible objection which can be made against revelation, leaving to those who consider the subject, the simple alternative of atheism or Christianity.

Mr. J. E. HOWARD.—I must express my great admiration of the paper which has been read to-night ; and in saying this, I know that I am giving utterance to a sentiment that prevails throughout this meeting. With regard to what has been said as to the varieties of the human species, as shown by the oldest records on certain monuments, I think that the argument adduced in support of the extreme antiquity which has been claimed

for man, ought not to be allowed to go unchallenged, as though that argument had necessarily been proved. The question of the different races of mankind is one which I think might very appropriately occupy the attention of such a society as this. It is one which has been exceedingly well discussed in France, where much and patient research has led to certain conclusions with regard to the differences between species and races; and if you will permit me, I will put before you what has been said by one of the leading French naturalists—M. Quatrefages. He states:—

“The species is the collective amount of individuals more or less resembling each other, which are descended, or can be looked upon as descended, from one primitive pair by an uninterrupted and natural succession of families.

“The variety is an individual, or a collection of individuals belonging to the same sexual generation, which is distinguished from other representatives of the same species by one or more exceptional characteristics.

“The race is the totality of individuals belonging to a single species having received, and transmitting by way of generation, the characters of a primitive variety.

“Thus the species is the point of departure. In the midst of the individuals which compose the species appears the variety, and when the characters of the variety become hereditary they form a race. These are the relations which for all naturalists reign between these three terms, and which it is necessary to have constantly before the mind in the study of the questions which occupy us.”

From hence it follows that the notion of resemblance, which is very much attenuated in the species, becomes of absolute importance in the race. The union of individuals of different species is very rarely productive. It is quite otherwise with the union of individuals of the same species, but of different races. Here, however opposed the morphological characters may be, the union is easy, and always fruitful, and they transmit to their descendants the reproductive faculties which they themselves possess. These facts are admitted by Darwin, although opposed to his doctrines. It would, of course, follow that the human species is but one, because all the races are thus fruitful; and it would also follow that varieties having sprung up, perhaps suddenly, may become distinct races. This is proved most completely as regards both plants and animals. The question of time is not a matter to be considered as regards the formation of a variety: it may occur suddenly, and may then be transmitted so as to form a race; and races so produced, according to the view of M. Quatrefages, may go on propagating themselves. I do not wish to take up the time of the meeting on a point going beyond the question that has brought us together, but I have thought it right to direct attention to an argument which certainly ought not to pass without challenge—namely, that the different races of mankind necessarily prove anything as to the length of time man has occupied a place on the globe.

Rev. JOSIAH MILLER.—I should like to offer a few remarks in addition to those to which I have already listened with so much pleasure. It struck me in hearing the paper which has been read to us, that, although it is an

excellent and valuable contribution to the subjects discussed by this Society, it is capable of advantageous development in several respects. In § 10 reference is made to the seeming dissimilarity of the stellar bodies, especially in the case of the planets, which, it is stated, are found on investigation to be very similar. The writer might here have referred to the recent discoveries in connection with the spectral analysis;* and I suggest that it would have been well worth the while of an Institution like this, to have heard, and quite in harmony with the well-known attainments of the writer of the paper, if he had made some reference to this subject. (Hear.) This wonderful discovery, so lately made, has enabled us to know that the planets are similar in their character to the earth on which we dwell, and that there is some reason to believe that even the so-called fixed stars, which are suns themselves, are also composed of the same elements. Again, in § 14 a further reference is made to an interesting analogy between the constituent parts of the earth, and the various things found in the Bible, against which it is charged, that they are thrown together confusedly and without discrimination, and that therefore the Bible cannot be the work of the divine Creator. It is said by the writer of the paper that we find the various strata of the earth, although seemingly thrown together without order, yet, by means of this apparent disorder, bringing up to the surface where needed the various elements required for the comfort and sustenance of man. No doubt this is in itself a very

* Mr. R. A. Proctor, F.R.S., has since written in regard to a recent discovery as follows:—"News has been received about the constitution of the atmosphere of Uranus, and news so strange (apart from the strangeness of the mere fact that any information could be gained at all respecting a vaporous envelope so far away) as to lead us to speculate somewhat curiously respecting the conditions under which the Uranians, if there are any, have their being. Admitting that the line seen by Dr. Huggins is really due to hydrogen—a fact of which he himself has very little doubt—we certainly have a strange discovery to deal with. If it be remembered that oxygen, the main supporter of such life as we are familiar with, cannot be mixed with hydrogen without the certainty that the first spark will cause an explosion (in which the whole of one or other of the gasses will combine with a due portion of the other to produce water), it is difficult to resist the conclusion that oxygen must be absent from the atmosphere of Uranus. If hydrogen could be added in such quantities to our atmosphere as to be recognizable from a distant planet by spectroscopic analysis, then no terrestrial fires could be lighted, for a spark would produce a catastrophe in which all living things upon the earth, if not the solid earth itself, would be destroyed. A single flash of lightning would be competent to leave the earth but a huge cinder, even if its whole frame were not rent into a million fragments by the explosion which would ensue. Under what strange conditions, then, must life exist in Uranus, if there be indeed life upon that distant orb. Either our life-sustaining element, oxygen, is wanting, or, if it exists in sufficient quantities (according to our notions) for the support of life, then there can be no fire natural or artificial, on that giant planet. It seems more reasonable to conclude that, as had been suspected for other reasons, the planet is not at present in a condition which renders it a suitable abode for living creatures." [Ed.]

important argument drawn from analogy ; but I think it would have been well if there had also been reference to the fact, that just as each book of Scripture has its definite object, so also had each stratum of the earth its particular use, which affords an explanation of the reason existing for the variety observable. The Book of Deuteronomy, in the Old Testament, had its definite object, as also have the Epistles of St. Paul, each, in its own way, fulfilling its destined purpose ; just as recent discoveries have shown that there have been important eras in the history of geology, in which each stratum, or series of laminae, have had their due relation to the work of the Creator. I would therefore suggest, that in this way the point which has been so well taken up by the writer of the paper might have been illustrated with advantage.

Mr. J. P. HARRISON.—I will just offer a remark or two as to what has been said about different races of man, and as to the negro being pictured on the monuments of Egypt so soon after the Flood. There seems, to my mind, no reason to suppose that there may not have been a black man in the ark, because it is quite possible that the black race may have been developed before the Deluge. It should be remembered that we have the four races of mankind distinctly marked as they are, and corresponding with the four patriarchs of the ark—namely, Noah and his three sons. If these all went in different directions, to different parts of the world, the races would be thus kept separate, and the peculiar features of each portion of the family would become developed and spread, while, by intermarriages between the different races, varieties would be very quickly produced.

Captain M. S. NOLLOTH, R.N.—I should like, Sir, to make a brief observation in reference to what has been said about the varieties and origin of the human species. I believe it is admitted that in both America and Australia, a small but perceptible alteration is observable in the appearance of the race during the brief periods of our connection with those countries respectively. The peoples have become taller and thinner, and in minor respects different from their European ancestors ; and the Australians are said to be approaching more nearly in each generation to the Anglo-American type. I venture to think it somewhat strange that the darkest-skinned Hindoo should, in the long frame-work, be more like the white Caucasian than the Mongolians, many of whom are as white as ourselves, while their—the Mongolians'—frame approaches in several respects to that of the Negro, as do their facial features, in certain particulars, to that of the latter. I think that, with many persons the difficulty of believing in a common origin lies more in difference of mere colour of skin, than in that of osteological features. But I do not profess to be learned in these matters.

Mr. WELDON.—I have to thank those that have spoken, for the gentle manner in which they have applied their criticisms to my paper. I must say that I expected to have been much more "cut up" than I have been, and I am glad to find that you have so generally agreed with the drift of my observations, relative to the origin of species. I regard it as one of

the advantages of reading a paper before an audience in whom unity in variety exists, that the arguments may be criticised with any amount of keenness, provided the criticism be based on sufficient data. (Hear, hear.) I have also noticed from time to time, that in papers read to mixed audiences, as critic after critic rises up, the authors of the papers have very little to reply to, because the several critics answer each other as the discussion goes on. In the present instance I am much obliged to Mr. Howard and Mr. Harrison, who have already anticipated my remarks in reply to Dr. Currey, who spoke first of all with regard to species. Perhaps I may be allowed to say here, with regard to the paper before me, that I mention in the prefatory portion of it that I was dealing with the subject only in an elementary and suggestive manner; and I am glad to find that, to some extent, my suggestions have been taken up. I also feel that if I had written a much longer paper, it would not be so satisfactory as it now is to go away with the knowledge that I have been criticised for not being long enough, inasmuch as this is a fault which, generally speaking, we clergy are not often found guilty of. With regard to the allusion which has been made to distinct varieties, which have been clearly marked, and preserved through successive generations, we must remember that in past times the means of locomotion were very little known, and that those who happened to find themselves on islands, or in situations where they were separated by great convulsions of nature from the rest of the world, could hardly be expected to undergo any change of type. People so circumstanced must for ever preserve the same types which were originally found to prevail in the different islands and continents upon which they have lived, separated from other tribes by the impassable obstacle of the ocean. The question has been asked to-night, "How is it that these different types remain so constant, and so uniformly maintain the same characteristics?" My reply is that they continue constant because they have nothing to interfere with their remaining so; but the moment you introduce other races, as has been observed by one gentleman who has addressed us, you find from that period an alteration of the type—a change in the external form of skull takes place at once. (Hear, hear.) While travelling through the forests in the interior of the Sierra Nevada I came across two Englishmen, who, seeing me wandering through that unfrequented part of the world, almost took me for an improved order of gorilla. They asked me to their huts, and introduced me to their wives, and in both cases the wives or squaws were original, thoroughbred, out-and-out specimens of the Indian Digger race. It was a treat to witness the pride of those two men as they showed their little children. One of them had two children, five and seven years of age respectively, both of whom he brought forward, and he would not allow me to leave the hut till he had shown all their points. He said, "I intend bringing these two little boys to London to show what an improvement may be made in the race." And certainly, when I compared the type of the humble and modest squaw, who seemed to have anticipated the use of veils, with the beautiful children of whom she

might well be proud, I could not help seeing that the introduction of another race had considerably altered, even in the very first generation, the appearance of the skull and all the other characteristics which are considered as having been for ages constant and unvarying. (Hear, hear.) There is another fact which I wish to point out, and that is that the Anglo-Saxon race generally runs itself pure; that is to say, that as the Anglo-Saxon race becomes associated with the various races of the earth, the progressive development theory is sure to end in very greatly improving the races with whom the Anglo-Saxon element comes in contact. I wish you to remember, therefore, that the absence of the means of locomotion, and the lack of intermarriages, have a great deal to do with accounting for the marked and constant appearances preserved throughout successive generations of the same types. Another point to which attention has been called is that of the argument derived from botany. What I meant by referring to the orders of grasses was this: I cannot help thinking that if you were to take up a single piece of meadow grass, and show the stalk of it to some ignorant and well-meaning peasant, telling him that it was of exactly the same family as the sugar-cane, he would look at it with very wondering eyes, and you could scarcely expect that he would give credence to the statement. I intended by the analogy I thus employed, to say that there does not appear to be a greater difference among the varieties of the human race, than what we see among the different varieties of the same order of grasses, and my object was merely to show the unity of plan which is everywhere apparent in almost endless varieties of forms. With regard to what has been suggested as to Scriptural testimony, possibly I may be open to correction there; but I was under the impression, from what I had read in the *Times* with regard to the recent discovery, that there was an undesigned coincidence in the new testimony in support of the statement that there had at one time been a great cataclysm or deluge, and that whatever there might be in the various traditional descriptions of this great event, which tended to support the Biblical narrative, all helped towards establishing its truth. (Hear, hear.) We know how frequently it happens that things, which in themselves are mere nothings, when taken in the aggregate, become very important, and in the same way I say that things which are found outside Scripture, although only regarded as mere myths, are often truths which have been perverted, as we know must be the case where they can only be preserved by oral tradition.

Mr. Row.—Pardon me; I think you have misunderstood. I did not say that the myths themselves might not be evidence, but that in the particular case of the stone which has been recently deciphered, the story was by the inscription itself shown to have been classed among a set of myths.

Mr. WELDON.—I am a great believer in the mythological histories of the old Greeks and Romans, as proving how a great variety of truths may in the progress of time have lost the original impress of truth, as is always the tendency of history handed down by means of oral tradition only. With regard to the brevity of my paper, noticed also by Mr. Row, I must confess

that that was a designed coincidence. I felt that, as this was the first time I had come among you, it would be rather presuming on my part if I were to take up too great a portion of your time. Moreover, there is some degree of satisfaction in knowing that one fault alleged against the paper was that it was too short. I may also say, at this point, that I have extended my analogy considerably further than has appeared in the paper; and if I had had time, I would have pointed out that there is an analogy between the four ages of nature, which I have classified as the reigns of fishes, reptiles, mammals, and man, and the successive dispensations, as mentioned in the Bible. There you will see the Patriarchal dispensation, the Levitical, the Prophetical, and the dispensation of the New Testament. I look on old Judaism, with its types and symbols, as containing so many petrifications, as it were, which it is most useful for us to refer to, and which help many a time to throw light on what we see in the New Testament. But I did not think it necessary for me, in such a paper as I have read, to go into these details. With reference to what has been said about the Germanic, the Greek, and the Celtic forms of Christianity, I wish to make one observation by way of caution, and it is this: The law of variety has its limits, and this is most beautifully shown in the case of orchids, to which reference is made in the paper. Do your best, and you cannot propagate them beyond a certain limit, and this is one of the strongest and most fatal facts that can be used in opposition to the Darwinian theory. And so it is with regard to the various forms of Christianity. I maintain that by analogy, every form of Christianity retaining the simple truths of the Bible is a form of Christianity which is in itself pure, and good, and excellent; but this observation is to be limited in proportion as there is introduced upon those Bible truths, anything which verges upon mere tradition. I might have alluded to the Greek Church; but I did not like to enter into these things in my paper, because I did not know but that, although there might be unity here in general, there might be great variety in details. (Laughter.) But I cannot help saying, however much I may differ from some of my friends on this point, that I am somewhat catholic and liberal in my views, which I may explain by the expression of St. Paul, that there are differences of denominations, but the same Lord. (Hear, hear.) Every one of us, as a basis of unity, may acknowledge the same Lord, but there may be many differences as to other matters. With regard to what Mr. Row has said, about the danger of assuming that many of the peculiar structures of the animal creation have resulted, not from the act of the Divine being, but from the fall of man; I think that there is no creature which has been placed upon this earth that does not show, in some way or other, the wisdom of the Great Designer; but how far we are to trace back the various evils to be noticed in connection with God's creatures, to their Almighty Maker, is quite another question. (Hear, hear.) This point arises in connection with the venom of the serpent, the trickery of the fox, and many other well-known instances; but this sort of inquiry might lead us too far back out of the original line of argument, because we can never forget that there is a

spirit of evil, as well as a spirit of good, and how far that spirit of evil has been suffered to prevail, and for what end, is not for us to determine, and pronounce with any degree of certainty. With reference to the subject of the spectral analysis, I may state that I did not wish to introduce that topic, for I find that in several of the papers or discussions in connection with this Institute, that peculiar analysis has its place. I might also have introduced the authority of the Duke of Argyll, if I had not likewise seen him quoted before in previous papers; but you will observe that I do say, in § 10 of my paper, that the planets which are apparently so dissimilar, are constructed in the same manner; and the information on which this is affirmed has been obtained, among other sources, from the spectral analysis. With respect to what has been said as to the illustrations to be drawn from the Bible, I would desire very briefly to observe, that as each stratum of the earth's surface is essential for the uniform production of those things which are requisite to our existence, so I hold that you cannot eliminate a single book from the Bible without interfering with the beautiful uniformity of design that pervades the whole of the Word of God. Every stratum of the earth has its particular adaptation, each helping to produce the general result; and in the same way, whatever casket you unfold in the Word of God, from Genesis to Revelation, you will be sure to find some precious jewel regarding Jesus Christ, which, whether it be put before us in the shape of prophecy, parable, symbol, or type, is illustrative of the great truth to be afterwards disclosed when in the fulness of time the occasion arrives. (Hear, hear.) With reference to what has been adduced in relation to the character of the Egyptian monuments, I think it would not be wise for us to trust to the colouring which has been employed on the various vases and tombs that have been discovered in Egypt. I hardly think that the Egyptians knew much about the art of colouring, and I do not regard the fact that some of the figures were delineated in black pigments as a very strong argument that they were intended to be represented as black. And then, with regard to the question how far the sun has an effect upon human beings, so as to produce a remarkable colour which is capable of being inherited, is a matter that has been very little touched upon as yet. I know that in the case of tribes of the Mexicans, originally descended from Europeans, you would suppose that they were approaching half-way to what is termed the black colour, simply from the constant exposure to the sun, as well as from peculiarities of food, and so forth. In my opinion, we have a great deal yet to learn with regard to this question of colour and pigment; and the subject is, I confess, one upon which I am too ignorant to know how it could be properly treated. With regard to the general effect of the paper, I have simply to say that I should be very happy to receive from any one here, any suggestion which he would like to see developed in some other form; but I must add that it is very necessary that papers, such as are read at these meetings, should not contain too much; and it is, I think, rather a good fault if, when we go away from an entertainment,

whether of a festive or a literary character, we are still desirous of a little more.

Mr. Row.—I should be glad if the author of the paper would state his authority for the extraordinary fact that the bones of a pig will change colour if the animal be fed upon madder, and if he will also state how long it will take to produce this result?

Mr. WELDON.—The fact is well known, and I believe it will take only about six weeks, or even three, to change the colour of the bones. The simplest way of proving this, however, is to try the experiment. However, as I have stated, the fact is generally known; and as another example I may mention the case of bees, whose honey has often been found to take a variety of colour from the nature of the food they obtain during the summer months.

The Meeting was then adjourned.

THE PRESENT ASPECT OF INQUIRIES AS TO THE INTRODUCTION OF GENERA AND SPECIES IN GEOLOGICAL TIME. By Principal J. W. DAWSON, LL.D., F.R.S., McGill College, Montreal, *Hon. Foreign Correspondent of the Victoria Institute.**

THERE can be no doubt that the theory of evolution, more especially that phase of it which is advocated by Darwin, has greatly extended its influence, especially among young English and American naturalists, within the few past years. We now constantly see reference made to these theories, as if they were established principles, applicable without question to the explanation of observed facts, while classifications notoriously based on these views, and in themselves untrue to nature, have gained currency in popular articles and even in text-books. In this way young people are being trained to be evolutionists without being aware of it, and will come to regard nature wholly through this medium. So strong is this tendency, more especially in England, that there is reason to fear that natural history will be prostituted to the service of a shallow philosophy, and that our old Baconian mode of viewing nature will be quite reversed, so that, instead of studying facts in order to arrive at general principles, we shall return to the mediæval plan of setting up dogmas based on authority only, or on metaphysical considerations of the most flimsy character, and forcibly twisting nature into conformity with their requirements. Thus "advanced" views in science lend themselves to the destruction of science, and to a return to semi-barbarism.

In these circumstances, the only resource of the true naturalist is an appeal to the careful study of groups of animals and plants in their succession in geological time. I have myself endeavoured to apply this test in my recent report on the Devonian and Silurian flora of Canada, and have shown that the succession of Devonian and Carboniferous plants does not seem explicable on the theory of derivation. Still more recently, in a memoir on the Post-pliocene deposits of Canada, now in course of publication in the *Canadian Naturalist*, I have by a close and detailed comparison of the numerous species of shells found embedded in our clays and gravels, with those living in the Gulf of St. Lawrence and on the coasts of Labrador and Greenland, shown that it is impossible to suppose that any changes of the nature of evolution were in progress; but on the contrary, that all these species have remained the same, even in their varietal changes, from the Post-pliocene period until now. Thus the inference is that these species

* These remarks are from Dr. Dawson's Annual Address as President of the Natural History Society of Montreal, May, 1872.

must have been introduced in some abrupt manner, and that their variations have been within narrow limits and not progressive. This is the more remarkable, since great changes of level and of climate have occurred, and many species have been obliged to change their geographical distribution, but have not been forced to vary more widely than in the Post-pliocene period itself.

Facts of this kind will attract little attention in comparison with the bold and attractive speculations of men who can launch their opinions from the vantage-ground of London journals ; but their gradual accumulation must some day sweep away the fabric of evolution, and restore our English science to the domain of common sense and sound induction. Fortunately also, there are workers in this field beyond the limits of the English-speaking world. As an eminent example, we may refer to Joachim Barrande, the illustrious palæontologist of Bohemia, and the greatest authority on the wonderful fauna of his own primordial rocks. In his recent memoir on those ancient and curious crustaceans, the Trilobites, published in advance of the supplement to vol. i. of the *Silurian System of Bohemia*, he deals a most damaging blow at the theory of evolution, showing conclusively that no such progressive development is reconcilable with the facts presented by the primordial fauna. The Trilobites are very well adapted to such an investigation. They constitute a well-marked group of animals trenchantly separated from all others. They extend through the whole enormous length of the Palæozoic period, and are represented by numerous genera and species. They ceased altogether at an early period of the earth's geological history, so that their account with nature has been closed, and we are in a condition to sum it up and strike the balance of profit and loss. Barrande, in an elaborate essay of 282 pages, brings to bear on the history of these creatures his whole vast stores of information, in a manner most conclusive in its refutation of theories of progressive development.

It would be impossible here to give an adequate summary of his facts and reasoning. A mere example must suffice. In the earlier part of the memoir he takes up the modifications of the head, the thorax, and the pygidium or tail-piece of the Trilobites, in geological time, showing that numerous and remarkable as these modifications are in structure, in form, and in ornamentation, no law of development can be traced in them. For example, in the number of segments or joints of the thorax we find some Trilobites with only one to four segments, others with as many as fourteen to twenty-six, while a great many species have medium or intervening numbers. Now in the early primordial fauna the prevalent Trilobites are at the extremes, some with very few segments, as *Agnostus*; others with very many, as *Paradoxides*. The genera with the medium segments are more characteristic of the later faunas. There is thus no progression. If the evolutionist holds that the few-jointed forms are embryonic, or more like to the young of the others, then on his theory they should have precedence, but they are contemporary with forms having the greatest number of joints, and Barrande shows that

these last cannot be held to be less perfect than those with the medium numbers. Further, as Barrande well shows, on the principle of survival of the fittest, the species with the medium number of joints are best fitted for the struggle of existence. But in that case the primordial Trilobites made a great mistake in passing at once from the few to the many-segmented stage, or *vice versa*, and omitting the really profitable condition which lay between. In subsequent times they were thus obliged to undergo a retrograde evolution, in order to repair the error caused by the want of foresight or by the precipitation of their earlier days. But, like other cases of late repentance, theirs seems not to have quite repaired the evils incurred; for it was after they had fully attained the golden mean that they failed in the struggle, and finally became extinct. "Thus the infallibility which these theories attribute to all the acts of matter organizing itself is gravely compromised," and this attribute would appear not to reside in the trilobed tail, any more than, according to some, in the triple crown.

In the same manner the palæontologist of Bohemia passes in review all the parts of the Trilobites, the succession of their species and genera in time, the parallel between them and the Cephalopods, and the relations of all this to the primordial fauna generally. Everywhere he meets with the same result; namely, that the appearance of new forms is sudden and unaccountable, and that there is no indication of a regular progression by derivation. He closes with the following somewhat satirical comparison, of which I give a free translation:—"In the case of the planet Neptune it appears that the theory of astronomy was wonderfully borne out by the actual facts as observed. This theory, therefore, is in harmony with the reality. On the contrary, we have seen that observation flatly contradicts all the indications of the theories of derivation with reference to the composition and first phases of the primordial fauna. In truth, the special study of each of the zoological elements of that fauna has shown that the anticipations of the theory are in complete discordance with the observed facts. These discordances are so complete and so marked that it almost seems as if they had been contrived on purpose to contradict all that these theories teach of the first appearance and primitive evolution of the forms of animal life."

This testimony is the more valuable, inasmuch as the annulose animals generally, and the Trilobites in particular, have recently been a favourite field for the speculations of our English evolutionists. The usual *argumentum ad ignorantiam*, deduced from the imperfection of the geological record, will not avail against the facts cited by Barrande, unless it could be proved that we know the Trilobites only in the last stages of their decadence, and that they existed as long before the Primordial as this is before the Permian. Even this supposition, extravagant as it appears, would by no means remove all the difficulties.

MEETING,* MARCH 17, 1873.

H. CADMAN JONES, ESQ., IN THE CHAIR.

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

MEMBERS :—

R. C. L. Bevan, Esq., 25, Prince's Gate, Kensington, W.
 R. Luke Howard, Esq., Bruce Grove, Tottenham, N.
 E. Rigge Lloyd, Esq., Spark Hill, Birmingham.

ASSOCIATES :—

The Rev. T. R. Birks, M.A., Professor of Moral Philosophy in the University of Cambridge, Trinity Parsonage, Cambridge.
 The Rev. G. K. Flindt, M.A., Incumbent of Denmark Hill, 157, The Grove, Camberwell.
 Major E. D. Smith, The Laurels, Twickenham.

Also, the presentation of the following Books to the library :—

“Transactions of the Royal Society.” Part 142. *From the Society.*
 “The Quinology of the East Indian Plantations.” By J. E. Howard, Esq. *From the Author.*

The Rev. H. Moule then read a Paper “On the Testimony of a Portion of the Vegetable Kingdom to the God of the Scriptures.” A discussion followed, in which Admiral E. P. Halsted, the Rev. J. W. Buckley, the Rev. G. W. Weldon, Messrs. J. Bateman, F.R.S., C. Dibdin, J. E. Howard, T. W. Masterman, A. V. Newton, P. Vernon Smith, and the Chairman took part. The Rev. H. Moule having replied, the meeting was then adjourned.

* Intermediate.