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JOURNAL OF  
THE TRANSACTIONS  
OF  
The Victoria Institute,  
OR  
Philosophical Society of Great Britain.

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EDITED BY THE HONORARY SECRETARY,  
CAPT. F. W. H. PETRIE, F.R.S.L., &c.

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VOL. XII.



LONDON :

(Published for the Institute)

HARDWICKE & BOGUE, 192, PICCADILLY, W.

E. STANFORD, CHARING CROSS.

1879.

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## ORDINARY MEETING, FEB. 4, 1878.

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

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

HONORARY FOREIGN CORRESPONDING MEMBER :—H. M. Stanley, Esq.

MEMBERS :—The Right Rev. Bishop Staley, D.D., Lichfield ; Rev. Professor Dabney, D.D., United States ; Rev. R. W. Kennion, M.A., Norwich ; W. H. Porter, Esq., Letterkenny.

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

“Proceedings of the Royal Geographical Society,” 1st yearly Part.

*From the Society.*

“Proceedings of the Royal United Service Institution,” Part 93.

*From the Institution.*

“Comparative Psychology.” By Professor Bascom. *The Author.*

“The Charing Cross Magazine.” *From T. W. Greenwell, Esq.*

The CHAIRMAN.—We are all well aware that in the present day, unfortunately, scientific thought is, by some scientists, made to interfere with what properly belongs to the scope of religious belief. I have therefore much pleasure, on the present occasion, in inviting your attention to the paper now to be read, in which we shall find that the important principles we proclaim are placed in a highly satisfactory light. I have now to call upon Bishop Cotterill to read his paper. (Cheers.)

The following Paper was then read by the Author :—

**ON THE TRUE RELATIONS OF SCIENTIFIC THOUGHT  
AND RELIGIOUS BELIEF.** By the Right Reverend  
the BISHOP OF EDINBURGH.

IT is probable that by this time most persons are tired of hearing that “the problem of the age is the reconciliation of science and religion.” Such language is certainly exaggerated, and implies, I think, some misconception of the question at issue. Many of us, doubtless, are of opinion that if only scientific men and theologians would be content to work in their several spheres, with sincere, patient, and reverent love for truth, religion and science would in due course reconcile themselves, without any interference of ours ; and we ourselves may not only find no obstacle to our religious belief in any of the legitimate results of scientific research, but even in regard to speculations which may seem to us to transgress the true limits of scientific thought, we may cheer-

fully rest in the conviction that "Truth is the daughter of Time," and that we must not expect at once to discover the harmony of all things in heaven and earth.

2. The very existence, however, of this Institute is itself a proof that we are conscious that there is nevertheless an important work to be done, in some degree peculiar to the present age, in investigating the true relations between these two departments of human thought. Those of us, indeed, who know from sad experience how deeply infidelity and even atheism have penetrated into the lower strata of our English life, and how they are fostered by the specious arguments against all religious belief which some of the theories of modern science suggest, cannot but feel how necessary in these days, and how highly to be valued, are the labours of those who devote themselves to the special work of exposing these sophistries. And we cannot but ask with some anxiety, what progress has been made in this direction, and whether anything has been effected towards the solution of the problem (to use the popular language) of the reconciliation of science and religion.

3. It seems impossible to doubt that there has been of late among the more intellectual classes some reaction from the general disbelief which at one time was the fashion, and which still represents itself in some of our leading periodicals as the most advanced thought of the age. It has been found that the leaders in that department of science which is physical science in its true and proper sense are, in this age, as they have been in former ages, believers in Revelation; whilst the objections to Christianity have proceeded almost exclusively from men who, however eminent for certain scientific attainments, are students only of the phenomenal laws, and not of the dynamics of nature. Indeed, dynamical science has turned the tables on the objectors, proving from its own standing-point, if not all that it attempts to prove, at all events that the problems of the universe present greater difficulties to the unbeliever than to the Christian. And on all sides there seems to be growing up a somewhat altered feeling. On the one side, it is discovered that Christianity has much more to say for herself on purely scientific grounds than was anticipated. On the Christian side, there is more confidence that all real science ought to be welcomed as an ally, and not feared as an enemy; and there is, on this side at least, much less of that dogmatical and overbearing language as to the questions at issue, which too often in controversy displays the consciousness of want of argument.

4. We have, therefore, good reason to believe, it would seem, that some progress has been made in the right direction. Yet, if we are to have a lasting peace—I do not, of course,

mean between Christianity and unbelief: between these there can be no peace while the world lasts, but between science itself and religion, as there certainly ought to be,—it must be established, as it appears to me, on a somewhat broader basis than has been as yet assumed. Attempts to reconcile them at particular points only are always of doubtful advantage. We may seem to have gained much when we prove, for example, that the history of creation in Holy Scripture harmonizes with the conclusions of geology or of dynamical science; or when it is maintained by scientific men that the physical universe is constructed of atoms which have the character of “manufactured articles”; or when a new discovery throws doubt on some theory that seems to us to exclude the Creator from His own world. But there is no small risk in this mode of dealing with the question, of doing some injury alike to science and religion, and especially of producing a feeble hybrid, which is neither genuine science nor true religion. And this method of seeking a reconciliation between the two seems to assume that the conclusions of science have a certainty such as the principles of Christianity do not possess, which is exactly the opposite of the truth. For not only is it manifest that many of the particular hypotheses of science are more or less guesses in the dark, which more knowledge may largely modify, but also generally scepticism, which is fatal to religion, is the very life of science. And if some of those scientific conclusions, which seem to confirm religion and to effect the reconciliation desired, are found in the progress of human knowledge to be not altogether trustworthy, religion itself may receive no small detriment. At all events, our faith is in danger of becoming a poor faint-hearted thing, always suspicious of science, and afraid lest some new discovery should knock away the uncertain supports on which it had too much relied in its conflict with infidelity.

5. Indeed, very little reflection might convince us that in order to avoid these dangers we need a general solution, and not any number of particular solutions of the problem. However, it is clearly not sufficient to say generally that science and religion have different spheres, that each is paramount in its own, and that the one need not interfere with the other. This the unbeliever readily admits, and complacently bids religion confine itself to the *sentiments*, and elevate them, leaving to science the sphere of logical reasoning, for which he claims absolute authority over the mind. But sentiment, we well know, means anything or nothing, except it be rational and have a basis of reality; and certainly Christianity claims to be, in the highest conceivable sense, reasonable, the very manifestation in human life of Divine Reason.

6. It is evident, then, that this question of the several spheres of religion and science needs to be very carefully investigated, and my purpose this evening is to offer a few suggestions towards the solution of this great problem. My deep conviction is that the rapid progress of physical science in modern times has given rise to popular notions as to the authority of scientific thought, and its right to control and dictate to the intellect, which are both altogether groundless and very misleading. And I am now referring not merely to some doubtful theories, but even to those conclusions which we all accept without questioning. In order, however, to discuss this, it will be necessary first of all to examine—and this I will do as concisely as is possible without being obscure—the several distinct modes of regarding the universe, that is, the several spheres of thought of which the human mind is capable, and of which the scientific method is but one. Fichte, who, at times, even while subverting the very basis of all religious belief, yet indicates with singular clearness the lines on which Christian thought should proceed, has, in a work known in this country by an English translation, *The Way towards the Blessed Life*, marked out a fivefold division of this subject, which, with such modifications as are required to make it Christian instead of Pantheistic, and are, indeed, necessary to its exactness and completeness, seems to me a perfectly exhaustive analysis; and without accepting his conclusions, or even following his arguments, I shall avail myself of the general outline of his analysis, as directing us to accurate distinctions of the several spheres of human thought which become, I think, almost self-evident when they are once defined.

7. (I.) For instance, it will not be questioned that the first and lowest mode of regarding the universe, the view of the outer world to which we are all naturally more or less enslaved, is that of *sense*; that in which those things which men apprehend by their sight, their hearing, their feeling, and their other bodily senses, seem to them the only realities. The man who cannot rise above this sphere of thought is in the lowest sense, *ἄνθρωπος ψυχικός*, a natural man, and is, without all doubt, living a life unworthy of the high powers and the great ends of humanity. Or, as Wordsworth says,—

“ Whose mind is but the mind of his own eyes,  
He is a slave, the meanest we can meet.”

And you will remember when the poet would describe a man destitute of all generous feelings and honourable motives, his incapacity of regarding any other aspect of nature beyond that which the senses recognize is the index of his character :

“ A primrose by the river’s brim  
 A yellow primrose was to him,  
 And it was nothing more.”

8. But, although such a view of the world around us differs little, probably not at all except in degree, from that of animals, yet we cannot, without undermining the foundations both of all knowledge and of all morality, treat this sense-view as in itself unreal, or consider the forms and phenomena of the universe to be illusions. These phenomena, indeed, when tested by reason, are found to be the effects of causes oftentimes totally different from the interpretation put on them by the senses; the colour of an object, for example, as it appears to the eye, and the particular vibrations of the ether which produce the sensation of that colour, are so different in kind that the mind can trace no connection or analogy between them. Yet the one is as truly a reality as the other, and as certainly the work of the Creator. It is the mere pedantry of science to condemn as untrue popular language, the language of the senses; as if those things which science regards as realities were anything else than effects of yet higher causes, such as doubtless would be found, could we comprehend them, to differ as widely from the conceptions of science as these do from our immediate perception of the phenomena.

9. (II.) Again, it requires but little consideration to discover that the second, or next in order from the lowest mode of viewing all created existence, is that to which our logical faculty, and reason (in a limited sense of the word) directs us; in which the universe is regarded as the outcome of *law*, and of orderly sequences of cause and effect. This view, in reference to the material universe, is that of physical science, the office of which is to investigate the laws according to which the sequences of natural phenomena are governed. Such, though by no means so accurately defined, or so logically determined, as it has become in modern times, was the idea which in the ancient Greek philosophy was involved in the word *φύσις*, the notion in this, as in the Latin *natura*, being that of a generative and productive power expressing itself, according to some primordial law, in the forms and phenomena of the Universe. In conformity with this idea, modern science, as its horizon extends, aims not only at discovering the immediate antecedent of each phenomenon, but also at proving these various antecedents to be results of some common cause, and thus representing the various energies of nature as only different forms of the same universal energy, and the apparently diverse or even conflicting laws, as all dependent on one common law.

10. But this view of Nature,\* as was recognized even in the Greek philosophy, includes not the material universe only, but the whole nature of man, and, therefore, his civil and political relations—those which belong to him as a member of the human family; and it is thus the foundation of social and moral science. In regard to these, however, its sphere is very limited, as it cannot transcend the realm of law, or deal with questions, the governing principle in which is spirit, and not Nature only—that spirit which is life, and not mere law, which is self-determining, and not the mechanical effect of antecedent causes. Science, however, as the logical investigation of law, and of the sequences of causes and effects, has to do, not only with those relations between men which are determined by the laws of the State, but also with that lower, yet most true, doctrine of morals which forbids injustice between man and man, and dictates obedience to that which duty requires, whether commanded by any external law or not. Nor is this science, as might be imagined, of a different order from physical science; for the law and order of the material universe are but the counterpart of those which must govern the social state of man, if it would fulfil its proper ends; as has been beautifully said, in the spirit of the truest philosophy, of those molecules of which, according to the theory which the writer has expounded, all the systems of the material universe are constructed,

“From the ineffaceable characters impressed on them, we may learn that those aspirations after accuracy in measurement, truth in statement, and justice in action, which we reckon among our noblest attributes as men, are ours because they are essential constituents in the character of Him Who in the beginning created, not only the heaven and the earth, but the materials of which heaven and earth consist.” (*Clerk Maxwell on Molecules.*)

11. (III.) And yet, however superior to the life of sense, and worthy of a rational being, the scientific mode of regarding the universe may be—and to many it appears the sum total of all conceivable wisdom,—it is nevertheless certain that most cultivated intellects, and many, indeed, that are uncultivated, find this view wholly insufficient of itself to satisfy them, and that there is a higher and nobler region of thought, as far removed from that of mere law as this is from the domain of the senses. The grandeur and the beauty of the universe appeal to a faculty in man, far superior to that logical faculty which amounts only to the recognition of identities; while the spirit of man has a *poetic* or creative power, and derives from the universe ideas which the dialectic reason

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\* *Maine's Ancient Law*, p. 54.

could never have discovered there. Certain notions of beauty indeed there are which proceed merely from pleasurable effects on the senses, or from associations with such effects; but these belong to the first, or lowest, view of the universe, and even animals seem to possess some such feelings. But the true human consciousness of beauty is of a different order from this, and exists even in the absence of actual sensation. It depends, however, in no degree on the knowledge of the causes by which phenomena are produced, and is in no way connected, it would seem, with the logical faculty; indeed, the scientific mode of regarding the universe, except as it enlarges our view of Nature, seems to be a hindrance rather than helpful to the exercise of the higher and creative faculty. "The glory of Nature," to use the eloquent words of the late Canon Mozley, "in reality resides in the mind of man; there is an inward intervening light through which the material objects pass, a transforming medium which converts the physical assemblage into a picture." This mode of regarding all created being, which as looking through Nature to invisible ideals, and being a witness that we belong to a higher universe than this which is seen, we may call the *spiritual* mode, is not only the source of all real art, as distinguished from the mere imitation of nature, but, in another form, is essential to that higher moral life which consists not in mere obedience to law, even the law of conscience, but in the love of that which is good and excellent, τὸ καλοκαγαθόν, for its own sake. To this sphere of thought and sentiment belongs indeed all that is noble and elevating in man, and in the history of the world. The ideas which are of this order, soaring above the region, not only of the sensible perceptions, but also of mere law and scientific conclusions, refuse to be measured by the same standard as these, and often, in regard to the physical world, appear to the scientist, and, in reference to morals, to the legalist, as extravagant and unreal, as the conclusions of science seem to him who knows nothing but that which his senses teach. Yet this would be a dreary world if law were the only reality and the one master in the universe.

12. (IV.) But every one of these several aspects of the universe has pointed onwards to one higher still, which though distinct from all, and transcending all, yet embraces all; for how is it that these existences are what they are, to us and to each other? The answer, by law, does not in the least solve the difficulty; science merely asserts and expounds the orderly sequence of the phenomena, but gives no further explanation. The mystery of the relation of our perceptions to the external world it leaves a mystery. The original cause

of the various energies, the mutual connection of which it is ever attempting to determine, it does not profess to know; in fact it loudly proclaims it unknowable. It is evidently quite out of its province to account for the fact that these physical laws produce in nature objects of beauty, and that our minds have the aspirations and sublime ideas which Nature suggests by its various forms, yet does not itself contain. There is only one possible answer to the question. As certainly as it is blindness in him whose view is limited by the perceptions of the senses not to recognize the order that underlies the things that are seen, and in the scientific mind to be incapable of realizing the beautiful and good and noble, and of loving it for its own sake, so, and much more, is he blinded who does not regard all these things as proceeding from God, and subsisting in God. The fact that to some minds the *religious* view of the universe seems unmeaning, and perhaps absurd, is no argument whatever against its truth, any more than that many are incapable of scientific conceptions, and that to others poetic ideas are unintelligible, can be admitted as a proof of the unreality of these modes of thought. The universal conscience of man has led him in all ages and in all nations, with no exceptions but such as prove the rule, to regard God as the omnipotent, all-pervading, omnipresent Will, "of Whom are all things, and we by Him; in Whom we live and move and have our being." To the religious mode of regarding the universe it is quite unnecessary to define whether we should say that the events happen by God's permission, or by God's overruling providence, or by God's appointment, or God's predestination; it is simply that to exclude God, the sum and source of all goodness and all reality, from anything whatsoever in the universe, is to the religious mind not only intolerable, and more horrible than death itself, but an absolute self-contradiction and absurdity.

13. (V.) It might be supposed that when man has attained to the religious view of the universe, this must be the highest possible region of human thought; and, indeed, that the mind is incapable of reaching further, except with the aid of a Divine revelation, seems self-evident. But it was a true instinct that suggested to Fichte that, in order to exhaust every mode of thought, a yet higher sphere is required; and though he calls it the view of science or philosophy, yet his language evidently means, that as the religious view regards all things as of God, and God in all things, that which the mind still demands for its satisfaction, is a knowledge of the manner of the relation of God to all existences, and of all these to God. But here all speculation must, in the nature of things,

fail ; for this is the knowledge of the unknowable, it is looking into the impenetrable darkness of Infinite Light. And yet without such knowledge religion is a mere sentiment or instinct of faith, rather than a reasonable belief ; and however firm and immovable the conviction may be, producing implicit confidence in One of whom all that is known is that He is God, yet such conviction is unprolific, and cannot generate those concrete religious ideas which alone become living principles and powerful motives in the soul. Indeed, in all ages, the human mind has shown itself incapable of resting in an abstract or indefinite religion, but has felt after God if haply it might find some form in the darkness, and has struggled to rise from nature to some more defined knowledge of God. But the effort has been fruitless, and the result has only been superstition and idolatry. This want of the human mind Christianity alone claims to have supplied, by its revelation of God made man, and of the mystery of the relation of God to the universe in Christ. It claims to have solved the problems which the preceding modes of thought suggest, but do not explain. And it must be observed that this, which for distinctness we may call the *theosophic* view, and which the Christian revelation opens to us, instead of carrying us further away from the universe as it is, on the contrary in that which is its central idea, the incarnation of the Word or Son of God, is connected with every other sphere of human thought, and gives a new reality to all. It is, for example, impossible to regard the *sense* view of the world and human life as an unreality if we believe in the Incarnation. The very foundation of the Revelation, as a manifestation of God in human nature, lies in the region of the senses (1 John i. 1, 2). Again law, in which, we have seen, moral law must be included as its highest form, has new light thrown on it by the history of this relation of God to man, whilst the morality which is superior to law finds here its noblest and its perfect type. The mode, therefore, of regarding the universe which Christianity alone enables us to take does really complete the cycle of human thought, and leaves no space for any other mode, nor any possibility of some superior region of thought being attainable. And comprehending, as it does, the whole range of human thought from the highest to the lowest, it appeals to all, and must needs be in harmony with all, and the reality in this sphere cannot be contradictory to the reality in any other. But it must not be forgotten that each mode of thought has its own proper faculty which it addresses, and Christianity expressly demands a spiritual faculty in man, without which its truths are unintelligible. "The natural man," St. Paul says, "receiveth not the things of the Spirit of God, for they are foolishness unto

him; neither can he know them, because they are spiritually discerned." There is nothing strange in this; the very same might be said, *mutatis mutandis*, of the inability of the merely scientific mind to discern the true beauty of the universe. The only difference is that in the case of the spiritual faculty required to distinguish revealed truth, the incapacity arises from an unwillingness to receive a divine gift, and to come into the light. And further it must be observed, that although this applies only to the reception of the abstract truth, yet this has from the nature of the case but one concrete form. If, for example, the Incarnation and the Atonement are recognized by the spiritual mind as realities,—we may say, indeed, as necessary truths,—the reality can only be found in the history of Him, Who was born at Bethlehem, Who died on Calvary, and rose again on the third day from the grave. Those only who do not apprehend or appreciate the spiritual truths question the supernatural history.

14. It is unnecessary for our present purpose to discuss further the distinctions which have been indicated, but we may observe generally that, although each higher sphere of thought contains nothing contradictory to those which precede it in order, yet the ideas of the lower do not of themselves direct us to the higher, but they may in some cases even seem to be opposed to it. Even so the Jews thought that the righteousness of faith contradicted the law, and believed they did God service by persecuting the Church. Some new power is required in order to pass from one phase or sphere of thought to that which is higher. The attempt, for example, to rise by the means of scientific ideas, without any other powers, to those of religious belief and knowledge, is even more futile than it would be to endeavour to become an artist by the study of Euclid, or a poet by the aid of the differential calculus.

15. But having so far cleared the ground by determining what must be the special spheres of scientific thought and religious belief, the latter of which includes both belief in God as the Sovereign and Almighty Will, and belief in those relations of God to the universe which are revealed in Jesus Christ, we may now turn to the question of the relation of these two, and, specially—for this is all I propose to examine—of the claim on the part of physical science to limit and control religious belief. We do not find any claim asserted of its authority over art or poetry. It would be absurd to consider science as capable of interfering with, or limiting, the æsthetic view of the universe. Why, then, is it to be supposed that religion should be subject to its authority? There seem to be only two reasons for allowing such a claim that can be given

or imagined. On the one hand it is assumed, and has been too hastily conceded, that as the conclusions of science are drawn by the aid of reason, therefore science is the exponent of reason, and its conclusions are necessary truths, to which the mind cannot do otherwise than assent without self-contradiction; and the supernatural appears to be at variance with these conclusions. On the other hand, it is argued that the result of scientific thought being to establish the universality and continuity of law, there is no room left for will. And if this were true, it must entirely exclude God, and therefore, all religion, from the universe.

16. I will briefly examine both these notions, and if it shall appear that there is no foundation for either, we may be content to leave to science its legitimate position as one of the true modes of human thought; neither the highest nor the lowest; extending, indeed, into regions quite inaccessible by him who is enslaved to the ideas which the senses suggest, yet occupying a very small part of the whole realm into which the mental vision of reasonable man can penetrate.

17. (I.) First, then, in order to ascertain whether, or to what extent, the conclusions of physical science ought to be invested with the authority of necessary truths, let us consider through what process the mind arrives at such conclusions. They are derived, we know, as deductions from certain primary assumptions as to material things, which the perceptions of our bodily senses suggest. The process of logical reasoning by which the deductions are drawn, in all except the simplest and most obvious cases, is the science of mathematics; including both the science of abstract quantity and that of relations of abstract space, by means of which, combined, those conditions of quantity and space are determined, which define the various phenomena of nature. In these sciences, the fundamental principles are not merely probable assumptions, or laws which require to be verified by the senses, they are propositions self-evident to reason, logical identities, which cannot be denied without a contradiction in terms. A world in which two and two made five (as has been supposed possible) must be a world in which the term "two and two" would not mean what we mean by it. And the result of mathematical investigation, however complicated, and though conducted by symbols by which the logical reasoning is so condensed as to be often obscured, if not entirely concealed, is yet nothing else than the comparison of different forms of identities which the reason thus determines to be equivalent. Thus far we are in the sphere of pure reason, and deal only with its relations; and, except on the supposition of some error in the operations, anything contradictory to these conclusions is an absurdity.

18. But when we proceed to apply these logical processes to physical relations, we tread on different ground altogether. Our senses train us to form certain conceptions as to material substance, and its motion or other relations to space and time. We conceive of matter as something occupying space, so that no portion of space, the whole of which is filled by one portion of matter, can at the same time contain any other. We further conceive of it as inert, that is, absolutely incapable of altering its own conditions. These two conceptions direct us to certain fundamental laws of the motion of material bodies; the laws being, as far as we can judge, necessary consequences of our primary conceptions. At the same time, it must be remembered that the confidence which the mind now feels in these laws of motion was very slowly attained, and has arisen from the fact that the results of almost innumerable observations coincide with the results of those calculations which are made on the assumption of their truth and their universality. The senses, indeed, are both the origin and the verification of physical science, even in its most exact form. And this is even more manifestly true in reference to that extension of these laws which has been made in modern times, and which is known as the conservation of energy.

19. There is, however, another idea which our senses also suggest in regard to material things, the idea of force as that which causes either motion or a resistance to motion. In dynamics, or the science of force, this is measured by the velocity it would generate, if acting uniformly on a unit of mass through a unit of time; and if this effect of the force be known, the effect when the conditions are altered to other known conditions may be determined. But while science can thus investigate and compare the several effects of that which is called force, it teaches us nothing whatever, except in one particular case, of the causation itself. The one case in which the causation of motion is the necessary consequence of our original conceptions of material substances is when two or more incompressible bodies, having different motions, come into collision; and then the cause of the resulting motions is known to be the antecedent motions, the effects being determined by those laws of motion which are essential to matter, as we conceive it. But in every other case of the causation of motion the word force is merely the disguise of our ignorance; it stands for the unknown cause of certain effects. But if no reason for the causation can be given by science, this means that science is unable to determine the law of the force as a necessary truth; and, therefore, the aim of science is, and must be if the domain of reason is to be

extended, to get rid of all unknown forces, and to explain them as modes of motion which produce other motions as the necessary consequence of matter being inert and occupying space. I need merely refer to the modern theories of light and heat and molecular action, and, above all, to the vortex atom theory, as illustrations of this continual and ever-increasing tendency of true physical science.

20. But it will be needful to consider a little more carefully this very important principle, that no law of force, indeed no physical law whatever, can be accepted as a necessary truth, unless it can be exhibited as a sequence of cause and effect, the reason of which is known. Because if the reason be unknown there is no security whatever that the same antecedents will always be followed by the same event. I am glad here to use the language of so acute a logician as Professor Jevons, who in his preface to his treatise on logic and scientific method, expresses his "strong conviction that before a rigorous logical scrutiny the reign of law will prove to be an unverified hypothesis, the uniformity of nature an ambiguous expression, the certainty of our scientific inferences to a great extent a delusion." In that work he argues that "no experience of finite duration can be expected to give an exhaustive knowledge of all the forces which are in operation. There is thus a double uncertainty" as to the uniformity of natural laws. "Even supposing the universe as a whole to proceed unchanged, we do not know the universe as a whole. Comparatively speaking, we know only a point in its infinite extent, and a moment in its infinite duration. We cannot be sure then that some fact has not escaped our observation, which will cause the future to be apparently different from the past; nor can we be sure that the future will really be the outcome of the past." (*Principles of Science*, vol. i. p. 169.)

21. It appears then that the tendency of the human mind to accept as necessary laws sequences which, within the limits of human experience, are found to be uniform, but the causation of which is unknown, is not an obedience to reason, but rather a subjection to sense. The recognition of the uniformity, and the classification of apparently diverse phenomena as results of one natural law, are in themselves triumphs of reason over sense; but when it is further supposed that the phenomenal laws thus established, by an induction necessarily imperfect, are safe from exceptions or even reversal, this is to follow the suggestions of the senses and to abandon the guidance of reason. In fact, there are found not unfrequently what seem to us in our ignorance arbitrary exceptions to phenomenal laws, such, for example, as the expansion

of water as its temperature is reduced near the freezing-point, which though undoubtedly no exceptions to the true law of causation, yet warn us against admitting any sequence the reason of which is unknown, as a necessary law. Of all phenomenal laws, the one perhaps of which the evidence from observation in favour of its universality seems the most complete is the law of gravitation. But if we knew the true cause of the phenomenal law that each unit of mass attracts every other inversely as the square of the distance, we should probably ascertain many conditions under which the results would be at variance with what in the present state of our knowledge we call the law. For example, Sir W. Thomson has pointed out that if Le Sage's explanation were the true theory, some crystals might have different weights according to the position in which they are held, and that thus work might be done by gravity without expenditure of energy; in other words there would be an exception both to the law of gravitation and to that of the conservation of energy, as we now understand them.

22. It is, indeed, only in very few cases out of the infinite multiplicity of phenomenal laws that science can make even an approach to the true law of causation. But even if the wildest dreams of modern science were fulfilled, and all such forces as elasticity, the attraction of cohesion, electricity, and the like, could be exhibited as necessary results of certain combinations of mass and motion,—and at present the mathematics are not in existence which can accomplish this, yet there would still remain the infinitely varied and complex laws of chemical forces and agencies, the reasons for which, as far as we can judge, lie entirely out of the range of all possible human knowledge. Why water, that is a combination of certain proportions of (what we know as) oxygen and hydrogen, should be what it is, and not something else, is a problem which, although it refers to a phenomenon the commonest and apparently the simplest in nature, we cannot, in the present state of our knowledge, conceive to be capable of ever receiving such a solution as to be intelligible to the human mind.

23. And we must proceed still further. Even though physical science could prove all natural laws to be sequences of cause and effect, necessarily determined by the constitution of matter as we conceive it, this merely removes the difficulty a step further from us, and leaves science as incapable as ever of proving them to be necessary truths. Our conceptions of material substance are nothing more than the generalization of effects produced on our senses, but the objective reality may be, or rather must be, something quite different. If the

original material be supposed, as in the vortex atom theory, to be an incompressible fluid, what is the cause of its subsistence as such? Our reason can give no account of this, and therefore cannot accept it as a necessary truth. Or, if we adopt a theory like that of Boscovich, and substitute for material substance an infinite succession of centres of forces, that is of unknown causes arbitrarily changing their effects, to account for the results we observe in matter, this is, of course, to remove the whole question at once entirely out of the sphere of reason, and to make the whole foundation of physical science purely empirical.

24. We must conclude, therefore, that even as regards the phenomena of inanimate nature, while the value of physical science is very great in tracing in all directions the operation of orderly sequences of cause and effect, yet it can claim no authority for its conclusions as necessary truths, to which exceptions cannot occur. It is the exponent of Reason only in a limited degree, as investigating the logical deductions which must follow, on the supposition of certain laws being assumed to be invariable, without giving us any certainty as to the universal truth of the assumptions. And this, which is sufficiently evident even as to the phenomena of inanimate existences, is much more apparent when we consider those of organic life. Our knowledge in regard to this is, and must continue, purely empirical; and the conditions are here so variable and complex that it is impossible to attain to anything approaching that exactness and completeness, even as regards phenomenal laws, which science imperatively demands in the inorganic world. And it is certainly impossible to conceive any extension of human knowledge, by which these could be established as necessary truths. On this branch of the subject, however, it is unnecessary to dwell, for if material substance contains mysteries insoluble by reason, much more does life.

25. (II.) The second of the grounds on which it is claimed that science should interfere with religious belief, viz., that as the result of physical science is to establish the universality of law, therefore there is no room left in the material universe for a governing will, it might seem unnecessary to examine here, since its fallacy has been often and sufficiently exposed. But one aspect of the question requires a brief notice, as it does not appear to have received the attention it deserves; I mean the evidence which physical science itself supplies or suggests, that law of itself leaves all the problems of the physical universe indeterminate, and that will must be premised in order to determine any of those particular solu-

tions in conformity with law, by which the universe is what it is.\*

26. First, then, it must be observed that both revelation and science—not physics only, but also the theory of evolution—point to an original state of the universe, when it was “without form and void.” Was it developed from this initial state into its present condition by law only, or, as Holy Scripture teaches, by the Divine Will determining the operations of law? The investigations of physical science, we will allow, prove that the multiplied and manifold differentiations which have resulted in the present aspect of nature took place in accordance with physical laws. But the question is, whether this complex, and unsymmetrical, and exceedingly diversified structure of Nature, could be the result of forces acting without any guidance whatever except that of law.

27. Of what kind, then, must the original state of the universe be conceived to have been, in order that such a result might be produced merely through the mechanical operation of forces? According to the theory of evolution, it must have been homogeneous. Mr. H. Spencer, in his *First Principles*, has a chapter on “the instability of the homogeneous”; and the changes supposed to be produced in the universe through the action of the several parts on each other, according to the nebular hypothesis, are adduced as an illustration of the process of evolution. But his argument obviously depends on the assumption (to use his own words) that “the several parts of any homogeneous aggregation are necessarily exposed to different forces, forces that differ either in kind or in amount; and being exposed to different forces they (the several parts) are of necessity differently modified.” But in the case of the universe we may just as well assume at once the variety of results as the variety of forces. Something must have determined the variety of forces; it cannot have arisen from the mutual action of the parts, for the structure is, by the supposition, homogeneous. If the universe should be supposed infinite and homogeneous, and, for example, the forces acting on it the mutual attraction of each particle, every particle would then be acted on by equal and opposite forces, and no change whatever could take place. If it were finite, the only effect could be the concentration and, so to speak, the crystallization of the whole mass. The variety of nature

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\* In a very able article on Supernatural Religion in the *Church Quarterly Review* for April, 1876, this principle is assumed. But it cannot be assumed without some proof that it is consistent with the teachings of physical science, and indeed, as there stated, it seems fairly open to question.

necessarily implies the introduction of some other element besides that of uniform law. One arrangement may by its heterogeneity of structure and its different forces be developed into another yet more varied, with nothing but law to direct it; but that which is homogeneous can never become varied by law alone. Variety itself thus points to a higher origin than law.

28. The fact is that it is a fallacy, indeed an absurdity, to suppose that physical laws of themselves determine results. In the first place, these depend on the arrangement of the antecedent causes; the self-same laws will produce an infinite number of results, and these not only different, but contrary to one another, according as the arrangement is altered. To use the words, again, of Professor Jevons, "The problem of creation was what a mathematician would call an indeterminate problem, and it was indeterminate in an infinitely infinite number of ways. Infinitely numerous and various universes might then have been fashioned by the various distribution of the original nebulous matter, though all the particles should obey the one law of gravity." . . . "Out of infinitely infinite choices which were open to the Creator that one choice must have been made which has yielded the universe as it now exists." (*Principles of Science*, ii. 434.)

29. I do not feel certain that the eminent writer whose words I use means here what his language seems to imply, that the exercise of will in the original constitution was of itself sufficient to determine the conditions of the universe ever after; for he condemns as a "superficial and erroneous" notion, derived "from false views of the nature of scientific inference," the supposition that the course of nature is to be regarded as being determined by invariable principles of mechanics, and the idea that "even if the origin of all things be attributed to an intelligent creative mind, that Being is to be regarded as having yielded up arbitrary power, and as being subject, like a human legislator, to the laws which He himself has enacted."\*

30. However, let us for the moment suppose it possible

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\* At the same time he says: "We may safely accept as a satisfactory scientific hypothesis the doctrine so grandly put forth by Laplace, who asserted that a perfect knowledge of the universe as it existed at any given moment would give a perfect knowledge of what was to happen thenceforth and for ever after." It may be a grand idea, but as it involves that which is a contradiction, the knowledge of infinite and infinitely varied causes and arrangements of causes, and the exercise of logical reasoning on all these, it is an idea which merely embarrasses the question.

that out of the "infinitely infinite" methods of original disposition one might have been chosen that by the mutual action of its parts according to uniform and fixed law should produce the universe and all its developments in time, exactly and in all respects such as it has been, as it is and ever shall be. An infinite mind must of necessity foresee all the infinite results and outcomes, and foresee them as the results of the original constitution, and therefore all the subsequent effects are really determined by that mind. The objection which is sometimes urged against this mechanical view, that it throws the Divine action into an infinitely distant past, and excludes Him from the present, argues an imperfect conception of the Divine mind, which is equally present throughout all time; and every effect of a perfect machine is as truly the effect of will, when it is comprehended in the original design of the machine, as when it is produced by the will of the workman acting through the machine. So that even on this strictly mechanical view it must be admitted that the whole outcome of the universe is the result of will acting by law. Much has been said of the "molecules" having the characteristics of "manufactured articles," and different reasons, which may justify their being so called, have been discussed; but it is sufficient explanation that they have the character of those articles which are produced by human will acting by law, that is, either by machinery or by the aid of some chemical or other physical agencies. And is there not exactly the same reason to pronounce the various products of nature to be manufactured? What, for example, could more completely answer to the character of a "manufactured article" than the water which nature manufactures, according to physical laws, in quantities sufficient for organic life, yet not so largely as to destroy it? and how could mere law have determined that out of all the "infinitely infinite" combinations of atoms that were possible, this one combination should hold the particular position which it does hold in the economy of nature?

31. However, this does not exhaust the question by any means. So far as proving that the operation of will cannot possibly be excluded, it is sufficient. But having once allowed the action of will in the Universe, is it possible to limit it, or to exclude it from any part of space and time? It may not be possible for us to prove that the present Universe could not be the mere outcome of mechanical action; in fact, we cannot argue on a problem in which the factors are not only infinite in number but infinitely different in magnitude and in kind. When we attempt to reason on such a problem, we are merely

brought to absurd or contradictory conclusions. We can only say that as the regularity of nature indicates law, so the irregularity of nature, its infinite variety, its unsymmetrical complexity, points no less distinctly to will acting, not without order, in accordance with law. But, indeed, no reasonable account can be given of a Divine will acting and then ceasing to act; whereas an eternally active Will is involved in the very idea of God, and none will question that if Will has at all acted in the Creation of the Universe as it exists, it must be the Will of One who is both Eternal and Infinite.

32. No doubt the difficulty which many scientific minds feel in regard to this question is, that it seems to them impossible that Will should determine results in the Universe, without being somewhat of the same nature as a physical force; and from any idea of this kind the scientific mind recoils as an absurdity. But surely the analogy of the actual operation of the relations, whatever they may be, between organic life and law, ought to be of itself a sufficient reply to any such objection. Much of the infinite variety of nature is due to the fact that besides the mechanical forces of the physical universe, there is what we understand by life. Nothing seems to be more clearly established by science than that life creates no force, that it adds nothing to the stock of material energies, but that in all the phenomena of life that which already exists is employed to produce the results. When a plant springs up from the earth and, apparently in defiance of the laws of gravitation, throws out its shoots into the air, and forms its leaves and blossoms and fruit according to the laws of its own growth, this is no contradiction to the laws of inorganic matter, nor are the material energies which produce this result something which did not exist before. It is merely that those physical agencies, for which the environments of the plant supply the materials, are called into its service; for life is in some sense, and to some extent, quite beyond our knowledge, the master, while the material energies are its servants.

33. Without in the least professing to explain that which to finite reason may be inexplicable, yet it may illustrate the meaning, or at least somewhat aid the conception of this, if we take simply the case of kinetic energy, which, as is known, is in proportion to the square of the velocity, and is measured by half the product of this quantity into the mass. Now, by the law of the conservation of energy, the sum of all the energies of a system can neither be increased nor be diminished by the mutual action of the parts of the system. In regard to this, life introduces no change whatever. But it must be observed that this law is quite insufficient of itself

to determine the actual outcome of the action of these energies. That depends also on the direction in which each force operates or each particle moves; so that there might be an infinite number of different results of the same energies, according to the different directions of the motions only. But the law of the conservation of energy, of which some speak as if it bound up all nature in the iron chains of necessity, has nothing whatever to do with direction; and its mathematical expression represents the energies as signless quantities, that is, as those the direction of the action of which is absolutely indeterminate. Indeed, many illustrations may be found of the truth that the direction of motions may be altered indefinitely, and the nature of the work done changed to any extent, without any expenditure of energy. This law, then, of the conservation of energy does not touch the very principle that determines the ultimate outcome of the energies employed.\*

34. Whether life modifies the result of energies by affecting the direction of motion, or, which is possibly the same thing, by transforming one kind of energy into another, or in any other way, does not signify; at all events, the fact remains, that living organisms introduced into inanimate material affect it most extensively, so that the results are totally different from those which would be produced if those organisms were not there, although not the least change be made in the sum of the energies. This, which is sufficiently apparent even in regard to the lower forms of organic life, is even more evident when we consider the development and action of animal life, to which the same principles apply. The argument is not affected by the question whether or not animals are altogether the creatures of their own environments. Whatever may determine them, they, without doubt, very largely affect and modify the operations of physical laws in

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\* I am aware that an illustration, somewhat similar to this which I have given, or rather the inference from it as to the influence of Life and Will in the physical universe, is rejected by the authors of the *Unseen Universe* on the strange ground of the confusion which it would cause in the minds of beings superior to man, who must be supposed to know all the mysteries of molecular action, and, it would seem, regard the laws of such action as the ultimate realities in the universe. If it were necessary to give any answer to an argument which, characteristic as it is of the authors, can hardly be considered serious, it would be sufficient to reply that, from all we learn of such superior intelligences from trustworthy sources, nothing would confound their minds so much as the least apparent deviation from the most fundamental of all laws, that the Will of the Lord God Almighty governs all things in Heaven and earth.

the objects that surround them, as well as in their own bodies.

35. The human will, however, which is not merely influenced by circumstances, but derives motives from reason, and is finally self-determined, and not only uses the energies of nature unconsciously, but employs them to fulfil man's own purposes, with a knowledge of the laws of their action, yet without altering in the least their amount—in other words, in perfect conformity with physical laws,—is a proof of the power of the will to determine the outcome of physical energies which has been often urged, and is of itself abundantly conclusive. Sometimes, indeed, the analogy is pressed too far, and it is forgotten that the will, the efficacy of which throughout the universe we assert, is the will of Him who is Eternal as well as Infinite. But those effects of will which we every day experience leave no excuse for the argument that law excludes will. On the contrary, while we conclude from various indications that law without will could not have created the universe as it is, we are further assured that since that will, from the nature of the case, must be the will of Him who is infinite in power and in knowledge, and who fills all space and time with His presence; therefore the Divine will must be the ruler of law in all its manifold operations, so that no single event in heaven or earth can be independent of that will; \* and although in most of these events the operation of law alone may be apparent, and the designs of will are concealed, whilst in others, as in those which we call miraculous, it is the express purpose to exhibit the power of the will of God, while the law by which it works may be hidden from us; yet in both classes of events it is equally certain that will directs law, and that the Divine will and the Divine order are in perfect harmony.

36. It appears then that neither on the plea of being the exponent of reason and the teacher of necessary truth, nor on that of establishing some general principle contradictory to the supremacy of the Divine will, is physical science at all competent to control or interfere with religious belief. The conclusion is that we must relegate science to its legitimate position as one of the modes of regarding God's universe; one of the utmost value so long as it confines itself to its proper sphere, but which, when it claims a supremacy to

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\* This argument does not, of course, include that which is a much deeper mystery than the relation of Will to Law,—the question of the relation of the Divine to the human.

which it is not entitled, not only tyrannizes over the human mind, and makes it a slave to unrealities, but is in the highest degree irrational ; and though the slave of the senses is no doubt the meanest of all, the condition of the slave of law is of all the most hopeless. If the one is the publican, the other is the Pharisee of humanity, indeed a Pharisee beyond all others ; for he not only believes that he is " not as other men are," but he thanks himself, not God, for his fancied superiority.

The CHAIRMAN.—I beg, in the name of this meeting, to tender our thanks to the author of the paper for his very able and valuable disquisition.\* We shall now be glad to hear observations upon it from those present. The subject is a very important as well as a very comprehensive one.

[After a pause ;]

Rev. Preb. IRONS, D.D.—I should have preferred it had some other member been first to speak upon the subject which the Right Rev. Prelate has brought before us with such remarkable power. There is always a danger that the opener of the discussion should fasten upon some points which are only *obiter dicta*, and which do not involve anything vital to the whole view of the question brought before us. There is some difficulty in avoiding this on the present occasion, but I will endeavour to do so, because the main subject which has been so strikingly exhibited is that which ought to engage our attention. Nevertheless, I shall say, at the outset, that there are one or two points in the latter part of the paper to which I would more fully refer, if I were sure that there was no danger, by so doing, of losing the interest of the principal subject. I will but intimate what these points are, and then pass on. In sec. 35, this statement occurs,—“while we conclude from various indications that law without will could not have created the universe as it is, we are further assured that since that will, from the nature of the case, must be the will of Him who is infinite in power and in knowledge, and who fills all space and time with His presence, therefore the Divine will must be the ruler of law in all its manifold operations, so that no single event in heaven or earth can be other than the fulfilment of that will.” Literally understood that would, it appears to me, be found to make moral responsibility an impossibility. Other indications of the same idea will be found in §§ 13 and 14, but I am quite sure that the Right Rev. Prelate will say something upon that subject that will save us from any conclusions of so perilous a kind.—And now, as to the paper itself. It seems to me

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\* Letters in regard to the paper were received from the Bishop of Manchester and Canon Cook ; the former “was much struck by the ability of the argument” ; the latter said,—“I consider it a paper of the highest excellence ; I am wholly mistaken if it does not deal with the deepest questions in a way that will carry conviction into the minds of candid and perplexed inquirers, and shake deeply-rooted prejudices which have long obscured intellects of high order. It is a noble discourse.”

impossible that there should be condensed better statements than those we have just heard, which shut out science, for ever, from reasonably interfering in the domain of theology or religion. (Hear, hear.) We certainly seem, as the Bishop has stated, to have arrived at a period when there is a change coming over men's minds in this matter. A part of the scientific world is rather taking refuge, in what seems to me a somewhat cowardly spirit, if not a spirit of hostility; but it looks, I say, somewhat cowardly for scientific men, when they find they cannot trace the causes of things, to say that they therefore must leave them to be determined by some invisible physical motor. They profess at once, indeed, what they call agnosticism. But they do not see that it is not quite fair that they should deny that there is a superphysical sphere of action and being. Because they know that life exists as a fact, and that causation is actually a fact; that matter is inert; that germs of life must be found somewhere before you can have evolutions of life; and as they admit all that, it would be more generous, more noble, more truth-loving, if they were candidly to make this admission—that as there is life, there must be something beyond our physical scientific sphere to account for it; in which case many physical cavils have been without reason. I think that the five-fold divisions of Fichte, which Bishop Cotterill has so clearly explained and commented upon, cannot be too highly estimated. It is quite clear to any one contemplating the five spheres of thought, indicated by Fichte, that the position taken by our opponents is to be traced, not to the lowest or the "sensible" sphere, but to that which is almost the lowest—that of sense *plus* logic; and we have given to us by him an account of the active operation of the mind, even in combining the sense and the logic. The logical process itself has a beginning in Causation; but of that the scientific theorists give physically no account. They surely intimate that they revert to a superphysical sphere, even in using the very reason which brings them to their scientific conclusions. As science has plainly been driven to this by the force of its own investigations, as well as by the close watchfulness of philosophy, it must, in future, vacate the ground of purely religious controversy as to causes. I think that these higher spheres—and the fifth especially—which Fichte has pointed out, will eventually show us that there is something beyond; and that we cannot be at length refused the knowledge of the absolute and the infinite, since, indeed, we have recourse to them in approaching the nature of God and in recognizing His presence—at all events, if not the latter, the former. Evidently, ontology of some kind is inevitable in the future. We have neglected it too long. As I have thus expressed in a few words my admiration of this Paper, my conviction that it will lead to great results, and my hope that a few little points which seem contrary to moral ideas may be cleared up; it is right, perhaps, that I should leave to others the discussion which I thus briefly and imperfectly touch. (Cheers.)

The DEAN OF LICHFIELD.—I should think myself very presumptuous if I were to undertake to offer any comments upon so comprehensive, intellectual, and able an address as this, after so short an acquaintance with it as I have

had from hearing Bishop Cotterill read it ; but I am very glad to have the opportunity of expressing my general appreciation and admiration of the whole paper. I do not see the difficulty that Dr. Irons has seen in the particular passage he has quoted. I imagine that the Bishop's words are in perfect consistency with what Revelation itself tells us, that " whatsoever the Lord pleased, that did He in Heaven and earth, and in the sea, and in all deep places." If I might venture to add one other observation, I would say that I hope no one who has hitherto applied his mind merely to the second branch of the subject to which Bishop Cotterill has alluded, will be at all discouraged from the endeavour to penetrate those higher and nobler realms which lie beyond. On the contrary, I am persuaded that the man of faith has an enormous advantage in dealing with questions of science. With regard to the man of science, much as we are indebted to him for what he has done for us (and for myself, I must say I feel under great obligations to every one who truthfully and honestly applies his mind to the investigation of great scientific truths), I cannot but feel that without exploring those higher realms he lacks something in moral force. It would be an enormous advantage to him, and would give a higher elevation to all his thoughts, if he were to apply his energies and powers to the investigation of these subjects, with which he ought to be more familiar. I am inclined to think that there may be something in the thought that it is possible, that by a succession of inductions we may at last, by scientific methods, reach a point at which we shall see that the whole of the universe around us is the product of one universal Intelligence pervading all things. I thank the Bishop very heartily for his masterly and suggestive paper.

Rev. D. GREIG.—I should be obliged if you will allow me to express my great appreciation of the paper which we have had the good fortune to hear read this evening. I am quite sure that all those who have been occupied, as I myself have to some extent been, in studying these questions, will feel, as they go through this paper, that the author has really got to the bottom of the subject. It is the paper of a man who has really worked out the question he has set himself to consider. You see this in every sentence, and there are many indications of that which probably to a person unacquainted with the subject would not be very evident, but which are clear enough to those who have studied the question. Therefore I look upon the paper as one of very great value. There can be no doubt that the subject is the great subject of the day. It distinguishes the respective spheres of science and theology. Now this is rather too hard a question to discuss in an extemporary manner, but I must say that the more one studies the point, the more one sees that there are really two spheres. There is really one half of nature which it is impossible for science to touch. Science deals with only one side of nature, so to speak. The points of distinction have not yet been exactly defined, but still they are very palpable, and what gratifies me especially in this paper is that it takes up and brings out in a very clear and telling way one effect of the distinction which probably

those who have not studied the subject may have overlooked. If his lordship will allow me to refer to an incidental remark contained in his paper, I will do so very briefly. I know that there is the great danger, of which my friend Dr. Irons has warned us, of taking up points which really do not belong to the essence of the paper. But his lordship quotes from an article in the *Church Quarterly Review*. The remark which his lordship makes refers to a point that was not very fully discussed in that article, but was simply alluded to, and if I may be considered in order, I might explain what I consider to be there set forth. The point is—How it is that one half of nature belongs to religion or theology, and the other half to science? In this way; science takes cognizance of causation—cause and effect; theology of the mechanism which makes cause and effect possible. You cannot have cause and effect except as part of a mechanical system; and you cannot have a mechanical system except as the production of a mind. Hence, while science takes cognizance of cause and effect, or, as we say, of the laws of nature; theology takes cognizance of those mechanical arrangements which make the laws of nature possible. Formerly, under “the mechanical theory,” God was supposed to have completed the mechanical arrangements of nature once for all, but now, under the theory of evolution, these arrangements require to be renewed from day to day. That Science cannot go beyond the laws of nature, that she cannot take cognizance of that mechanism which makes these laws possible, is clearly shown by scientific experiment. Before the laws of nature which the experiment is to illustrate can come into play, mechanical arrangements must be made, and they can only be made by the mind of the experimenter. The experimenter must first of all find the bodies he is to experiment upon, and then he must put them in their proper positions, so as to make a mechanical system out of them. Then, and then only, do the laws of nature, to be illustrated, come into play. Here, therefore, we have clearly two factors, the mind of the experimenter and the laws of nature, conspiring to effect one result; that is to say, in other words, we have illustrated the respective spheres of theology and science. If we look more closely at what I have designated as “mechanical arrangements,” you will find that it consists of three things—the individual existence of bodies, their order in space, and their order in time. Now you have only to look into a manual of science to find that these three particulars are always postulated. The formula of science is, “if so and so, then so and so.” What does this “if” mean, but that these three particulars which constitute the mechanism of nature, viz. the existence of bodies, and their order in space and time, lie outside the sphere of science and must be postulated. They belong not to science but to theology. I have only to express my great thanks to the Bishop for his exceedingly interesting paper.

Rev. Prebendary Row.—Although I have read this paper through, I have not had sufficient time to thoroughly master it; hence I do not feel myself competent to discuss it to my own satisfaction to-night. Perhaps, however, the author will allow me to tell him of one defect I thought I found in

reading it. He uses the term "law," as it appears to me, in three or four different senses. This seems, to my mind, to cause a considerable difficulty in getting to the meaning of the paper, and I should require to make a very close analysis of it before I could properly understand it. I am sure it would add greatly to the perspicuity of his paper if the term "law" were used in a more definite sense. My idea is that the term "law" should simply be used in an invariable set of sequences. It seems to me that he uses it to denote force, cause, and invariable sequence, which is to complicate its meaning. Apart from this, the paper generally has my entire appreciation. There are a few points in it that seem to me more or less doubtful, but I quite agree in the author's first remarks. I wish, however, to call attention to one passage. I do not lay much stress on what I consider to be its ambiguity, which, I have no doubt, the Bishop will hereafter explain; but in section 10 of the Paper he seems to lay down that there is no great distinction between physical and moral law. He says:—"Nor is this science, as might be imagined, of a different order from physical science." I think there is a difficulty in this sentence. It seems to me that physical and moral science belong to very different orders of thought. I do not think that the Bishop has expressed what is exactly his meaning. I value the Paper so highly that I should be exceedingly sorry to see it go forth with any defects. I quite agree with the observations the Bishop makes about the subject of beauty, and, as far as my reading of the classics goes, I believe you might count on your ten fingers every allusion to the physical beauties of nature. For instance, the beauties of the scenery of the Lake of Geneva are not once alluded to by Julius Cæsar, who continually travelled through that district. It seems as if the heathen mind were absolutely incapable of perceiving these natural beauties. It is a valuable characteristic of the Paper that it deals with the higher regions of thought, and I should be sorry not to do it full justice. I agree with the writer in deprecating the habit many people have of merely resting the controversy on certain specific subjects, instead of taking a general view, and endeavouring to get to the root of the entire question. I believe that this Paper does go to the root of this subject. There are many things on which we are too much in the habit of attaching importance, because we find there is some little agreement between science and Scripture. But that does not get us over the main difficulty. I am sure that we do a great deal of damage to the cause we are attempting to defend if we spread it over a needlessly wide field. We have seen the result of this error during the present war; when the Russians were extending their forces over an enormously wide surface, they got the worst of it. Those who are engaged in defending Revelation should keep their eyes on this illustration, and endeavour to confine themselves to central positions, and should not allow themselves to be driven from them. They should lay down those central positions which constitute the essence of Revelation, and refrain from going into endless controversy on a set of minor points. It is in this respect that the Paper we have heard of is of great value and importance. It deals

mainly with the more vital questions, instead of wasting its strength in endless discussions on a variety of subordinate matters.

Dr. IRONS.—I wish to make one remark on a subject which seems to me worthy the attention of those whom I had the pleasure of addressing a few minutes ago. I feared that I had diverted your minds, in some degree, from the great object of this essay, but what has since been said by Prebendary Row encourages me to hope that he may be induced to read this paper carefully over again, because I think that the point he refers to (in §§ 10 and 11) is one which really ought to be regarded as extremely valuable. (Hear, hear.) The author has warned us, apparently, that there is a lower sphere of moral or social duty which must be determined by law. What he stated, for example, in his system of ethics, shows the way in which duty may be determined by examining the various relations of men to one another; and the author goes on afterwards, on the very next page, with the third of Fichte's divisions, to show that the higher morality really pertains to a higher sphere altogether. I think that when sections 9 to 12 are carefully read once more by my acute friend, he will entirely agree with me that there is no more valuable passage in the whole of the essay than that in which it is pointed out that social law is not merely determined by ourselves, but also by the Divine Will. Then I will hope that the author will find time to say a few words on motion. In section 19 he speaks of motion as generating motion. How it is that motion generates motion it is not very easy to say. There are some wonderful remarks on the subject in Bishop Berkeley's essay, *De Motu*, in which he quotes Torricelli. I should like to know how force can communicate motion, so that it becomes a new force at the next stage of motion. Does the motion create motion, or is a second force created to move the second object—or the third? Suppose a force, at the outset, to touch the first object, does that touch, or the result of that touch, create a force in respect of the second object, and so on to the third and fourth along the whole line of objects? Where is force generated? It seems to me most difficult to understand how it can be as here put; because, either we must place God behind every molecule to direct it, or else, at all events, some real force that begins the movement. I hope I am making myself intelligible as to this difficulty of force creating force.

Bishop COTTERILL.—A metaphysical difficulty.

Dr. IRONS.—Perhaps a mathematical one; but there is a difficulty to me in seeing how force generates force. Of course, we all understand that there must be a cause for everything. Without a cause, could force impress itself on an object? Does a force so impressed become a motion-making power? Does it communicate its own nature to a third and fourth object, and so, all along the whole line, generating continuous action or motion? I myself object to any proposition that brings God, as a force, immediately behind every molecule to give it its direction; and yet I do not quite see how the author can avoid this conclusion, if he will allow me to put it in such a way.

Mr. Row.—I think what I have said has been misunderstood. My general impression of the passage I referred to was that it might lead to such theories as are laid down in Buckle's *History of Civilization*. I agree with Dr. Irons, that there are a number of social forces which are within the region of moral law, but the general theory laid down by Buckle is one which I absolutely dispute. He lays down that human will and man's moral nature are as necessary in their action as the forces of the physical universe. The passage might be supposed to lend a certain degree of sanction to very wide principles, on which a great amount of the unbelief of the present day is erected. I do not suppose the author means to support this view, but I think he is somewhat ambiguous, and that he might be supposed to lend the sanction of his name to some of the general principles laid down by Buckle. Buckle lays down, for instance, that marriages are as necessary as the physical laws of nature, because, having regard to a set of averages, their variation in numbers nearly approximates to the variations in the price of corn. To make his argument of the smallest value they ought perfectly to coincide.

Rev. C. L. ENGSTRÖM.—I do not wish to put myself prominently forward with regard to this most admirable paper, but with respect to the question as to the agreement between science and religion, it has struck me that we may find in science most valuable suggestions as to the non-necessity of endeavouring to make the two spheres *evidently* fit together. I will take, as an illustration, the scientific instrument known as the stereoscope. You will have noticed that in using this instrument there is generally, just for a moment or two, a difficulty in getting the focus of each eye so adjusted as to make the two pictures form one perfect image. It is not unreasonable to suppose that the mind has a similar difficulty in regard to questions such as we have had put before us, and that thus it may be that two conceptions may be made to form, as in natural objects, one complete image, when properly focussed. It seems to me that science and religion bring these questions before the mind (as physical objects are seen by the eye) from different points of vision, and that the difficulty we often have in making some particular point of the Bible agree with some particular point in science, is only like the difficulty we find in focussing the two pictures in the stereoscope. And yet we know that it is *because* there are two distinct pictures in the stereoscope that we are enabled to see one solid image. There was a remarkable article in the *Quarterly* or *Edinburgh* some years ago—an article which drew attention to the way in which the vision is corrected by mental impressions. It was pointed out that if you look at a man when a hundred yards off, the impression on the mind is that he looks nearly as large as when standing only ten yards off. This is a matter of which any one present can judge the next time he goes into the street. The explanation of it is that the mind is continually correcting the impressions of the senses. This probably runs through the whole of our impressions. We may fancy that we are guided in some matters

they were not *intangible, imperceptible, and invisible*, and if they could be seen to be imbued with life, I should reverently believe, but with as sincere astonishment as if I saw an image of plaster of Paris suddenly endowed with living breath; and I should then at last think I saw Genesis enacted afresh before my eyes!

The Scripture informs us, in accordance with all modern discoveries, that everything was created *very good* in the sight of God. The Creator did not form imperfect essays of things to be afterwards evolved and their defect remedied by natural selection. Each creature is made after its kind, למינה,\* and apparently *after a pre-existing idea* in the mind of the Creator, every plant in the field *before it was in the earth*, and every herb of the field *before it grew*. There is order, fixedness, and design from the first, and this is essentially the opposite to all that is involved in the doctrine of evolution, however modified. The Creation, as seen in Scripture and as studied in the records of geology, is perfect in each era from the beginning. The universe, as seen by the consistent evolutionist, is continually self-evolving, but still imperfect, and having its blunders rectified and its imperfections remedied, by a pseudo-divine power. The latter, or Pantheistic view, cannot be made consistently to agree with any one portion of Christian revelation.

All Christians believe in the watchful care and superintending hand of God extended over all His creatures, and many identify this with the Darwinian doctrine of "Natural Selection," or the improved phrase "survival of the fittest." I shall endeavour to show the difference as far as my space will allow. Both these evolutionist expressions are designed to convey the idea of continual improvement, of advantageous change resulting in development from one form into another, higher, more advantageous, or in some sense *fitter*, according to our views of creation.

Now, I am bold to assert that whatever may be the occupation of the imaginary power of Darwin, such is not the occupation of Divine Providence. The ways of Providence are confessedly mysterious; but as regards the best field of observation we possess, they do not result in what would be, *to our apprehension*, the survival of the *fittest*. I care not what standard of fitness is adopted, it will be found that "the race is not always to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to all."

Has it not been said with some show of truth that—

"The good die first,  
And they whose hearts are dry as summer dust  
Burn to the socket" ?

It may be said that all this is explained by a future life. Let us turn then to the physical organization of man. Has this improved by the survival of the fittest? All history, and I believe all geological research, shows the contrary. Whatever interposition of Divine power may have been put

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\* Gr. *ὁμοία*. See Ges. Lex.

forth, when God beheld and drove asunder the nations, to render the different races of mankind suited to their various abodes ; there is no such "selection" now. Every one knows that the children of English parents degenerate in India, probably also in Australia. The French, according to their own calculations, would soon die out in Algeria if left without fresh settlers. I hope I shall be pardoned for suggesting that the vigorous arterial circulation suited to the Teutonic race when called to populate the damp forests and marshes of ancient Europe, is not compatible with the powerful overstimulus of sunlight in America. From some less obvious cause it is not thought that the Spaniard thrives well in South America ; and yet, if we judge by the success of these nations in taking possession of these countries, they are the *fittest* to survive.

If we turn to the animal creation, I suppose every one will admit that the fittest do *not* survive. If we study the Assyrian sculpture or the Egyptian records, we find more noble, more varied, and higher types of animal life, than any that now exist in those ; and if we judge of fitness by aptness for domesticity, we learn that the Egyptians had succeeded in making useful to themselves, more than the few animals which we either do not now possess, or at least not as tamed creatures. If we go back a certain number of years, we find by the records of the past that man contended with and subdued animals of giant bulk and proportions, from which, if armed only with flints, he would, I suspect, now be glad to flee. (See Job xli. 30, original.)

There has been no improvement in the vegetable creation since the days when Solomon spake of trees, from the cedar-tree that is in Lebanon even unto the hyssop that springeth out of the wall. The only change has been that the fittest have *not* survived. The choice balsam has as much perished from Jericho as has the *reem* (unicorn) from the Jordan. The apples of Sodom and the grapes of Gomorrah may still be referred to as examples of "the survival of the fittest," but the vineyards have perished from Engedi, and "the clusters of Camphire" might be difficult to meet with. (Canticles i. 14.) The cedars of Lebanon have for the most part fallen to supply materials for the ships of Tarshish, as their congeners the deodars of the Himalayas have been hewn down, to a large extent I fear, in order to supply sleepers for railways. The Americans begin to mourn over their ravaged forests ; and everywhere man has been destroying the beauty and even the utility of creation. Many plants and animals have perished ; and "natural selection" has not furnished us with one new species of either. In 3,000 years this power has done literally nothing.

Mr. Lea thinks that I either misapprehend or misrepresent "the survival of the fittest." This is not the case, for I see it all around me ; but what is the result ?—simply that in this contest "the big battalions" do not always have their own way. The result of the struggle is that an infinite *variety* survive, and if you say these are the fittest to survive, you simply enunciate the proposition that the combination of circumstances happens to have favoured these the most.

At this season of the year (May) the varied kinds of grass and herbage seem emulously engaged in solving the problem "which shall survive." Moreover,