NATURAL SCIENCE AND RELIGION

TWO LECTURES, DELIVERED TO THE THEOLOGICAL SCHOOL OF YALE COLLEGE

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LECTURE II

THE RELATIONS OF SCIENTIFIC TO RELIGIOUS BELIEF.

IN a preceding discourse I brought to your (if notice a series of changes in view and opinion which have taken place among scientific men within my own remembrance. I restricted the survey to the biological sciences (with merely a reference to the principle of the conservation of energy in its application to the organic world), and in these to the supposed facts and immediate inferences, to what may be called their natural-historical interpretation. These new views are full of interest of a kind which you cannot expect a naturalist to under- value. For they have greatly exalted his calling. In the days of Linnaeus, who died only a hundred and two years ago, and throughout a long generation of his followers, species were looked upon as" simple curiosities of Nature," to be inventoried and described; and striking phenomena in plants and animals, as something to be wondered at, but not to be explained. With the advent of Morphology, the precursor and parent of Evolution, Natural History developed from a curious pursuit, training the observing powers, to that of a true science, engaging the reason in the search for causes. According to one definition, "Science is the labor of mind applied to Nature." In this sense, modern botany and zoology have certainly become scientific. They are at least attempting great labors. But in widely extending, as they now do, the operation of natural causes in the organic world, they make close connections between biology and physics, or what used to be called, and I think deserves to be called, natural philosophy. And the connection brings in, or brings up afresh, considerations which affect the ground of natural and revealed religion. Under this aspect, they properly excite your anxious attention. I used throughout the phrase "scientific belief," as the one best suited to the occasion. The term is comprehensive and elastic, covering many degrees of conviction or assent, from moral certainty down to probable opinion. In this respect, scientific and theological beliefs are similar; as they also are in being mainly states of mind toward that which is incapable of demonstration, -either because, as in the case of ultimate beliefs (on which all science and knowledge are based) it is impossible to go beyond them, or else Because the subject-matter is not positively known, and certainty is unattainable from the nature or the present conditions of the case. The proofs upon which both biological and theological investigations have to rely are largely probabilities, some of a higher, some of a lower order, and much that is accepted for the time is taken on trial or on prima facie evidence. Much also is or should be held under suspense of judgment, a state of mind eminently favorable to accurate investigation. As to those who can forthwith assort the contents of their minds into two compartments, one for what they believe and the other for what they disbelieve, neither their belief nor their denial can be of much account. In all subjects of inquiry, those only are to be trusted who discriminate between inevitable beliefs, established convictions, probable opinions, and hypotheses on trial. Now, our general inquiry in this lecture is, What should be the attitude, I will not say of theological students, but of thoughtful men, in respect to scientific beliefs, tendencies, and anticipations, such as we have been considering? To a certain extent it may well be a waiting attitude. The strictly scientific matters must necessarily be left mainly to the experts, whose very various and independent investigations, pursued under every diversity of bias, must in time reach reasonably satisfactory conclusions. But the naturalists claim no monopoly in the consideration of the great problems which now interest us, in which indeed most of them de- cline to take any part. Perhaps theological students and divines might be asked to wait until views and hypotheses still ardently controverted among scientific investigators are I brought nearer to a settlement. But the disposition to discount expected results, either for or against supernatural religion, has always prevailed. The theologians at least have never waited, and cannot be expected to wait; and while some of their contributions to the

subject have been inconsiderate, others have been most valuable. In any case, there is no call to wait on the ground that the disturbing views are only hypotheses. For, in the first place, we should have long to wait for demonstration one way or the other; and one crop of hypotheses is the fertile seed of another. Besides, hypothesis is the proper instrument for dealing with this class of questions; indeed, it is the essential precursor of every fruitful investigation in physical nature. You can seldom sound with the plummet while standing on the shore. To do this to any purpose, you must launch out on the sea, and brave some risks. Nearly all valuable results have been gained in this way. Newton's theory of gravitation was a typical hypothesis, and one which happened to be capable of early and sufficient verification. The undulatory theory of light was another. The nebular hypothesis, or portions of it, and the, kinetic theory -of gases, less verifiable, are accepted willingly because of the success with which they explain the facts. Evolution is a more complex, loose and less provable hypothesis, or congeries of d hypotheses, which can at most have only a relative, though perhaps continually increasing probability from its power of explaining a great variety of facts. Its strength appears on com-paring it with the rival hypothesis -for such it is -of immediate creation, which neither ex-plains nor pretends to explain any. How the more exact physical sciences are becoming more reconditely hypothetical, especially in the imagination of entities of which there can be no possible proof beyond their serviceability in explaining phenomena, we must not stop to consider. Only this may be said, that the adage, "Where faith begins science ends" is now well nigh inverted. For faith, in a just sense of the word, assumes as prominent a place in science as in religion. It is indispensable to both. Let it be noted, moreover, that the case we have to consider does not come before the tribunal of reason with antecedent presumptions all on one side, as theologians generally suppose. They say to the naturalists, not improperly, we will think about adopting your conclusions, contrary as they are to all our prepossessions, when they are thoroughly and irrevocably substantiated, and not till then. Your theory may prove true, but it seems vastly improbable. Here the naturalist is ready with a rejoinder: In this world of law you cannot expect us to adopt your assumption of specific creations by miraculous intervention with the course of Nature, not once for all at a beginning, but over and over in time. We will accept intervention only when and where you can convincingly establish it, and where we are unable: to explain it away, as in the case of absolute beginning. If the naturalist starts with the presumption against him when he broaches the theory of the descent of later from preceding forms in the course of Nature, so no less does the theologian when in a world governed by law he asserts a break in the continuity of natural cause and effect. But, indeed, you are not so much concerned to know whether evolutionary theories are actually well-founded or ill-founded, as you are to know whether if true, or if received as true, they would impair the foundations of religion. And, surely, if views of Nature which are incompatible with theism and with Christianity can be established, or can be made as tenable as the contrary, it is quite time that we knew it. If, on the other hand, all real facts and necessary inferences from them can be adjusted to our grounded religious convictions, as well as other ascertained facts have been adjusted, it may relieve many to be assured of it. The best contribution that I can offer towards the settlement of these mooted questions may be the statement and explanation of my own attitude in this regard, and of the reasons which determine it. I accept substantially, as facts, or as apparently well-grounded inferences, or as fairly probable opinions, -according to their nature and degree, -the principal series of changed views which I brought before you in the preceding lecture. I have no particular predilection for any of them; and I have no particular dread of any of the consequences which legitimately flow from them, beyond the general awe and sense of total insufficiency with which a mortal man contemplates the mysteries which shut him in on every side. I claim, moreover, not merely allowance, but the right to hold these opinions along with the doctrines of natural religion and the verities of the Christian faith. There are perplexities enough to bewilder our souls whenever and wherever we look for the causes and reasons of things; but I am unable to perceive that the idea of the evolution of one species from another, and of all from an initial form of life, adds any new perplexity to theism. In unfolding my thoughts upon the subject, I wish to keep as close "to the solid ground of Nature " as I possibly can, even where the discourse must rise from the ground of science into the finer air of philosophy. Specially I must heed the injunction: "If thou hast any tidings; prithee, deliver them like a man of this world," and not trouble myself, nor you, with

meta- physical refinements and distinctions which, I' however needful in their way and place, are unnecessary to our purpose. I take for granted, "like a man of this world," the objective reality and substantiality of what we see and deal with, though I am told it cannot be proved; and I assume, -although demonstration is impossible, that what I and my fellow-men cannot help believing we ought to believe, or at least must rest content with. I suppose you will agree with me that it is not science, at least not natural science, which raises the most formidable difficulties to Christian theism, but philosophy, and that it is for philosophy to surmount them. The question which science asks of all it meets is, What is the system and course of things, and how is this or that a part of it in the fixed sequence of cause and effect? Philosophy asks whence the system itself, and what are causes and effects. Theology is partly historical science, and partly philosophy. Now I, as a scientific man, might rest in the probability of evolution as a general inference from the facts or a good hypothesis, and relegate the questions you would ask to the philosophers and theologians. But I am not one of those who think that scientific men should not concern themselves with such matters; and having gone so far as to say that the evolution which I accept does not seem to me to add any new perplexity to theism, and well knowing that others are of a contrary opinion, I am bound to further explanation and argument. But I have not the presumption to suppose that I can make any new contribution to this discussion; and what I may suggest must not be expected to cover the ground widely nor penetrate it deeply. I am sure that you will not look to me for the rehandling of insoluble problems and inevitable contradictions, into which the philosophical consideration of the' relations of Nature and man to God ultimately lands us. Certainly they are not peculiar to evolution. So, in so far as we may fairly refer any of its perplexities to old antinomies, which can neither be reconciled nor evaded, the burden will be off our shoulders. It might suffice to show that evolution need raise no other nor greater religious or philosophical difficulties than the views which have already been accepted, and held to be not inimical to religion. But, indeed, our universal concession that Nature is, and that it is a system of fixed laws and uniformities, under which every thing we see and know in the inorganic universe, and very much in the organic world, have come to be as they are, in unbroken sequence, implicitly gives away the principle of all ordinary objection to the evolution of living as well as of life- less forms, of species as well as of individuals. It leaves the matter simply as one of fact and evidence. Indeed, mediate creation is just what the thoughtful and thorough observer of the ways of God in Nature would expect, and is what some of the most illustrious of the philosophic saints and fathers of the church have more or less believed in. In saying that the doctrine of the evolution of species has taken its place among scientific beliefs, I do not mean that it is accepted by all living naturalists; for there are some who wholly reject it. Nor that it is held with equal conviction and in the same way by all who receive it; for some teach it dogmatically, along with assumptions, both scientific and philosophical, which are to us both unwarranted and unwelcome; more accept it, with various confidence, and in a tentative way, for its purely scientific uses, and without any obvious reference to Its ultimate outcome; and some, looking to its probable prevalence, are adjusting their conditional belief in it to cherished beliefs of another order. One thing is clear, that the current is all running one way, and seems unlikely to run dry; and that evolutionary doctrines are profoundly affecting all natural science. Here you remark that your objection is not so much to the idea of mediate creation as to the form it has assumed; that the mediate production of species mall indeed be completely theistic. But that, whereas their immediate creation directly asserts Divine action, their incoming under Nature only implies it. To those who already believe in a Supreme Being the two views may religiously amount to the same thing. But, you continue, living beings were thought to afford a kind of demonstration of a supernatural creator. Science, in taking this away, leaves us only the assurance that if we bring the idea of God to Nature we may find Nature wholly compatible with that idea. Well, what is lost in directness may perhaps be gained in breadth and depth. It is certain that the whole progress of physical science tends, in respect to Divine action, to consider that mediate, general, and in a sense indirect, which had been thought to be immediate and special. Youth is ever taught by instances, manhood by laws. You go on to say: The evolution of species now, so commended to us by science, not long ago seemed as improbable to scientific as to ordinary minds. What assurance can we unscientific people have that science will not reverse its present judgments? None, perhaps, except -that,

while many particular judgments have been reversed or altered, the general course of e thought has run in one direction. And theologians, like naturalists, must be content with the best judgments they can form upon the present showing, and be ready to modify them upon better. Finally, and to reach the present point, you a pertinently commend to scientific men their own saying: "Science asks of every thing how it is a part of the system of Nature, of the chain of cause and effect." An hypothesis must give the how and why, and from its own resources, before it is worth attending to. A credible hypothesis should assign real and known causes, and ascertain their actual operation somewhere before assuming their operation everywhere. A complete hypothesis should assign not only real but sufficient causes for all the effects; and when it assumes them in invisible and intangible forms, such as molecules and molecular movements, it is bound to show that all the observed consequences flow from the assumption. Now to declare that species come through evolution, without either proving it by facts or clearly conceiving the mode and manner how, is only supporting a thesis which was until lately deemed scientifically improbable by hypotheses of a kind which have always been regarded as invalid. Just here Darwinism comes in with a modus operandi, in which lies all its essential value. As the conception of the derivation of one form from another is the only distinctly-pointed alternative to specific supernatural creation, so the principle of natural selection, taken in its fullest sense, is the only one known to me which can be termed a real cause in the scientific sense of the term. Other modern hypotheses assign metaphysical, vague, or verbal causes, such as development, anticipation, laws of molecular constitution, without indicating what the special constitution is, -none of which have much advantage over the "nisus formativus" of earlier science. I have no time to recapitulate what I briefly said of natural selection in a former lecture; nor to analyze the applications of the principle by Darwin, Wallace, and others to critical instances; nor to specify its limitations and apparent failures. The discussion or even the presentation of these would fill the hour, and divert me from my particular task. Instead of this, I will merely give my impression of the present state of the case as respects the points now before us. You will remember the distinction which I pointed out between the principle of natural selection, which I take to be a true one, and the Darwinian hypothesis founded on it, which I take to be to a considerable extent probable. That is, I think that the influences and actions which the term "natural selection" stands for, give a sufficient scientific explanation of the way in which smaller differences among plants and animals may rise into greater, varieties into species. Given differences -and an internal tendency to differ more, i.e., given variation as an inexhaustible factor, and natural selection should suffice for the preservation and increase of the select few as a consequence of the destruction of the intermediate many. Surely there is nothing either improbable or irreligious in the idea that lines of individuals or races, once in existence, should be subject to the conditions of Nature, and that the fittest for particular conditions should thereby be preserved. As to variation, that really occurs as a fact, though we know not how; and, if we frame explanations of the mode and get conceptions of the causes of the variation of living things, still we probably shall never be able to carry our knowledge very much further back; for in each variation lies hidden the mlJ8terlJ of a beginning. We cannot tell why offspring should be like unto parent; how then should we know why it should sometimes be different? So then Darwinism has real causes at its foundation, viz., the fact of variation and the inevitable operation of natural selection, determining the survival only of the fittest forms for the time and place. It is therefore a good hypothesis, so far. But is it a sufficient and a complete hypothesis? Does it furnish scientific explanation of (i.e., assign natural causes for) the rise of living forms from low to high, from simple to complex, from protoplasm to simple plant and animal, from fish to flesh, from lower animal to higher animal, from brute to man? Does it scientifically account for the formation of any : organ, show that under given conditions sensitive eye-spot, initial hand or brain, or even a different hue or texture, must then and there be developed as the consequence of assignable conditions? Does it explain how and why so much, or any, sensitiveness, faculty of response by movement, perception, consciousness, intellect, is correlated with such and such an organism? I answer, Not at all! The hypothesis does none of these things. For my own part I can hardly conceive that anyone should think that natural selection scientifically accounts for these phenomena. Let us here discriminate. To account scientifically for phenomena, or for complex series of phenomena, by assigning real and sufficient natural causes, is one thing. To believe

that the phenomena have occurred in the course of nature, and have natural causal connection, is another. It is not natural selection which has led Mr. Darwin and many others to believe that life was originally breathed by the Creator into a few forms or into one," and "that the production and extinction of the past and present inhabitants of the world has been due to secondary causes; " but it is the observed fact of likenesses and that of gradation from form to form which suggested the idea of an actual evolution from form to form having somehow taken place. Variation and natural selection are .now assigned as causes or reasons of the evolution. Variation originates all the differences. Natural selection, determining which forms shall survive, reduces their number and intensifies their character. But Darwin may likewise consistently speak of his favorite principle as a cause of the evolution, it being that in the absence of which the evolution could not take effect. A cause of variation it certainly is not, but it is a necessary occasion of it, or of its progress. Because without natural selection to pave the way, the wheels of variation would at once be clogged and all progress be arrested. Variation provides that upon which natural selection operates; the operation of natural selection makes room for further variation, gives opportunity for variability to change its fashions and display its novelties; and so the two go on, hand in hand. But, although thus conjoined, there is always this difference between the two, that natural selection works externally, with known natural agencies, and in the light of common day; variation works internally, in darkness, and its agencies and ways are recondite and past finding out. Or, when we find out something, -as we may hope to do, -we only resolve a before unexplained phenomenon into two factors, one of them a now ascertained natural process, the other a something which still eludes our search. But we suppose it to be natural, although as yet unknown. Surely we are not to suppose that natural agencies cease just where we fail to make t them out. To Proceed: what Darwinism maintains is that variation, which is the origination of small differences, and species-production, which represents somewhat larger differences, and genus- production, which represents still greater differences, are parts of a series and differ only in degree, and therefore have common natural causes whatever these may be; and that natural selection gives a clear conception of a way in which continually or occasionally arising small differences may be added up into large sums in the course of time. This is a legitimate and on the whole a good working hypothesis. The questionable point is whether the sum of the differences can be obtained from the individually small variations by simple addition. I very much doubt it. I doubt especially if simple addition is capable of congruously adding up such different denominations. That is, while I see how variations of a given organ or structure can be led on to great modification, I cannot conceive how non-existent organs come thus to be, how wholly new parts are initiated, how any thing can be led on which is not there to be taken hold o£ Nor am I at all helped in this respect by being shown that the new organs are developed little by little. The doubt is not whether the organs and forms were actually evolved in the course of Nature. I agree with Darwin that they probably were, and if so then doubtless under natural selection. And I cannot help thinking that Darwin would agree with me that the principle of natural selection does not account for it. That is, we both account for it all, only by assuming as an inexplicable fact that variation does occur to the whole extent of the extreme differences. All appears to have come to pass in the course of Nature, and therefore under second causes; but what these are, or how connected and interfused with first cause, we know not now, perhaps shall never know. Now views like these, when formulated by religious instead of scientific thought, make more of Divine providence and fore-ordination than of Divine intervention; but perhaps they are not the less theistical on that account. Nor are they incompatible with "special creative act," unless natural process generally is incompatible with it, -which no theist can allow. No Christian theist can eliminate the idea of Divine intervention any more than he can that of Divine ordination; neither, on the other hand, can he agree that what science removes from the supernatural to the natural is lost to theism. But, the business of science is with the course of Nature, not with interruptions of it, which must rest on their own special evidence. Still more, it is the business of science to question searchingly all seeming interruptions of it, and its privilege, to refer events and phenomena not at the first but in the last resort to Divine will. Moreover, "special creative act" is not excluded by evolutionists on scientific ground, is not excluded at all on principle, except by those who adopt a philosophy which antecedently rules out all possibility of it. Darwin postulates one creative act and a probability of more, and so in

principle is at one with Wallace and with Dana, who insist on more. But it has been said, and indeed is said over and over, even by thoughtful men, that, although Darwinism is not necessarily atheistic, yet, when once started it dispenses with further need of God. "Given [it is said] the laws which we find, then there is no more use for God, and all things have come out as we find them with none of his supervision. There may have been -we do not know -a God once; but law and not God, is the great Creator." A few words should dispose of this. First, by what right is it assumed that the Darwinian differs from the orthodox conception of law? In the next place, this line of argument applies equally to a series of creative acts separated by intervals, during which it could with the same reason (or unreason) be said that there is no use for God, that there may have been a God at times! So it cuts away the ground from under the Christian evolution which the writer quoted from allows, as well as from that which he deprecates. And it equally dispenses with use for God in Nature for the several thousand years which have passed since creation under the biblical view was finished, and the Creator rested from all the work which he had made." There is no more validity in the argument in the one case than in the others. A word or two upon the subject of creative acts occurring in time may not be out of place. These, when spoken of in the present connection, do not usually refer to the making of a new form of plant or animal instanter out of the dust of the ground. However it might have I been when there was only one act of creation to think of, the enormous crudeness of such a conception when applied to a long succession of animals would now be seriously felt by every one. It is a phrase most used by those who accept the" idea of the evolution of one species from another, but who feel the utter incompetence of known natural causes to account for it. In the absence of such causes, they, being theists, naturally (and I cannot say unphilosophically) assign the simpler and seemingly easier part of evolution to recondite natural causes which they are unable to specify, the more difficult or inscrutable to a diviner and more direct or supernatural act, which they liken to creation. I suppose they do not feel the necessity, as they have not the ability, to draw any definite line between what they think mere Nature may accomplish, and what they believe she cannot. Probably what they have in mind is mediate creation and not miracle. Perhaps they are convinced that if they could behold the birth of a species, they would see nothing more miraculous than in the birth of an individual. They mean that the springs of Nature are somehow touched by a new form or instance of force directed to some new end. Yet so they must be in a degree in the origination of a new race or variety. This whole conception of mediate creation is logically carried out to its extreme by my philosophical colleague, Professor Bowen, when he concludes that " not only every new species but that each individual living organism, originated in a special act of creation." So the difference between pure Darwinism and a more theistically expressed evolution is not so great as it seemed. Both agree in the opinion that species are evolved from species, and that evolution somehow occurs in the course of Nature. Darwinism opines that the whole is a natural result of general causes such as we know of and in a degree understand, such as we recognize under the concrete terms of variability, heredity, and the like, -terms which we can estimate and limit only by reference to what we see coming to pass, -along with complex physical interactions which are more measurable and predictable. The very much that it has not accounted for by these causes and processes, it assumes may be in time accounted for by them, or by as yet unrecognized general causes like them. The specially theistic evolution referred to judges that these general causes cannot account for the whole work, and that the unknown causes are of a more special character and higher order. I think it does not declare that these are not secondary causes, and whether they would be ranked as natural causes would depend upon the sense in which the term Nature was at the moment used. Probably such evolutionists, if they had to give form to their conceptions, would vary in all degrees between the direct interposition of a supernatural hand at certain stages or crises, and that extreme extension of the Supernatural into and through the Natural which Professor Bowen reaches the assertion that each individual living organism, as well as every new species, originated in a special act of creation. This, the complete assimilation of specific to individual origination, is simply Darwinism, expressed in less appropriate language. What the one calls "special act" the other, along with the rest of mankind, calls general process. The common principle of the Divine ordination of Nature, which the philosopher here asserts in a paradoxical way, the Darwinian implies, or even postulates, on appropriate occasions. The Darwinian Naturalist, I mean, not the monistic

and agnostic philosopher, -from whom, so far, we have kept as clear as has Mr. Darwin in every volume and every line. Suppose now that we are shut up to Nature for the evolution of the forms of living things. As theists, we are not debarred from the sup- position of supernatural origination, mediate or immediate. But suppose the facts suggest and inferentially warrant the conclusion that the course of natural history has been along an unbroken line; that -account for it or not- the origination of the kinds of plants and animals comes to stand on the same footing as the rest of Nature. As this is the complete outcome of Darwinian evolution, it has to be met and considered. The inquiry, what attitude should we,- Christian theists, present to this form of scientific belief, should not be a difficult one to answer in my opinion, we should not denounce it as atheistical, or as practical atheism, or as absurd. Although, from the nature of the case, this conception can never be demonstrated, it can be believed, and is coming to be largely believed; and it falls in very well with doctrine said to have been taught by philosophers and saints, by Leibnitz and, Malebranche, Thomas Aquinas, and Augustine. So it may possibly even share in the commendation bestowed by the Pope, in a recent sensible if not infallible allocution, upon the teaching of "the Angelic Doctor," and make a part of that genuine philosophy which t the Pope declares to stand in no real opposition to religious truth. Seriously it would be rash and wrong for us to declare that this conception is opposed to theism. Our idea of Nature is that of an ordered and fixed system of forms and means working to ultimate ends. If this is our idea of inorganic nature, shall we abandon or depreciate it when we pass from mere things to organisms, to creatures which are themselves both means and ends? Surely it would be suicidal to do so. We may, and indeed we do, question gravely whether all this work is committed to Nature; but we all agree that much is so done, far more than was formerly thought possible; we cannot pretend to draw the line between what may-be and what may not be so done, or what is and what is not so done; and so it is not for us to object to the further extension of the principle on sufficient evidence. I trust it is not necessary to press this consideration, though it is needful to present it, in order to warn Christian theists from the folly of playing into their adversary's hand, as is too often done. But I am aware that we have not yet reached the root of the difficulty. We are convinced theists. We bring our theism to the interpretation of Nature, and Nature responds like an echo to our thought. Not always unequivocally: broken, confused, and even contradictory sounds are sometimes given back to us; yet as we listen to and ponder them, they mainly harmonize with our inner idea, and give us reasonable assurance that the God of our religion is the author of Nature. But what of those- you will say -who are not already convinced of His existence? We thought that we had an independent demonstration of His existence, Ii and that we could go out into the highways of unbelief and "compel them to come in;" that "the invisible things of Him from the creation of the world were clearly seen, being understood by the things that are made," "so that they are without excuse." We could shut them up to the strict alternative of Divinity or Chance, with the odds incalculably against Chance. But now Darwinism has given them an excuse and placed us on the defensive. Now we have as much as we can do, and some think more, to reshape the argument in such wise as " to harmonize our ineradicable belief in design with the fundamental scientific belief of continuity in nature, now extended to organic as well as inorganic forms, to living beings as well as inanimate things. The field which we took to be thickly sown with design seems, under the light of Darwinism, to yield only a crop of accidents. Where we thought to reap the golden grain, we find only tares. The outlook is certainly serious, yet not altogether disheartening. Perhaps we cannot now safely separate the wheat from the tares, but must let them grow together unto the harvest. Nobody expects in this world to ascertain the limits between design and contingency. Nobody expects to demonstrate any design, except his own to himself by consciousness; he cannot really prove his own to his bosom friend; though his assertion may give his friend, and his actions may give his enemy, convincing reasons for inferring it. But we are sure that every intellectual being has designs, that the reach and pervasiveness of design must be in proportion to the wisdom; and that the designs of the Author of Nature, if any there be, must be all-pervading and fathomless. Yet if they be wrought into a system of adaptations, some of the adaptations themselves may be such as irresistibly to suggest their reason to our minds. At least they suggest reason, even if we fail to apprehend, or wrongly apprehend, the reason. The sense that there is reason why is as innate in man, as that there is cause whereby. Now, to adopt the apt words of Francis Newman, "after stripping off all that

goes beyond the mark of sober and cautious thought, there remain in this world fitnesses innumerable on I the largest and the smallest scale, in. which alike common sense and uncommon sense see I design, and the only mode of evading this belief is by carrying out the cumbrous Epicurean argument to a length of which Epicurus could not dream. We cannot prove, we are told, that the eye was intended to see, or the hand to grasp, or the fingers to work delicately. Of course we cannot. But what is the alternative? To believe that it came about by blind chance. No science has any calculus or apparatus to decide between the two theories. Common sense, not science, has to decide, and the most accomplished physical student has in the decision no a vantage whatever over a simple thoughtful man." Arrangements innumerable, extending through all nature, subserving all ends, of course involve innumerable contingencies. The theist is not expected to have any definite idea of the respective limits of these. He can. only guess at the limits of intention and contingency in the actions of his nearest neighbor. The non-theist gains nothing by eliminating instances, unless he can eliminate all design from the system. Until he does this, he gains nothing by showing that particular fitnesses come to pass little by little, and under natural causes. He cannot point to a time where there were no fitnesses, apparent or latent, and if he argues that all fitnesses were germinal in the nebulous matter of our solar system, he does not harm our case. The throwing of design ever so far back in time does not harm it, nor deprive it of its ever- present and ever-efficient character.. For, as has been acutely said, "If design has once operated in rerum natura (as in the production of a first life-germ), how can it stop operating and undesigned formation succeed it? It can-not, and intention in Nature having once existed, the test of the amount of that intention is not the commencement but the end, not the first low organism, but the climax and consummation of the whole." I am not going to re-argue an old thesis of my own that Darwinism does not weaken the substantial ground of the argument, as between theism and non-theism, for design in Nature. I think it brought in no new difficulty, though it brought old ones into prominence. It must be reasonably clear to all who have taken pains to understand the matter that the true issue as regards design is not between Darwinism and direct Creationism, but between design and fortuity, between any intention or intellectual cause and no intention nor predicable first cause. It is really narrowed down to this, and on this line all maintainers of the affirmative may present an unbroken front. The holding of this line secures all; the weakening of it in the attempted defence of unessential and now untenable outposts endangers all. I have only to add a few observations and exhortations addressed to Christian theists. If intention must pervade every theistic system of Nature, if we give credit to Mr. Darwin when in this regard he likens his divergence from the orthodox view to the difference between general and particular Providence, is it safe to declare that his theory, and his denial that particular forms were specially created, are practically atheistical? I might complain of this as unfair: it is more to my purpose to complain of it as suicidal. It is in effect holding a theistic conception of Nature for our private use, but acting on the opposite when we would discredit an unwelcome theory. Or else it is trusting so little to our own belief that we abandon it as soon as any weight is laid upon it. As soon as you do this, by conceding that the evolution of forms under natural laws militates against design in Nature, you are at the mercy of those reasoners, who, looking at the probabilities of the case from their own point of view, coolly remark that:- "On the whole, therefore, we seem entitled to conclude that, during such time as we have evidence of, no intelligence or volition has been concerned in events happening within the range of the solar system, except that of animals living on the planets." You may say that implicit belief of intention in Nature affords an insufficient foundation for theism. But you are not asked to ground your theism upon it, nor upon the whole world of external phenomena. You may reiterate that you cannot believe that all these events have occurred under natural laws. Nothing hinders your assuming what you need from the supernatural; but allow that the need of other minds may not be identical with yours. As I have said before, what you want is, not a system which may be adjusted to theism, nor even one which finds its most reasonable interpretation in theism, but one which theism only can account for. That, it seems to me, you have. An excellent judge, a gifted adept in physical science and exact reasoning, the late Clerk-Maxwell, is reported to have said, not long before he left the world, that he had scrutinized all the agnostic hypotheses he knew of, and found that they one and all needed a God to make them workable. When you ask for more than this, namely, for that which will compel belief in a personal Divine Being, you

ask for that which He has not been pleased to provide. Experience proves that the opposite hypothesis is possible. Some rest in it, but few I think on scientific grounds. The affirmative hypothesis gives us a workable conception of how" the world of forms and means" is related to "the world of worths and ends." The negative hypothesis gives no mental or ethical satisfaction whatever. Like the theory of the immediate creation of forms, it explains nothing. You inquire, whither are we to look for independent evidence of mind and will "concerned in natural events happening within the range; of the solar system." Certainly not to the court of pure physical science. For that has ruled this case out of its jurisdiction by assuming a fixed dependence of consequent upon antecedent throughout its domain. There are plenty of phenomena to which it cannot assign known causal antecedents; but it supplies their place at once, either by assuming that there is a physical antecedent still unguessed, or by inventing one in an hypothesis. It deals in effects and callses, and knows nothing of ends. It has no verdict to render against our case, for it does not entertain it, and has no jurisdiction under which to try it. But its wiser judges do not insist that theirs is the only court in the realm. We have not to go beyond Nature for a jurisdiction, which may be likened to that of Equity, since it enforces specific performance, and which adds to causes and effects the consideration of ends. Biology takes cognizance of the former, like physics, of which it is on one side a part, but also of ends; and here ends (which mean intention) become a legitimate scientific study. The natural history of ends becomes consistent and reasonably intelligible under the light of evolution. As the forms and kinds rise gradually out of that which was well-nigh form- less into a consumate form, so do biological ends rise and assert themselves in increasing distinctness, variety, and dignity. Vegetables and animals have paved the earth with intentions. The study and the estimate of these is quite the same, under whatever 'view of the mode in which the structures and beings that exemplify them came to be. The highest of these exemplars is himself conscious of ends. He pronounces that critical monosyllable I. I am, I will, I accomplish ends. I modify the outcome of Nature. Here, at length, is something "on the planets" it which "has been concerned in events;" and in my opinion it is just now a good and useful theistic view which connects this something with all the lower psychological phenomena that preceded and accompany it. Our wills, in their limited degree, modify the course of Nature, subservient though that be to fixed laws. By our will we make these laws sub serve our ends. We momently violate the uniformity of Nature. But we do not violate the law of the uniformity of Nature. Is it not legitimate, is it not inevitable, that a being who knows that he is a will, and a power, and a successful contriver, should explain what he sees around and above him by the hypothesis of a higher and supreme will? A will which has disposed things in view of ends in establishing Nature, and which may, it Deed be, dispose to particular and timed ends, either with or without perceptible suspension of the law of the uniformity of Nature, The question I ask has "been adversely answered, substantially as follows: It may be that in the first instance men can hardly avoid predicating a being who has done and is doing all this. Nevertheless a trained mind soon reaches the incongruity of it, at least "as concerns any events which have happened within the range of the solar system." For the belief that a supernatural power has so acted contradicts that very belief in the uniformity of Nature upon which all scientific reasoning and practical judgments rest. To this it is well rejoined, that the ultimate scientific belief on which our reason reposes "is that belief in the uniformity of Nature which is equivalent to a belief in the law of universal causation; which again is equivalent to a belief that similar antecedents are always followed by similar consequents. But this belief is in no way inconsistent with a belief in supernatural interference. If the principle of the uniformity of Nature asserted that every natural effect is, and has ever been, preceded by natural causes, then it would be in terms inconsistent with supernatural interference and with supernatural origination of the system. But science does not give us nor find any such principle. All scientific beliefs are in themselves as true and as fully proved if supernatural interference be possible as they are if such interference be impossible. A law does no more than state that under certain circumstances (positive and negative) certain phenomena will occur. If on some occasions these circumstances, owing to supernatural interference, do not occur, the fact that the phenomena do not follow proves nothing as to the truth or falsehood of the law." If such interference violates the law of the uniformity of Nature, the human will, and all wills, and all direction of material forces to ends, are every day violating it. It is also urged that

giving particular direction in a special act would be an addition to the plenum of force in the universe, and therefore a contradiction to the recently acquired scientific principle of the conservation of energy. The answer may be this. It is not at all certain that all direction given to force expends force; it is certain that, under collocations, a minute : use of force (as pulling a hair-trigger or jostling a valve) may bring about immense results; and, finally, increments of force by Divine action in time, of the kind in question, if such there be, could never in the least be known to science. The only remaining supposition that I now think of is the crude one that thought and will are functions of the body, secretions as it were of the organ through which they are manifested, " psychical modes of motion." Then, as has well been said, they must be correlated with physical modes of motion, at least in conception; but it is conceded by all sensible I thinkers that thought cannot be translated into extension, nor extension into thought. Now, since the only conceivable source of physical force is supernatural power, still more must this be the only conceivable source of thought. There is an old objection which threatens to undermine the ground on which we infer Divine will from the analogy of human; namely, that our wills, being a part of the course of Nature and amenable to its laws, their movements, though seemingly free, are as fixed as physical sequences upon this insoluble problem we have nothing practical to say, except to admit that so much of choice is determined by antecedent conditions and the surroundings, by hereditary bias, by what has been made for the individual and inwrought into his nature, that, granting the will has an element of freedom, it may be in effect a small factor. I can only urge that it is not an insignificant factor. As to this, a pertinent although homely suggestion came to me in the remark of a humble but shrewd neighbor, to the effect that he found the difference between people and people he dealt with was really very little, but that what there is was very important. So facts and reasonings may shut us up to the conclusion that the will, sovereign as it seems to the user, is practically a small factor in the determination of events. But what there is makes all the difference in the world in man! And now, as to man himself in relation to evolution. I have no time left for the discussion of questions which naturally interest you more than any other, but which, even with time at disposal, are not easy to treat. I will not undertake I to consider what your attitude should be upon a matter which connects itself with grave ulterior considerations; but I will very briefly and frankly intimate what views I think a scientific man, religiously disposed, is likely to entertain. To pursue the illustration just ventured upon: The anatomical and physiological difference between man and the higher brutes is not great from a natural-history point of view, compared with the difference between these and lower grades of animals; but we may justly say that what corporeal difference there is extremely important. The series of considerations which suggest evolution up to man, suggest man's evolution also. We may, indeed, fall back upon Mr. Darwin's declaration, in a case germane to this, that "analogy may be a deceitful guide." Yet here it is the only guide we have. If the alternative be the immediate origination out of nothing, or out of the soil, of the human form with all its actual marks, there can be no doubt which side a scientific man will take. Mediate J creation, derivative origination will at once be I accepted; and the mooted question comes to be narrowed down to this: Can the corporeal differences between man and the rest of the animal kingdom be accounted for by known natural causes, or must they be attributed to unknown causes? And shall we assume these unknown causes to be natural or supernatural? As to the first question, you are aware, from my whole line of thought and argument, that I know no natural process for the transformation of a brute mammal into a man. But I am equally at a loss as respects the processes through which any one species, anyone variety, gives birth to another. Yet I do not presume to limit Nature by my small knowledge of its laws and powers. I know that a part of these still occult processes are in the every-day course of Nature; I am persuaded th1tt it is so through the animal kingdom generally; I cannot deny it as respects the " highest members of that kingdom. I allow, however, that the superlative importance of comparatively small corporeal differences in this consummate case may justify anyone in regarding it as exceptional. In most respects, man is an exceptional creature. If, however, I decline to regard man's origin as exceptional in the sense of directly supernatural, you will understand that it is because, under my thoroughly theistic conception of Nature, and my belief in mediate creation, I am at a loss to know what I should mean by the exception. I do not allow myself to believe that immediate creation would make man's origin more divine. And I do not approve either the divinity or the science of those who

are' prompt to invoke the supernatural to cover our ignorance of natural causes, and equally so to discard its aid whenever natural causes are found sufficient. It is probable that the idea of mediate creation would be more readily received, except for a prevalent misconception upon a point or genealogy. When the naturalist is asked, what and whence the origin of man, he can only answer in the words of Quatrefages and Virchow, " We do not know at all." We have traces of his existence up to and even anterior to the latest marked climatic change in our temperate zone: but he was then perfected man; and no t vestige of an earlier form is known. The believer in direct or special creation is entitled to the advantage which this negative evidence gives. A totally unknown ancestry has the characteristics of nobility. The evolutionist can give one satisfactory assurance. As the wolf in the fable was captious in his complaint that the lamb below had muddied the brook he was drinking from, so those are mistaken who suppose that the simian race can have defiled the stream along which evolution traces human descent. Sober evolutionists do not suppose that man has descended from monkeys. The stream must have branched too early for that. The resemblances, which are the same in fact under any theory, are supposed to denote collateral relationship. The psychological differences between man and the higher brute animals you do not expect me now to discuss. Here, too, we may say that, although gradations abridge the wide interval, the transcendent character of the superadded must count for more than a host of lower similarities and identities; for, surely, what difference there is between the man arid the animal in this respect is supremely important. If we cannot reasonably solve the problems even of inorganic nature without assuming initial causation, and if we assume for that supreme intelligence, shall we not more freely assume it, and with all the directness the case may require, in the field where intelligence at length develops intelligences? But while, on the one hand, we rise in thought into the supernatural, on the other we need not forget that one of the three old orthodox opinions,- the one held to be tenable if not directly favored by Augustine, and most accordant to his theology, as it is to observation, -is that souls as well as lives are propagated in the order of Nature. Here we may note, in passing, that since the "theologians are as much puzzled to form a satisfactory conception of the origin of each individual- soul as naturalists are to conceive of the origin of species," and since the Darwinian and the theologian (at least the Traducian) take similar courses to find a way out of their difficulties, they might have a little more sympathy for each other. The high Calvinist and the Darwinian have a goodly number of points in common. View these high matters as you will, the out-come, as concerns us, of the vast and partly comprehensible system, which under one aspect we call Nature, and under another Providence, and in part under another: Creation, is seen in the emergence of a free and self-determining personality, which, being capable of 'conceiving , it, may hope for immortality. "May hope for immortality." You ask for the reasons of this hope upon these lines of thought. I suppose that they are the same as your own, so far as natural reasons go. A being who has the faculty - however bestowed -of reflective, abstract thought superadded to all lower psychical faculties, is thereby per saltum immeasurably exalted. This, and only this, brings with it language and all that comes from that wonderful instrument; it carries the germs of all invention and all improvement, all that man does and may do in his rule over Nature and his power of ideally soaring above it. So we may well deem this a special gift, the gift beyond recall, in which all hope is enshrined. None of us have any scientific or philosophical explanation to offer as to how it carried to be added to what we share with the brutes that perish; but it puts man into another world than theirs, both here, and -with the aid of some evolutionary ideas, we may add- here- after. Let us consider. It must be that the Eternal can alone impart the gift of eternal life. But He alone originates life. Now what of that life which reaches so near to ours, yet misses it so completely? The perplexity this question raises was as great as it is now before evolution has ever heard of; it has been turned into something much more trying than perplexity by the assurance with which monistic evolutionists press their answer to the question; but a better line of evolutionary doctrine may do something toward disposing of it. It will not do to say that thought carries the implication of immortality. For our humble companions have the elements of that, or of simple ratiocination, and the power of reproducing conceptions in memory, and - what is even more to the present purpose -in dreams. Once admit this to imply immortality and you will be obliged to make soul coextensive with life, as some have done, thereby well-nigh crushing the whole doctrine of immortality with the load laid upon it. At least this is poising' the ponderous pyramid on its apex, and the apex on

a logical fallacy. For the entire conception that the highest brute animals may be endowed with an immortal principle is a reflection from the conception of such a principle in ourselves; and so the farther down you carry it, the wider and more egregious the circle you are reasoning in. Still, with all life goes duality. There is the matter, and there is the life, and we cannot get one out of the other, unless you define matter as something which works to ends. As all agree that reflective thought cannot be translated into terms of extension (matter and motion), nor the converse, so as truly it cannot be translated into terms of sensation and perception, of desire and affection, of even the feeblest vital response to external impressions, of simplest life.

The duality runs through the whole. You cannot reasonably give over any part of the field to the monist, and retain the rest. Ii. Now see how evolution may help you; -in its conception that, while all the lower serves its purpose for the time being, and is a stage toward better and higher, the lower sooner or later perish, the higher, the consummate, survive. The soul in its bodily tenement is the final outcome of Nature. May it not well be that the perfected soul alone survives the final struggle of life, and indeed "then chiefly lives," -because in it all worths and ends inhere; because it only is worth immortality, because it alone carries in itself the promise and potentiality of eternal life! Certainly in it only is the potentiality of religion, or that which aspires' to immortality. Here I should close; but, in justice to myself and to you, a word must still be added. You rightly will say that, although theism is at the foundation of religion, the foundation is of small practical value without the, superstructure. Your supreme interest is Christianity; and you ask me if I maintain that the doc- trine of evolution is compatible with this. I am bound to do so. Yet I have left myself no time in which to vindicate my claim; which I should wish to do most earnestly, yet very deferentially, considering where and to whom I speak. Here we reverse positions: you are the professional experts; I am the unskilled Inquirer. I accept Christianity on its own evidence, which I am not here to specify or to justify; and I am yet to learn how physical or any other science conflicts with it any more than it conflicts with simple theism. I take it that religion is based on the idea of a Divine Mind revealing himself to intelligent creatures for moral ends. We shall perhaps agree that the revelation on which our religion is based is an example of evolution; that it has been developed by degrees and in stages, much of it in connection with second causes and human actions; and that the current of revelation has been mingled with the course of events. I suppose that the Old Testament carried the earlier revelation and the germs of Christianity, as the apostles carried the treasures of the gospel, in earthen vessels. I trust it is reverent, I am confident it is safe and wise, to consider that revelation in its essence concerns things moral and spiritual; and that the knowledge of God's character and will which has descended from the fountain- head in the earlier ages has come down to us, through annalists and prophets and psalmists, in a mingled stream, more or less tinged or rendered turbid by the earthly channels through which it has worn its way. The stream brings down precious gold, and so may be called a golden stream; but the water -the vehicle of transportation -is not gold. Moreover the analogy of our inquiry into design in Nature may teach us that we may be unable always accurately to sift out the gold from the earthy sediment. But, however we may differ in regard to the earlier stages of religious development, we shall agree in this, that revelation culminated, and for us most essentially consists, in the advent of a Divine Person, who, being made man, manifested the Divine Nature in union with the human; and that this manifestation constitutes Christianity. Having accepted the doctrine of the incarnation, itself the crowning miracle, attendant miracles are not obstacles to belief. Their primary use must have been for those who witnessed them; and we may allow that the record of a miracle cannot have the convincing force of the miracle itself. But the very reasons on which scientific men reject miracles for the carrying on of Nature may operate in favor of miracles to attest an incoming of the super- natural for moral ends. At least they have nothing to declare against them. If now you ask me, What are the essential contents of that Christianity which is in my view a compatible with my evolutionary conceptions as with former scientific beliefs, it may suffice to answer that they are briefly summed up in the early creeds of the Christian Church, reasonably interpreted. The creeds to be taken into account are only two,- one commonly called the Apostles', the other the Nicene. The latter and larger is remarkable for its complete avoidance of conflict with physical science. The language in which its users "look for the resurrection of the dead" bears -and doubtless at its adoption had in the minds of at least some of the council- a worthier interpretation than that naturally suggested by

the short western creed, namely, the crude notion of the revivification of the human body, against which St. Paul earnestly protested. Moreover, as brethren uniting in a common worship, we may honorably, edifyingly, and wisely use that which we should not have formulated, but may on due occasion qualify,- statements, for instance, dogmatically pronouncing upon the essential nature of the Supreme Being (of which nothing' can be known and nothing is revealed), instead of the Divine manifestation. We may add more to our confession: we all of us draw more from the exhaustless revelation of Christ in the gospels; but this should suffice for the profession of Christianity. If you ask, must we require that, I reply that I am merely stating what I accept. Whoever else will accept Him who is himself the substance of Christianity, let him do it in his own way.. In conclusion, we students of natural science and of theology have very similar tasks. Nature is a complex, of which the human race through investigation is learning more and more the meaning and the uses. The Scriptures are complex, an accumulation of a long series of records, which are to be well understood only by investigation. It cannot be that in all these years we have learned nothing new of their meaning and uses to us, and have nothing still to learn. Nor can it be that we are not free to use what we learn in one line of study to limit, correct, or remodel the ideas which we obtain from another. Gentlemen of the Theological School, about to become ministers of the gospel, receive this discourse with full allowance for the different point of view from which we survey the field. If I, in my solicitude to attract scientific men to religion, be thought to have minimized the divergence of certain scientific from religious beliefs, I pray that you on the other hand will never needlessly exaggerate them; for that may be more harmful. I am persuaded that you, in 'I your day, will enjoy the comfort of a much better understanding between the scientific and the religious mind than has prevailed. Yet without doubt a full share of intellectual and traditional difficulties will fall to your lot. Discreetly to deal with them, as well for your-selves as for those who may look to you for guidance, rightly to present sensible and sound doctrine both to the learned and the ignorant, the lowly and the lofty-minded, the simple believer and the astute speculatist, you will need all the knowledge and judgment you can acquire from science and philosophy, and all the superior wisdom your supplications may draw from the Infinite Source of knowledge, wisdom, and grace.