

ARTICLE VI.

RECENT WORKS BEARING ON THE RELATION OF
SCIENCE TO RELIGION.¹

BY REV. GEORGE F. WRIGHT, ANDOVER, MASS.

No. IV.—CONCERNING THE TRUE DOCTRINE OF FINAL CAUSE OR
DESIGN IN NATURE.**Birks** (Thomas R.). *Modern Physical Fatalism and the Doctrine of Evolution.* 12mo. Macmillan.**Cocker** (Prof. B. F., D.D., LL.D.). *Theistic Conception of the World. An Essay in Opposition to certain Tendencies of Modern Thought.* pp. 426. New York. 1875.**Bowen** (Professor Francis). *Lowell Lectures on the Application of Metaphysical and Ethical Science to the Evidences of Religion.* pp. 465. Boston. 1849. In *Lectures* viii and ix. of the First Course, pp. 155–198, the “Argument from Design” is judiciously and powerfully presented, though of course without special reference to the peculiar problems of the present time.**Cook** (Rev. Joseph). *Monday Lectures delivered in Boston in the Fall and Winter of 1876 and 1877.* Published with the author's revision in the *Daily Advertisers* of the Tuesdays or Wednesdays following. Especially the Lectures on the Concessions of Evolutionists. Oct. 9, 16, 23, 30, 1876.**Dawson** (J. W., LL.D.). *An Address before the American Association for the Advancement of Science at Detroit, Michigan.* August, 1875. pp. 26. Montreal. 1875.Article in *International Review* for Jan. 1877, in *Review of Huxley's New York Lectures.* pp. 17.**Elam** (Charles, M.D.). *Winds of Doctrine: being an Examination of the Modern Theories of Atomatism and Evolution.* Reprinted from *Contemporary Review* for Sept., Oct., and Dec., 1876. pp. 163. London: Smith, Elder, and Co. 1877.**Fiske** (Prof. John). *Outlines of Cosmic Philosophy, based on the Doctrine of Evolution.* 2 vols. pp. 465, 523. Boston. 1875.Article in *North American Review* for Jan. 1877. pp. 90–106.

¹ The list of books and articles given here is supplementary to that given in the two previous papers. See *Bibliotheca Sacra* for July and October, 1876. We regret that through oversight Mesozoic was incorrectly spelled in the October Article. It was correctly spelled in the manuscript.

Hickok (Laurens P., D.D., LL.D.). *The Logic of Reason, Universal and Eternal.* pp. 192. Boston: Lee and Shepard. 1875.

Hill (Thomas, D.D., LL.D.). *A Statement of the Natural Sources of Theology; with a Discussion of their Validity and of Modern Sceptical Objections; to which is added an Article on the First Chapter of Genesis.* Reprinted from the *Bibliotheca Sacra.* pp. 139. Andover: W. F. Draper. 1877.

Huxley (Thomas H., F.R.S., F.L.S.). *Lectures on the Theory of Evolution, delivered in New York.* Published in *Tribune Extra.* No. 36, also, with the author's revision, in the *Popular Science Monthly* for Nov. and Dec. 1876, Jan. 1877.

2. Article on Biology in the ninth edition of *Encyclopaedia Britannica.*

Jackson (Rev. William, M.A., F.S.A.). *The Philosophy of Natural Theology. An Essay in Confutation of the Scepticism of the Present Day, which obtained a prize at Oxford, Nov. 26, 1872.* pp. xviii. and 398. New York: A. D. F. Randolph and Co. 1875.

LeConte (Dr. John L.) *Address before the American Association for the Advancement of Science at Detroit, Michigan, August, 1875.* pp. 18. Salem. 1875.

Martineau (James, D.D., LL.D.). *Modern Materialism in its Relations to Theology and Religion.* With an Introduction by Henry W. Bellows, D.D. 18mo. pp. 211. G. P. Putnam's Sons. 1877.

Maxwell (Prof. Clerk). In Article on "Atoms" in the ninth edition of the *Encyclopaedia Britannica.* He argues the absurdity of "pan-genesis," from mathematical calculations regarding the size of atoms.

Morse (Professor Edward S.). Paper read before the American Association for the advancement of Science at Buffalo, N. Y. Aug. 1876. Published in *Popular Science Review* for Nov. and Dec. 1876. pp. 1-16, 181-198.

McCosh (James, D.D., LL.D., President of Princeton College). *The Development Hypothesis: Is it Sufficient?* 12mo. pp. 104. New York: Robert Carter and Brothers. 1876.

The earlier works of the same author should by no means be neglected. The more important are:

The Method of the Divine Government, Physical and Moral. pp. 547. Especially Book II. pp. 75-257. Edinburgh. 1855.

Typical Forms and Special Ends in Creation. pp. 556. Edinburgh. 1857.

The Intuitions of the Mind Inductively Investigated. Revised edition. pp. 448. London. 1865.

Porter (President Noah, D.D., of Yale College). *The Human Intellect, etc.* pp. 693. Especially Chapter v. of the Fourth Part, on "Design, or Final Cause." New York. 1869.

Smith (Prof. Goldwin). "The Ascent of Man." Article in *Macmillan's Magazine* for Jan. 1877. pp. 10. Republished in *Eclectic Magazine* for March.

Socrates. Reported in Xenophon's *Memorabilia*. Book I. chap. 4 and Book IV. chap. 3. This author is not very recent, neither are the *Bridgewater Treatises*, to which the reader should be referred, fully up to date, but there is as much meaning in them now as ever, and, as modern science is trying to show, a little more.

Wallace (Alfred Russell). *The Geographical Distribution of Animals, with a Study of the Relations of Living and Extinct Forms as Elucidating the Past Changes of the Earth's Surface*. 2 vols. 8vo. pp. 503, 607. New York: Harper and Brothers. 1876.

Address at the Glasgow Meeting of the British Association. Published in the *American Journal of Science and Arts* for Nov. 1876. pp. 354-85.

Weismann (Prof. August). *Studien zur Descendenz-Theorie*. II. Über die letzten Ursachen der Transmutationen, Mit fünf Farbendrucktafeln. 8vo. pp. 336. Leipzig. 1876.

Wilder (Rev. M. A.) *Natural Law and Spiritual Agency*. Article in *New Englander*, Vol. xxxiii. (Oct. 1874). pp. 674-702. This is a very satisfactory vindication of the general doctrine of Mind in Nature.

I. *Is there Design in Nature?*

If on shaking a quantity of type in a basket it should appear that some of the pieces stuck together, when they fell, in such order as to compose the story of Moses in the bulrushes, could we resist the conclusion that these particular types were loaded with the design of composing that story, on condition that they were well shaken? Indeed, should we not see more design in type thus endowed than in ordinary "pie," from which an intelligible sentence can be formed only by the direct efforts of a highly skilled workman?

We read the design in the complicated and intelligible adaptation of the final result. It is no prejudice to our conclusion to show that the forces producing this delicate adaptation have passed through a variety of transformations, and that their origin is out of sight. Whatever that might prove, it would in no manner disprove origination in an intelligent designer. The atmosphere of modern speculation is not inimical to the Paleyan argument when properly understood, but is rather a positive supporter of it.

We hear much about the conservation of force. Energy may be cast down from one seat and another, but it cannot be destroyed. It is protean in its forms. There is a principle of continuity in nature. Lines of force which we see in operation in present phenomena may be traced backward into more indefinite, because less known, forms; but they cannot be run so far back as to project behind adequate causation. It is precisely so with the evidence of design in complicated adaptations of nature. Chance produces nothing *definite and orderly*.¹ Nature "conserves" design as much as it does force, and in much the same manner.

"One day at Naples," says a French writer, "a certain person in our presence put six dice into a dice-box, and offered a wager that he would throw *sixes* with the whole set. I said that the chance was possible. He threw the dice in this way twice in succession; and I still observed, that possibly he had succeeded by chance. He put back the dice into the box for the third, fourth, and fifth time, and invariably threw *sixes* with the whole set. 'By the blood of Bacchus,' I exclaimed, '*the dice are loaded*'; and so they were.

"Philosophers, when I look at the order of nature that is constantly reproduced, its fixed laws, its successive changes, invariably producing the same effect,—when I consider that there is but one chance which can preserve the universe in the state in which we now see it, and that this always happens, in spite of a hundred millions of other possible chances of perturbation and destruction,—I cry out, '*Surely, Nature's dice are also loaded.*'"²

The adaptations which we behold in such profusion in nature, may each of them, with respect both to their secondary causes and their final causes, be compared to a river like the Mississippi, flowing past our doors. We shall not be able to dispense with the idea of design in the location of the river by showing that the channel was not dug by the

¹ How little sense there is in attributing orderly manifestations to *chance*, especially such adaptations as those by which we live and move and have our being, we have shown in previous Articles. See Bib. Sac., Vol. xxxii. pp. 544–547; also Vol. xxxiii. pp. 669, 674, 676, and 687; see also, Hill's *Natural Sources of Theology*, p. 77 f.; J. S. Mill's *Inductive Logic*, Book iii., chapters 17 and 18; Bowen, on *Metaphysical and Ethical Science*, pp. 165–171; Jevons's *Principles of Science*, Vol. i. p. 225 ff.

² The Abbé Galiani in discussion with Diderot, translated and quoted by Bowen from Dugald Stewart's notes.

use of spades, and the material removed on wheelbarrows; for that is only one way, and is not God's way, of forming a canal. The nature of the instrument used in accomplishing an object has nothing whatever to do with the fact of a design. We may, if we please, trace the Mississippi back through all its numerous tributaries to the raindrops and the skies, but we are still in a charmed and closed circle of "principles of order," combining for definite results. We never in our investigations get within sight of chaos. What is science but a study of orderly operations? Where order seems to cease, the scientific investigator pauses in bewilderment. "Principles of order" compass his "path and his lying down," they beset him "behind and before." If he "ascend up into heaven they are there; if he take the wings of the morning and dwell in the uttermost parts of the sea, even there shall they lead him."

In any case of secondary causation we do not care, so far as the argument for the existence of an intelligent designer is concerned, at how many, or at what points, the various elements of design entered. The inference of design in nature is drawn from complexity and niceness of adaptation. This inference need not be affected by any new view of the mode of origination, and cannot be rebutted, except by assigning a sufficient physical cause, irrespective of intelligence. If any one asserts that these adaptations arise from necessity, he is bound to show by what necessity. Until that is shown, the inference of an intelligent cause is as good as it ever was, however much our conception of nature's intricate machinery may be enlarged. Man is himself a designer. The hypothesis that the adaptations of nature had their origin in design is, to say the least, more intelligible than that which ascribes them to necessity. Certainly it devolves upon those who deny or refuse to recognize design in organic complexity, to do more than push back one step, or one hundred steps, the point at which the designing impulse may have been given. They must draw lines of circumvallation around the whole field, and cut off every avenue of approach, or the argument

for design will enter with all its force in spite of them. Sober-minded naturalists do not undertake this task. We do not envy the success of those philosophers who have undertaken it. For, it is as hard to banish the idea of final cause as of efficient causation, and for precisely the same reason.

In the case referred to, of type arranging itself to compose the story of Moses, there is an accumulation of particular designs. In type set up by a printer, a very large part of the particular design enters through his work. But he did not design the type, nor did the type-founder design the story. In this case the skill of the type-setter is called into requisition because the type-maker had not the power or the inclination to go farther in his design than to get the material in readiness for the more specific designs of the printer. But if this type, when shaken sufficiently by horse power in the cellar, would in a square box become Milton's "Sonnet on his Blindness," in a round one the "Lord's Prayer," in a tin pan the "Sayings of Poor Richard," and in a rush basket the story of Moses, we have not lost the design because an animal furnished the power which did the shaking. We grant that the animal did not of his own will add anything to the evidence of the design,—perhaps he was only trying to get at an ear of corn on a stick before him. But design entered in adjusting the forces to make the mill go. We grant, also, that a person of less skill than a printer could set the mill in operation. But so far as the argument for design is concerned, you have, in bringing forward these considerations, only transferred more of the designing activity to this extraordinary type-founder. The evidence of design is not obscured.

II. *Paley did not Reason in a Circle.*

Paley, in the second chapter of his *Natural Theology*, considers the case of one watch being produced from another in a regular series; and shows that such a discovery would only increase our "admiration of the contrivance," and our "conviction of the consummate skill of the contriver."

Paley, in company with all the scientific investigators of his day, was ignorant of the considerations which are now forcing upon the world the question of the derivative origin of species as well as that of individuals. But he was not so short-sighted as to base his argument on the mode of origination. When one individual gives birth to another, it is only "in some sense the maker" of it.

He is "asking for the cause of that subserviency to a use, that relation to an end, which we have remarked in the watch before us. No answer is given to this question by telling us that a preceding watch produced it."¹

Still farther on in the chapter Paley contends that supposing one watch to have been produced from another watch, and "that from a former, and so on indefinitely," "does not, even though we go ever so far," "bring us any nearer to the least degree of satisfaction on the subject." The difficulty is not diminished by removing it farther back.

"A chain composed of an infinite number of links can no more support itself than a chain composed of a finite number of links. And of this we are assured, though we never *can* have tried the experiment, because, by increasing the number of links, from ten, for instance, to a hundred, from a hundred to a thousand, etc., we make not the slightest approach, we observe not the smallest tendency, towards self-support."²

In the case of one watch being produced by another, Paley denies that "we have [in that fact] any cause whatever for the design, the contrivance, the suitableness of means to an end."³ The real effect of discovering such an origin would be to "increase beyond measure our admiration of the skill which had been employed in the formation of such a machine."⁴ But, while Paley satisfactorily disposed of the objections to his argument on the ground that individuals are propagated from each other, it could not be expected that he should altogether anticipate a somewhat different line of objection, subsequently arising out of a belief that living *species* have a genetic connection with one another. If individuals are endowed not merely with the power of producing other individuals exactly after their kind, but of producing them

¹ Paley's *Natural Theology*, chap. ii., sec. 3.

² *Ibid.*, sec. 4.

³ *Ibid.*, sec. 4.

⁴ *Ibid.*, sec. 5.

with variations of such a kind, and so correlated to their environment, that there shall be improvement in the organization, this, as Professor Gray early contended, compels an extension of the Paleyan argument for a designer.

We are fully aware of a remarkable passage, in which Paley is thought by some to assert that he would throw up his whole style of reasoning if such an hypothesis as that of Mr. Darwin should be established. The passage is as follows :

“There is another answer which has the same effect as the resolving of things into chance, which answer would persuade us to believe that the eye, the animal to which it belongs, every other animal, every plant, indeed every organized body which we see, are only so many out of the possible varieties and combinations of being which the lapse of infinite ages has brought into existence; that the present world is the relic of that variety; millions of other bodily forms and other species having perished, being, by the defect of their constitution, incapable of preservation, or of continuance by generation.”¹

If Paley had written in our day, he would no doubt have guarded his phraseology with more care. But even as it is, the section, as a whole, plainly indicates that the Lucretian theory of fortuitous development was in view. For in his more explicit statement, on the following page, we read :

“The hypothesis teaches, that every possible variety of being hath, at one time or other, found its way into existence, — by what cause or in what manner is not said, — and that those which were badly formed perished; but how or why those which survived should be cast, as we see that plants and animals are cast, into regular classes, the hypothesis does not explain; or, rather, the hypothesis is inconsistent with this phenomenon.”

Now, Mr. Darwin, in our day, has brought forward an hypothesis which purports to be consistent with this phenomenon. On this hypothesis, — suggested by observation, — of a wide range of variability, correlated to a complicated series of changing conditions which do not neutralize the effect of the tendency to variation, but direct and intensify it, naturalists are attempting to account for the definite direction in which species have progressed, and the “regular classes” in which they are cast. Yet this can be no hap-hazard process,

¹ Natural Theology, chap. v., sec. 4.

however concealed from our plodding intellects. No one can suppose that all possible events have occurred. The farthest one could go in that direction would be to surmise that all events possible under the present system of nature had come to pass ; but that would be a very different thing. Like all illustrations, the one we are now going to bring forward is very unsatisfactory in some respects ; but it is truthful to the main point. Each single variation in the hypothesis of Mr. Darwin is like an explosion of gunpowder, determinate in its tendency only as there is a gun-barrel to direct its force.

Had the modern speculations concerning the derivative origin of species been promulgated when Paley wrote, there can be little doubt that our American naturalist would have been anticipated in his supposition of the watch whose immediate descendants produced better watches, and whose remote descendants gave birth to a chronometer and a town clock. The question in natural theology raised by Darwinism does not disturb the argument for an intelligent designer, but pertains only to the times and modes in which the forces of design are introduced. It also modifies in some degree the interpretation of that design. How little the students of natural theology have to fear this theory of the origin of species, will appear when attention is directed to the contrivance and foresight of a higher power demanded by this theory, not so apparently in the construction of each particular part of the organic and balanced whole, when taken singly, as in the construction and preservation of the whole itself, which should *incorporate* and *retain* these contrivances and adaptations among its parts.

If Paley is open to criticism in one point more than in another, it is in this : that he does not make sufficiently prominent the *a fortiori* nature of his argument. To come down from the "Cosmos" to a watch, to find design, seems like labor lost, since the one is so infinitely inferior to the other. Furthermore, the watch reveals two separate things which we are likely to confound, namely, design, and man's

method of executing design. Making such a comparison prominent incurs the danger of encouraging conceptions of God which are too *anthropomorphic*, both as to the narrowness of the design contemplated and as to the means of attaining the end.

III. *Life does not exist or continue by Necessity.*

The profoundly mysterious power of life, somehow introduced into the world, is adjusted on the Darwinian hypothesis to the other forces which have operated co-ordinately with it. We can easily conceive that at any time since its introduction, changes in these co-ordinato powers might have altogether extinguished life itself. The theory of pangenesis, which is derided by some as absurd, has only that degree of absurdity that pertains to any attempt to state in comprehensive, material figures of speech the marvellous facts concerning the manifestations of life.

We are aware that at this point we are likely to be told that there is no more propriety in speaking of the "power of life" and "vitality" than in speaking of the "power of aquosity" in water. For the sake of the argument we are willing to grant it. But certainly the "power of aquosity" is something. Water is not a necessary existence, even when all the elements in its composition abound. Oxygen and hydrogen are not water, till other and a whole congeries of powers have brought them in to a particular relation to each other; and then they are held in that relation only so long as certain conditions are preserved. The word "aquosity" because superfluous, is not senseless. But no one would contend that there is not a far greater manifestation of power, and an inconceivably more delicate adjustment of conditions required in the production and perpetuation of living organisms, especially those of a higher grade, than in the production of water. As water is more than oxygen and hydrogen, so a living organism is more than oxygen, hydrogen, nitrogen, carbon, and whatever other chemical elements enter into it. If any one says that living organisms exist in nature by virtue

of necessity, we ask by what necessity? Chance knows no necessity. There can be no necessity in the outcome of Nature except such as is put into her operations. The reasoner never can get so far back in the chain of secondary causation that he is not compelled to posit a nature and conditions which involve in their operations all present phenomena. We by no means admit that philosophers have reduced, or ever can reduce, all phenomena to two or three elementary forms of motion. But if they should do so, they will not have reduced the amount of intelligence necessary to work out of these so-called simple motions the present complicated results and adaptations; for since the days of Aristotle we have rather heard that wisdom was most manifest in the power of accomplishing wonderful results by simplest means.

Let us now look more closely at the Darwinian hypothesis, and see if it in any manner excludes design.

Life is not, according to this hypothesis, a product of the present conditions of existence. It comes down from the past through a mysterious power of propagation. Life is a power co-ordinate with the other natural forces, and clothes itself in material forms which accord both with the nature of the inner principles and of the conditions. A living principle, capable, to a limited extent, of transforming other material powers, is set in motion. To maintain its existence this principle has to run the gauntlet of all the changes that take place in such a world as this. This power of life may be compared to a rove of cotton, and the conditions of life to the spinning-jenny and the combined machinery of a cotton-mill. The nature of the product depends on a vast complication of movements and adaptations, from those of the water-wheel to those which secure the proper tension of the thread. All these movements are independently adjusted with reference to the nature of the cotton. Too much tension will break the thread, too little would loop it.

The Darwinian supposition is, that life has been so adjusted to the changing conditions of the material forces of the

world, that for a period of one hundred million years, more or less, it has been continuous. That surely makes a demand for a Contriver who is omniscient as well as omnipotent. For, the conditions through which that plastic principle has passed have been changeable and trying. Time and again, land and water have shifted place, and transferred the scene for organic development from one portion of the globe to another. The alternations of climate have been extreme between distant periods of time. Now an arctic climate has crept slowly down far towards the equator, to give place in due season to ameliorating influences that should dispel even the rigor of the frigid zones. Volcanoes have at times belched forth their fires in almost every portion of the world, and earthquakes have everywhere shaken her solid foundations. Vast regions have sunk beneath the sea; while elsewhere plains as vast, and bearing mountain chains on their summits, were rising towards the sky. Amid all these changes, however slowly they may have occurred, the equation of life has had continually to re-adjust itself not only to forces outside, but to its own inherent tendencies. Race has warred on race, and individual has been brought into sharp competition with his fellow. The mystery is that the higher forms of life have been preserved at all. The hand of Providence certainly is not dispensed with, but rather called for. The Providence of the Darwinian resembles a far-seeing capitalist, who like the ant lays up his store in the summer season; while that of the catastrophist is like the day-laborer, whose family lives from hand to mouth. It is the inability of our imaginations to cross the cycles of time and its secondary causes, which makes it so difficult for us to recognize the similarity of contrivance from eternity with that which is originated to-day. There is convincing force in the remarks of Whewell, when applied to the subject in hand, as well as to that upon which he was writing.

“The adaptation of the bones of the skeleton to the muscles, the provision of the fulcrums, projecting processes, channels, so that the motions and forces shall be such as the needs of life require, cannot possibly become less

striking and convincing from any discovery of general analogies of one animal frame with another, or of laws connecting the development of different parts. Whenever such laws are discovered we can only consider them as the means of producing that adaptation which we so much admire. Our conviction that the artist works intelligently is not destroyed, though it may be modified and transferred, when we obtain a sight of his tools. Our discovery of laws cannot contradict our persuasion of ends; our morphology cannot prejudice our teleology. . . . The assertion appears to be quite unfounded that, as science advances from point to point, final causes recede before it, and disappear one after the other. The principle of design changes its mode of application, indeed, but it loses none of its force. We no longer consider particular facts as produced by special interpositions; but we consider design as exhibited in the establishment and adjustment of the laws by which particular facts are produced. We do not look upon each particular cloud as brought near us that it may drop fatness on our fields; but the general adaptation of the laws of heat and air and moisture to the promotion of vegetation does not become doubtful. We do not consider the sun as less intended to warm and vivify the tribes of plants and animals because we find that, instead of revolving round the earth as an attendant, the earth, along with other planets, revolves round him. We are rather, by the discovery of the general laws of nature, led into a scene of wider design, of deeper contrivance, of more comprehensive adjustments. Final causes, if they appear driven farther from us by such extension of our views, embrace us only with a vaster and more majestic circuit. Instead of a few threads connecting some detached objects, they become a stupendous network, which is wound round and round the universal frame of things."¹

IV. *Difficulties in the way of an Exhaustive Interpretation of God's Designs in Nature.*

It may be well to recur to our opening illustration of types possessed in some way of the capacity of sticking together according to an intelligible plan. Suppose, now, that after the amount of shaking, more or less, which brought out the story of Moses we should find a large quantity of "types," "leads," "spaces," and "quads" still jumbled together according to no discernible order: would that disprove the positive testimony we already had of intelligent design? We will not insult our readers by answering so plain a question for them, but may bring to their attention a pertinent remark of Paley on the point:

¹ The Philosophy of the Inductive Sciences, Vol. ii. pp. 88-94. London, 1840.

“True fortitude of understanding consists in not suffering what we know to be disturbed by what we do not know. If we perceive a useful end, and means adapted to that end, we perceive enough for our conclusion. If these things be clear, no matter what is obscure. The argument is finished. . . . A just reasoner removes from his consideration not only what he knows, but what he does not know, touching matters not strictly connected with his argument, that is, not forming the very steps of his deduction. Beyond these, his knowledge and his ignorance are alike relative.”¹ [That is to say, are *irrelative* to the matter in hand.]

But by the seeming waste and the apparent failures and imperfections of nature, we are brought to face a difficulty regarding the power, wisdom, and goodness of its Designer. We come now to the more important and difficult question of *interpreting* the designs of the Creator. The position which we defend is, that though his ways are as much higher than our ways, and his thoughts than our thoughts, as the heavens are higher than the earth, still, his name is something better than the “Unknowable.” We do know something about the heavens. The heavenly bodies are set for the dividing of times and seasons. The fugitive and the sailor know something, though far less than the astronomer, about the north star. “We may find God, though we can never find him out.” One may endeavor to point out the means of rescuing the doctrine of final causes from the general disrepute into which it has fallen in some quarters; and from certain objections, supposed to be new, arising in connection with Darwinism.

There are, indeed, few subjects upon which there has been so much loose speculation as upon that of the interpretation of the reasons which have actuated the Divine Mind in the creation of particular things. The arrogance of our short-sighted wisdom in pronouncing upon the ultimate reason why certain things are brought into existence has often been so manifest and so offensive, that it is not surprising that some philosophers have gone to the other extreme, and pronounced the ways of God absolutely unknowable. But it is surprising and somewhat discouraging that authors of the

¹ Natural Theology, chap. v., sec. 7.

calibre and breadth of Hamilton and Mansel should have landed in such a suicidal and self-stultifying position. The error has been in failing to consider the universe as a whole. We have cut nature up into parts, and discussed the meaning of these in their isolation. We have brought an atom within the field of the microscope, and reasoned about it as though it were the centre of the universe, as it is of our vision. Whatever thing was useful it has been assumed was made for that special purpose, with no farther thought of its relation to other objects. The bill of a mosquito is doubtless useful to its possessor, but it is a torment to the rest of the animal creation. The tail of the cow is of advantage to the cow chiefly as it is a terror to the mosquito.

There is no disguising the fact that a constant state of warfare exists between the members of the animal kingdom, in which the weakest go to the wall. Carnivorous animals live by depredations upon the herbivorous, and the more favored of the herbivorous live by snatching the food from the mouths of their less favored brethren, and subjecting them to slow starvation. The carnivora, too, struggle between themselves as well as with their more peaceable neighbors. The very need of many of the contrivances necessary for the preservation of the lives of plants and animals is created by the existence of antagonistic elements in surrounding nature. For example, some individual fishes produce millions of young every year; but the adverse conditions are so numerous and destructive that, on the average, not over one or two survive to maturity. It has been adduced as evidence of the care of the Deity for the welfare of these fishes that since the elements are so adverse to the survival of their young they are compensated by the power of producing so great a number, so that the species may not be lost. But then the rocks are full of evidences that numberless species have at last succumbed and become extinct.

“From scarped cliff and quarried stone
She cries ‘A thousand types are gone.’”

Where is the benevolent wisdom in these facts, when con

sidered in themselves, apart from the general system in which they are introduced? The truth is, that the rose-colored views of many of the evolutionists, and of still more of the pietistic interpreters of natural theology, are built upon a very narrow basis of facts, to the exclusion of another class of facts which abound in startling number. Much of what is ascribed to God as benevolence, displays as much confusion of mind on the part of those who adduce it, as did certain laws of Massachusetts for the protection of fish. Among other statutes on the subject, there was one making the lives of *pickerel* sacred at certain times of the year. The legislators did not consider that the lives of the more valuable fishes were in greater danger from the voracity of one hungry pickerel than from the depredations of half a score of fishermen.

V. *The Doctrine of Second Causes involves Difficulties analogous to those in the Doctrine of Final Causes.*

In stating the doctrine of secondary causation, logicians have found it necessary to disencumber themselves of many old-time distinctions between causes and conditions. In the realm of secondary causes nothing is the product of a single cause. As Hamilton remarks :

“Of second causes, there must almost always be at least a concurrence of two to constitute an effect. Take the example of vapor. Here, to say that heat is the cause of evaporation is a very inaccurate, at least a very inadequate, expression. Water is as much the cause of evaporation as heat. But heat and water together are the causes of the phenomenon. Nay, there is a third concause which we have forgot—the atmosphere. Now, a cloud is the result of these three concurrent causes or constituents; and, knowing this, we find no difficulty in carrying back the complement of existence, which it contains prior to its appearance. But on the hypothesis that we are not aware what are the real constituents or causes of the cloud, the human mind must still perforce suppose some unknown, some hypothetical, antecedents, into which it mentally refunds all the existence which the cloud is thought to contain.”¹

According to Stuart Mill :

“The statement of the cause is incomplete, unless in some shape or

¹ Lectures on Metaphysics, chap. xl., pp. 554, 555. Boston, 1859.

other, we introduce all the conditions. A man takes mercury, goes out of doors, and catches cold. We say, perhaps, that the cause of his taking cold was exposure to the air. It is clear, however, that his having taken mercury may have been a necessary condition of his catching cold; and, though it might consist with usage to say that the cause of his attack was exposure to the air, to be accurate we ought to say that the cause was exposure to the air while under the effect of mercury. Every condition of the phenomenon may be taken in its turn, and with equal propriety in common parlance, but with equal impropriety in scientific discourse, may be spoken of as if it were the entire cause. And in practice that particular condition is usually styled the cause whose share in the matter is superficially the most conspicuous, or whose requisiteness to the production of the effect we happen to be insisting upon at the moment. So great is the force of this last consideration that it often induces us to give the name of cause even to one of the negative conditions. We say, for example, 'the cause of the army's being surprised was the sentinel's being off his post.' Since, then, mankind are accustomed, with acknowledged propriety, so far as the ordinances of language are concerned, to give the name of cause to almost any one of the conditions of a phenomenon, or any portion of the whole number, arbitrarily selected, without excepting even those conditions which are purely negative and in themselves incapable of causing anything; it will probably be admitted, without longer discussion, that no one of the conditions has more claim to that title than another, and that the real cause of the phenomenon is the assemblage of all its conditions. The cause, philosophically speaking, is the sum total of the conditions, positive and negative, taken together."¹

We would not care to be held by all the phraseology of Mill, nor would we speak disrespectfully of those logicians and philosophers who, for special purposes, have endeavored to make accurate and intelligible distinctions between causes of various kinds and conditions. It is sufficient for our purpose that there is a word "concause": and its idea in a very comprehensive sense is indispensable to any proper understanding of the true doctrine of secondary or efficient causation. A difficulty which is always encountered by the men of science is to keep hold of all the threads of physical causation which centre in a given phenomenon. Some are invariably lost, and there is necessarily an apparent dissipation of

¹ Logic, p. 198 ff. See also President Edwards' definition of cause, in "Freedom of the Will," Part ii., sec. 3.

energy. The doctrine of the conservation of energy is not one of perfect experiment, but is one of thought; it is a belief which goes beyond experiment.¹ The students of natural theology, or of design in nature, encounter in their field difficulties altogether analogous to, but we apprehend no greater than, those just referred to as experienced by scientific men. The students of natural theology are endeavoring to harmonize in one principle the imperfect evidences of apparently conflicting designs which appear in nature. The universe is a compromise, in which subordinate ends are but imperfectly realized. Justice and mercy are not the only principles which coalesce with difficulty. There are paradoxes other than those presented by the co-existence in the human will of freedom and certainty. There is a nature of things which presents obstacles even to Omnipotence; for Omnipotence has relation only to such things as are the proper objects of power. Two hills cannot exist without a valley between. It is easy to conceive that two or more ends, desirable in themselves, may be so related as to require an indirect process for their accomplishment. For example, the perfection of the whole and the perfection of the part, are in a manner exclusive of each other, except as the mutual adaptation is an element of the perfection. It may not be derogatory to the divine wisdom to affirm that the eye is an imperfect optical instrument, because the securing of the power of sight is only one of the many ends to be accomplished in such an organism. Vision as an end is correlated with other objects of design. As each writer has his style, so God has his chosen mode of operations. The style of God's workmanship may be as essential in its correlation to the intellect of his creatures, as light is to the eye. If God has infinite ends in view, it is fitting, that in accomplishing these ends, he move along the curve of an infinite circle. The manner in which a thing is done, is a part of the thing itself. If it be impossible to penetrate far into the designs of the Creator,

¹ See an instructive paper, by Prof. Leebody in *British and Foreign Evangelical Review*, for Oct. 1876.

it is equally impossible to comprehend to any great extent, the method of his operations.

In the comprehensive theory of virtue elaborated by President Edwards and his successors, the "good of being" is made the ground of obligation. "The creation, taken not distributively, but collectively, as a system raised to a high degree of happiness," constitutes "the declarative glory of God."¹ God, in his infinite benevolence, must have sought, in the creation as a whole, the "good of being," in the most comprehensive sense of that phrase, including himself. Here comes the practical difficulty of interpretation; when we attempt to follow out the lines of this design as they radiate from the divine activity; or (to speak more properly) when we pick up a few loose strands of this infinite web, we soon plunge into mysteries and encounter paradoxes. But it ill becomes scientific men to magnify those difficulties in comparison with their own. The scientific fraternity had trouble, not long since, with a guild popularly styled "positivists," who well nigh classified science to death, and insisted that philosophers were to take no step beyond actual observation and experiment. From that folly Darwin has happily delivered them. So have we had, in the ethical field, those called "utilitarians," who insisted that there was no virtue except in such acts as have a tendency to promote happiness, — the *promotion* of happiness being the foundation of obligation. But that is too narrow a view of virtue, since man cannot tell absolutely what actions will, on the whole, promote happiness; he must accept the testimony of God as seen in the construction of human nature and in providence and in revelation. To the question what is Virtue; the Edwardean answers, Virtue consists in choosing the "good of being"; and that involves, on the part of a finite creature only such conformity of executive action in attaining the general object as corresponds to the light he has regarding the correlation of means to the end. Where there is a willing mind, God takes care of the results. But when we rise above the region of

¹ See Edwards' Works [The Younger], Vol. i. p. 481. Boston, 1854.

human infirmity, and speculate concerning the designs of infinite wisdom, we see that with God the choice and the action must coalesce. The general becomes particular, and the individual choice becomes universal. Doubtless, the universe is "all of a piece" both as to second causes and as to final causes. No part of the creation can be fully interpreted, either as to efficient cause or as to final cause, without regard to every other part. We may say, then, of any object in nature, that in the divine idea the final cause of its creation is the sum of all the uses to which it is ever to be put. This should introduce us to a very broad view of design, comprehending the principle of correlation, which has regard to negative use as well as positive, and bringing to view the whole question regarding the dignity of human nature, and the requisites for its mental and moral development. Even then there is an unknown range of possible intelligence, different from our own and perhaps above it, which will make us cautious about expressing negative conclusions regarding the wisdom of any work of God. With some of these questions, as they have been met both in the field of science and in that of theology, we shall deal in a future paper; so we will touch lightly upon them here. Doubtless there is in the mind of God a "sufficient reason" for the existence of each particular thing in the creation. But the full interpretation of this sufficient reason, like the complete comprehension of the doctrine of the "continuity of nature," lies beyond our capacity. Still, we are not in either department complete "agnostics"; we do know something. Let us see what, and about how much, it is.

VI. *How fully can the Human Mind interpret the Design in Nature?*

To get a proper understanding of the true doctrine of final causes, we must endeavor to shift the point of view from that in which we see things singly and disconnected to a position from which they shall be seen as parts of an organic whole. The reason for the existence of any part of the

creation cannot be fully understood except in its relations to all the other parts. The final cause of the least part of the universe can be interpreted only from a proper understanding of the final cause of the whole. The part must be merged in the whole before it can be exhaustively interpreted. As each particle of matter feels the attraction of every other particle, so all lines of design are deflected by the requirements of each subordinate element. We have not insisted enough upon the distinction between the chief end of creation and what is subsidiary or incidental to it. Each incidental good, however, comes in as a part of that whole which constitutes the chief end. The comprehensive end of the creation is, as we have said, the "highest good of being in general." We can conceive that this is secured in a variety of co-ordinate lines centering in that one generalization. The sensational happiness of all organic creatures, from the lowest animalcule to that of the most highly organized animal form, is an element to be considered in that general good of being. The pleasurable sensations of the intellect, investigating and interpreting the ways of God as displayed in the creation, is likewise a part of that good included in the end for which all things were made. The interchange of sympathy and love and admiration and gratitude which accompanies the development of moral character amid the trials of life, forms also a part of that object for which all things exist. But, aside from the satisfaction which we may suppose God to have himself in his own work and its results, we must, perhaps, in estimating the material creation's "value in use," give the foremost place to the probability that intelligent beings throughout all future time and in all space will need a clew by which to unravel and rightly interpret the scheme of God. The intellectual and moral emotions dependent upon the adaptability of the works of God to being understood may form the chief part of finite good. In other words, it may reasonably be supposed that it is of more account to God's creatures as a whole that the universe be capable of interpretation, and that the method of God in his works

be manifested, than that any amount of temporary good should occur during the earlier stages of the process of development. The happiness occurring now may be only such as can be worked in incidentally to the greater good that is to supervene in the consummation of all things. And even now it may be of more account to us to be assured that we have some conception of God's general plan of operations with reference to us, than it would be to know the full meaning and object of any part of his creation ; just as it is of more importance that a child should be certain that the command is from his parent than that he should understand the reason of the command.

The use to which we may put a thing is never more than a fragment of the final cause of its existence.

We may illustrate this by the reasons that prevail in the establishment of a manufactory at a particular place. We will suppose it is a saw-mill, the main object of whose construction is the production of lumber. A combination of reasons, no single one of which may have been sufficient alone, accounts for the existence of each particular saw-mill. The price of labor, the facility to a market for the principal production, the obstacles to be overcome in getting the raw materials to the mill, and, finally, the use that can be made of the refuse, or incidental production of the establishment, may, any one of them, come in as the determining reason. All the profits of the mill may be in the sale of the slabs and scantling, or in economizing these as fuel. The uses the miller's children may make of the refuse for play-houses, and the miller's wife for kindling, are none of them so insignificant as not to be taken into account. The children very naturally, might at a certain age, fix upon their incidental advantage as the main object, or final cause, for which the mill existed. And their error may not be half so ludicrous as that we make in assigning the temporary advantages we derive from them as the exhaustive reason for the existence of the several parts of the universe that come within the range of our limited observation. Indeed we may well

suppose that the highest conception we can compass with our imagination of the perfection and design of the divine workmanship, is but a partial appreciation of the utility of the chips that have fallen off incidentally in the process of rearing the walls of the city of God. We are living in the quarry, and are concerned with the fragmentary pieces of emerald and sardonyx and topaz that are scattered thickly about the region where God's hand is at work. This view is suggested by the last three pages in the work of Darwin on "Animals and Plants under Domestication"; which are worthy of the most careful study of the theologian.

"In accordance with the views maintained by me in this work and elsewhere, not only the various domestic races, but the most distinct genera and orders within the same great class; for instance, whales, mice, birds, and fishes, are all the descendants of one common progenitor, and we must admit that the whole vast amount of difference between these forms of life has primarily arisen from simple variability. To consider the subject under this point of view is enough to strike one dumb with amazement. But our amazement ought to be lessened when we reflect that beings, almost infinite in number, during an almost infinite lapse of time, have often had their whole organism rendered in some degree plastic, and that each slight modification of structure which was in any way beneficial under excessively complex conditions of life, will have been preserved, whilst each which was in any way injurious will have been rigorously destroyed. And the long continued accumulation of beneficial variations will infallibly lead to structures as diversified, as beautifully adapted for various purposes, and as excellently co-ordinated, as we see in the animals and plants all around us. Hence I have spoken of selection as the paramount power, whether applied by man to the formation of domestic breeds, or by Nature to the production of species. I may recur to the metaphor given in a former chapter; if an architect were to rear a noble and commodious edifice, without the use of cut stone, by selecting from the fragments at the base of a precipice wedge-formed stones for his arches, elongated stones for his lintels, and flat stones for his roof, we should admire his skill and regard him as the paramount power. Now, the fragments of stone, though indispensable to the architect, bear to the edifice built by him the same relation which the fluctuating variations of each organic being bear to the varied and admirable structures ultimately acquired by its modified descendants.

Some authors have declared that natural selection explains nothing, unless the precise cause of each slight individual difference be made clear. Now, if it were explained to a savage utterly ignorant of the art of build-

ing, how the edifice had been raised stone upon stone, and why wedge-formed fragments were used for the arches, flat stones for the roof, etc.; and if the use of each part and of the whole building were pointed out, it would be unreasonable if he declared that nothing had been made clear to him, because the precise cause of the shape of each fragment could not be given. But this is a nearly parallel case with the objection that selection explains nothing, because we know not the cause of each individual difference in the structure of each being.

The shape of the fragments of stone at the base of our precipice may be called accidental, but this is not strictly correct; for the shape of each depends on a long sequence of events, all obeying natural laws; on the nature of the rock, on the lines of deposition or cleavage, on the form of the mountain, which depends on its upheaval and subsequent denudation, and, lastly, on the storm or earthquake which threw down the fragments. But in regard to the use to which the fragments may be put, their shape may be strictly said to be accidental. And here we are led to face a great difficulty, in alluding to which I am aware that I am travelling beyond my proper province. An omniscient Creator must have foreseen every consequence which results from the laws imposed by Him. But can it be reasonably maintained that the Creator intentionally ordered, if we use the words in any ordinary sense, that certain fragments of rock should assume certain shapes, so that the builder might erect his edifice? If the various laws which have determined the shape of each fragment were not predetermined for the builder's sake, can it with any greater probability be maintained that He specially ordained for the sake of the breeder each of the innumerable variations of our domestic animals and plants, — many of these variations being of no service to man, and not beneficial, far more often injurious to the creatures themselves? Did He ordain that the crop and tail-feathers of the pigeon should vary in order that the fancier might make his grotesque pouter and fantail breeds? Did He cause the frame and mental qualities of the dog to vary in order that a breed might be formed of indomitable ferocity, with jaws fitted to pin down the bull for man's brutal sport? But if we give up the principle in one case, if we do not admit that the variations of the primeval dog were intentionally guided in order that the greyhound, for instance, that perfect image of symmetry and vigor, might be formed, no shadow of reason can be assigned for the belief that variations, alike in nature and the result of the same general laws, which have been the ground-work through natural selection of the formation of the most perfectly adapted animals in the world, man included, were intentionally and specially guided. However much we may wish it, we can hardly follow Professor Asa Gray in his belief 'that variation has been led along certain beneficial lines, like a stream, along definite and useful lines of irrigation.' If we assume that each particular variation was from the beginning of all time pre-ordained, the plasticity of

organization, which leads to many injurious deviations of structure, as well as that redundant power of reproduction which inevitably leads to a struggle for existence, and, as a consequence, to the natural selection or survival of the fittest, must appear to us superfluous laws of nature. On the other hand, an omnipotent and omniscient Creator ordains everything and foresees everything. Thus we are brought face to face with a difficulty as insoluble as is that of free-will and predestination."

This remarkable passage really raises, as Mr. Darwin evidently perceives, no new questions regarding final causes, but such as have already been raised by Copernicus and the geologists, and indeed by theologians in their discussions of the doctrine of general providence. That structure of rock to which he refers, as rendering it fit for building purposes, whether quarried by human tools, or by the powers of nature, is certainly adapted to meet the wants of man : and its general diffusion presents a remarkable correlation to the infirmities of man's bodily condition and to the range of his mental powers. Likewise the capacity for variation in animals, offering such a wide range of uses subservient to the purposes which men may cherish, whether benevolent or otherwise, is adapted to the capacity which man really possesses : and affords material, upon which man's character may impress itself in tangible shape. We may not fully comprehend the extent of the necessary limitations of any particular plan of creation. Into that question theologians have ventured, and have to venture, much farther than any other class of reasoners. But any one can see that this adaptation of nature to the use of man, does not exist from any necessity other than is involved in the conditions which we are compelled to postulate before we reason at all upon the matter. Nature is made for a long time ; what is not of present use, perhaps has been of use, or will be. To have things lying around loose, so that a being with man's freedom of choice and abundant infirmities, will run upon them is an element of value in them. To have them preserve marks such that the geologist, or the naturalist, can interpret their scientific meaning, is, perhaps, the highest of all the uses to which they are ever put.

Dr. Asa Gray's pertinent suggestions¹ concerning the purpose which is served by much of the seeming waste in nature, lay open a very wide subject. Some make the apparent waste in nature an argument against the wisdom of the Creator. But, as Professor Gray remarks, if there seems to be a superabundance, for example, of pine pollen, we must remember that "wind carriage is cheap"; and there is no wasteful excess when both the end — cross-fertilization — and the means of transportation are taken into account. So we can say of all mere material mechanism and of the lower forms of life, as of dirt, that they are exceedingly cheap. Our chief arguments in natural theology are drawn from the intellectual and moral constitution of man, as he is related to the complex system of nature. We might easily premise with regard to the adaptations suitable to man, that it would usually be much easier, and far better, to make Mohammed go to the mountain than to bring the mountain to Mohammed. What else should we expect of such a far-seeing capitalist as Nature, but that she should have laid by in store the tools and materials and means of intellectual and moral advancement which man, her crowning work, would need? The man of science does well in exalting to the highest degree of importance man's capacity for discerning truth. It is an inspiring and ennobling thought that man can

"Find tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."

In his search for truth in nature the man of science is not discarding final causes. He is but reading the hand-writing of God, and, consciously or unconsciously, paying deference to the highest end for which nature exists, namely, that of revealing the glory of the Creator's ways. The doctrine of final causes has been too often associated with low forms of utilitarianism. The paleontologist, for example, finds the cast of a trilobite in the bed of what was an old Silurian sea. The purpose of that low organism is by no means exhaustively explained when we have taken a measure of

¹ See *Darwiniana*, pp. 375-378.

the sensational happiness he derived from his monotonous existence. The light so well adapted to his marvellous eyes, the agreeable temperature of the waters, the slimy food on which he lived, all this, and more, brought him some degree of pleasure; and that is to be considered a part of the final cause of his existence. But a far higher purpose is served in the adaptation of his complicated organism, and the position of his tomb in a sedimentary deposit, to arrest the attention and direct the reasoning of a scientific observer. The pleasure of one lofty thought is worth more, and so more fitted to be with the Creator an object of design, than a whole herd of sensational pleasures. A page of Darwin has, to a single reader, more "value in use" than all the elements had, to the whole race of the trilobites in Silurian seas. Yet the latter, with their marks in the rocks,—what are present as well as what are absent,—when correlated with general laws of production and preservation, may have been necessary before ever the thought which illuminates the page of the naturalist could have been engendered. This leads us to the real question of the doctrine of final causes, a question that also lies at the foundation of the authority of conscience. And here the modern bent of the scientific mind allies itself with Theism as opposed to Deism, and with the intuitional theory of morals as opposed to the utilitarian.

VII. *The Revelation of God is the Highest End of Nature.*

With those modern men of science who give attention to the philosophy which really underlies their processes of thought, the combination of marks in the organic world pointing to the affinity of all species with each other, is held to be of the very highest value as God's hand-writing. The men of science would live "not by bread alone, but by every word that proceedeth out of the mouth of God." The temporal uses to which the various incidents of the development were put, are of infinitely less account than the purpose they serve in revealing the eternal glory of the Creator.

The very doctrine of final causes which leads us, as theolo-

gians, to look for occasional miracles in the administration of God's moral system, would, perhaps, persuade us not to look for them previous to the establishment of that system. In the true doctrine of final causes the wants of rational creatures must be supposed to be the principal object kept in view by the Creator. "How much better is a man than a sheep"? "Are ye not of more worth than many sparrows"? And of the wants of such beings the most imperious is that of a means of communication with each other and with the Creator. Thus the persistent adherence of the Creator to a definite plan of operations, and the trustworthiness of the marks revealing the style of his workmanship and handwriting, become essential elements in the well-being of a progressive and immortal race. It is confidence in this uniformity of manifestation as involving the veracity of supreme goodness, that renders it possible to have communion and fellowship either with our fellow creatures or with our Creator. It is this intuition of the value to us of uniformity in the ordinary operation of divine power, which makes a miracle miraculous, and therefore an instructive attestation; i.e. which makes a break in the apparent uniformity for moral ends conceivable and cognizable.

The theistic hypothesis which acknowledges the need of the revelation of the Bible has this special merit, that it brings into prominence the inscrutability of the ways of God. A prominent assumption at the bottom of the reasoning of theists regarding the revelation given in the Bible, is that we have less power to interpret, in the narrow sense, the final causes of existing things, than we have to discern the marks of God's veracity in revealing a law of conduct for us. Indeed, this revelation of a law of duty to us, is a large part of the final cause of all things. Our faith in Scripture rests on the intuition that, with the conscious limitations of power and experience belonging to human reason, it is easier for us to recognize the authenticity of the hand-writing of God, than it is to interpret the ultimate end which a particular part of the creation is designed to serve. The veracity of God in his dealings with

us flows more directly from his goodness than any other of his moral qualities. Confidence in the marks of his veracity as guides of our conduct is what constitutes faith. In these marks of God's veracity in revealing himself to us, we have a provisional guide in practical morality. The instincts of our nature have thus a certain amount of authority from God. And with reference to the Bible, though its revelations are beyond the reach of reason, and are many of them profoundly mysterious, yet the veracity of God is so bound up in the evidence of its genuineness, and of its authority on moral subjects, that we accept it as a rule of action, with all there is in it to stagger the reason.

It is upon the same department of our reasoning powers that the present scientific habit of thought makes its demands. It denies our power exhaustively to interpret the final cause of the narrow fields of nature which we explore. It says, in the true spirit of theism, the full meaning of this is above our sight, and we do not attempt to comprehend it. We will acknowledge to the fullest extent the uses to which all these contrivances are and may be put. But we still hold that there are irrefragable evidences that these uses are but incidental in working out a master scheme, whose law of development we dimly discern. We transfer you from the narrow and delusive study of the final cause of the things as isolated and in themselves, to contemplate the final cause of the whole scheme of nature. In that infinite scheme, — so the thoughtful man of science must say — we believe that the good which may come from being able to discover the truth in the works of God and to enlarge our conceptions of his plans, may be far greater than that possible to arise in connection with the transient sensational uses which a contrivance is allowed to serve. That is, God has taken more pains to reveal to us his methods and laws, than to reveal his particular ends. It is the supremest mark of design that the method of God should be so admirably correlated to the capacity of our understanding. The revelation of God himself is the larger part of the final cause of creation.

It is in place to remark here that a question altogether similar to the foregoing has to be considered when we seek for the ground of the authority of conscience. Is conscience guided by a direct perception of the utility of its commands, or by an indirect belief that certain impulses and intuitions are infallible guides to utility? The latter is most certainly the case. Man cannot refrain from acting till he has demonstrated the utility of his choice. He obeys certain impulses, and intuitions, and tendencies of mind, as being the voice of God. Within certain limits he does not discern the utility of purity or honesty, but accepts obedience to the voice of God as infallibly leading to the highest utility. General principles have more weight in sanctioning moral action than a narrow circle of visible results. There is the same distinction as this between the prevailing scientific interpretation of final causes and the ordinary method.

To prevent misapprehension it may be well, in conclusion, to state more explicitly our position. The universe is made for happiness of one sort or another. There is no happiness in the universe, not even that of the smallest insect, but such as was designed by the Creator. The system, however, was chosen as a whole. The prospective pleasure of the worm had *some* power as an element determining to the creation as it is, — it was a part of that sufficient reason which moved the divine being to creative activity in the modes which we witness. But there are grades of happiness, and hierarchies of being. The same impulse of the designing mind which leads to a provision for the sensational happiness of the oyster, leads also to the subordination of the oyster to the higher orders of being. The welfare of oysters, of birds, and of men, were elements in the final cause which led to the creation as it is. But for the sake of the oysters, God would have made the world somewhat different from what it is. But for the sake of the birds, he would have made it still more different. Had it not been that man was to be incorporated in the scheme, the plan would have been very different indeed. It is important, for both men of science and

theologians to occupy that median position, where the truth lies ; on the one hand avoiding the presumption which aspires by searching to " find out " God, and on the other hand, shunning that false humility which disowns our divine birthright of reason, — a birthright which enables us to penetrate to some extent into the realm of both final and secondary causes, and to partially answer the two inseparable questions, how does God work ? and what does he work for ?

It may have been observed that the order announced for the treatment of the subjects in this series of papers has been departed from in the present discussion. What was announced as the fifth, is given as the fourth of the series. This was partly due to the desire to present first, the subjects which were least theological ; though to some, this paper may seem theological enough. What follows, however, in succeeding Articles must be still more deeply tinctured with theology. But we beg our scientific readers, if we have any, to be patient with us, as we have been with them. Theology, even more than science, suffers from fragmentary treatment. If the men of science object to the petty criticisms, and narrow judgments, of those who have only a superficial acquaintance with the problems presented in nature ; so may students of theology complain, if the system of thought to which the great body of Christendom has given its assent is set aside without being adequately understood. " We be brethren," all of us, gathering pebbles along the shore of the same illimitable ocean.