Article V.—DOES SCIENCE TEND TO MATERIALISM?

An Essay on Classification; by Louis Agassiz. Boston: Little, Brown & Co. London: Longmans, Brown & Co.

The Origin of Species by means of Natural Selection. By Charles Darwin, M. A. New York: D. Appleton & Co.

The Evidences of Christianity; an Essay, by Baden Powell, M. A., and *The Mosaic Cosmogony;* an Essay, by C. W. Goodwin, M. A. Reprinted in *Recent Inquiries in Theology.* Boston: Walker, Wise & Co.

"Science," says Professor Huxley, "prospers exactly in proportion as it is religious; and religion flourishes in exact proportion to the scientific depth and firmness of its basis. True Science and true Religion are twin sisters, and the separation of either from the other is sure to prove the death of both." Mr. Herbert Spencer, to whom we are indebted for this quotation, in endorsing its sentiment, adds, that "doubtless in much of the science that is current, there is a pervading spirit of irreligion; but not in that true science which has passed beyond the superficial into the profound."* This distinction is well taken. The irreligious tone of a pretentious science, and the religious tendency of profounder scientific inquiry, are illustrated both in the theories of scientists, and in their personal bearing toward revealed religion. In science, as everywhere, an irreligious spirit is forward to assert itself; while true piety is modest and retiring. Hence, with superficial observers, the opinion has gained ground, that the study of the natural sciences, and the pursuit of professions based upon physical phenomena, tend to Materialism; the positive materialism of some men of science, and the

* Education; Intellectual, Moral, and Physical, p. 90.

religious indifferentism of others, giving prominence to the irreligious phase of scientific inquiry. Yet this is contradicted by the fact that many of the most eminent sons of science have not only retained through life the integrity of their Christian faith, but have even confirmed and strengthened this by their study of Nature; and also by the fact, that the more profound our investigations of physical phenomena, the more do we perceive that their laws run back toward one intelligent and active center—like the manifold lines of telegraphic wire, which traverse the continent northward, southward, eastward, westward, crossing river and prairie, forest and mountain, as solitary and independent lines of life and thought, yet interlinked at intervals by the net-work of magnetic sympathy, and converging at last in one central office, whence the living, thinking, operator speaks through them all. And when men, grown familiar with the mysterious forces of nature, fancy these, if not of their creation, quite under their control, the flashes of auroral light will bring to remembrance a diviner magnetism, and invisible forces work the wires, beyond the comprehension or control of man.

In carrying out the distinction suggested by Mr. Spencer, it will be in order first to trace certain causes or influences in the pursuits of physical science, which tend to Materialism; and then pass to the true interpretation of Nature in her laws, which leads, by a logical necessity, to the acknowledgment of a personal God as the Creator and Governor of the universe.

The habit of tracing physical phenomena to discoverable laws, which belongs to the inductive sciences, may lead the mind to rest in these as *causal powers*, instead of regarding them as *formal rules* or modes of operation established by some higher invisible power. There is a fascination in reducing a wide range of physical phenomena to a simple law which defines and governs their relations. Indeed, a great orator has affirmed that the very luxury of such a discovery is a sufficient reward for the toil of the discoverer. "Fulton had his reward when, after twenty years of unsuccessful experiment and hope deferred, he made the passage to Albany

by steam; as Franklin had his reward when he saw the fibers of the cord which held his kite stiffening with the electricity they had drawn from the thunder-cloud; as Galileo had his when he pointed his little tube to the heavens and discovered the Medicean stars; as Columbus had his when he beheld from the deck of his vessel a moving light on the shores of his new-found world. That one glowing, unutterable thrill of conscious success, is too exquisite to be alloyed with baser metal. The midnight vigils, the aching eyes, the fainting hopes turned at last into one bewildering ecstasy of triumph, cannot be repaid with gold."*

Now, this very fascination of the discovery of physical laws tends to invest those laws themselves with the reality of living powers. In its exhilaration at having found a proximate reason for a perplexing fact, the mind fancies that it has discovered the original and efficient cause of that fact. And since in every department of nature we can trace many laws of exquisite precision, beauty, and simplicity, there is a strong temptation to regard these formal reasons for phenomena as the original causes of these phenomena. A mind much occupied in tracing particular laws, unless well trained in synthesis and generalization, is liable to rest in the particular law as the end of its inquiry. Instead of pressing on from point to point, with Newton's "why not?" and why not?—"if the apple falls, why should not the moon, the planets, the satellites, fall?"—such a mind rests in the simple discovery of the law of accelerated motion by which the apple falls. The facility of tracing particular laws leads some scientists to conceive of the universe as a mere system of self-evolving laws. Thus Darwin closes his essay on "the origin of species by natural selection," by grouping together various forms of life as the evolution of a few general laws, which he defines comprehensively as laws of Growth with Reproduction, Inheritance, and Variability, with a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection. "It is interesting to contemplate an entangled

* Edward Everett, at the inauguration of Mr. Webster's statue, at Boston.

bank, clothed with many plants of many kinds, with birds singing in the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that those elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. . . . . There is a grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."*

This doctrine that the whole universe of matter and of life is a self-evolving system of laws, is really a materialistic pantheism. True, Darwin speaks of "the plan of creation," and "the laws impressed on matter by the. Creator;" and his theory of development through the evolution of organic laws is not necessarily inconsistent with belief in a personal God. It is not just to charge him with atheism, nor wise to concede that his theory of the origin of species, if scientifically established, would dispense with an intelligent Creator. It would only remove the intelligent first Cause farther back in the series of cause and effect. But the fascination of the idea of progressive evolution by physical laws, leads Darwin to conceive of the Creator as filling some honorary office rather than as performing any efficient function in the universe. Thus, in treating of the structure of the eye, he says, "It is scarcely possible to avoid comparing the eye to a telescope. We know that this instrument has been perfected by the long-continued efforts of the highest human intellect; and we naturally infer that the eye has been formed by a somewhat analogous process. But may not this inference be presumptuous. Have we any right to assume *that the Creator works by intellectual powers like those of man?*" He then supposes the formation of this delicate complex organ to be the result of "transitional grades," the process steadily advancing through "numerous, successive, slight, modifications."

* Origin of Species, American Edition, pp. 423, 424.

"In living bodies," he argues, "variation will cause the slight alterations, generation will multiply them almost infinitely, and natural selection will pick out with unerring skill each improvement. Let this process go on for millions on millions of years; and during each year in millions of individuals of many kinds; and may we not believe that a living optical instrument might thus be formed as superior to one of glass, as the works of the Creator are to those of man?"* This reference to the Creator seems a complementary allusion rather than a necessity of the author's logic, since the theory really denies to the Creator any personal superintendence of his works or any direct agency in producing them; while it personifies the laws of nature as intelligent powers. Indeed, with Schelling, it goes to the extent of endowing Nature with creative self-activity. Darwin puts this in so many words, when he says that "Natural Selection is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being, in relation to its organic and inorganic conditions of life."† What then is the Creator but an Emersonian Fate: "Let us build altars," chants the high priest of Pantheism, "to the Beautiful Necessity, which secures that all is made of one piece. . . . Let us build to the Beautiful Necessity, which makes man brave in believing that he cannot shun a danger that is appointed, nor incur one that is not; to the Necessity, which rudely or softly educates him to the perception that there are no contingencies; that Law rules throughout existence, a Law which is not intelligent but intelligence,—not personal nor impersonal,—it disdains words and passes understanding; it dissolves persons; it vivifies nature; yet solicits the pure in heart to draw in all its omnipotence."‡ And what is this again but the transcendent negation of the Hegelian philosophy, that pure and unde-

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* Origin of Species, p. 169.

† Page 80.

‡ Emerson, Conduct of Life, p. 42.

termined existence is pure Nothing." The personality of God vanishes before such a personification of Law.

This deification of natural law is the latest canon of worship in the "Westminster" and at Oxford. Step by step, says the Westminster Review,* "the notion of evolution by law is transforming the whole field of our knowledge and opinion. It is not one order of conception which comes under its influence, but it is the whole sphere of our ideas, and with them the whole system of our action and conduct. Not the physical world alone is now the domain of inductive science, but the moral, the intellectual and the spiritual are being added to its empire." And Baden Powell wrote, in the Essay cited at the head of this Article, that "the simple but grand truth of the law of conservation, and the stability of the heavenly motions, now well understood by all sound cosmical philosophers, is but the type"—of what?—the Divine wisdom of providence?—no; "the type of the universal *self-sustaining and self-evolving powers* which pervade all Nature."† And again, "Mr. Darwin's masterly volume on the Origin of Species by the law of natural selection—which now substantiates on undeniable grounds the very principle so long denounced by the first naturalists—*the originization of new species by natural causes*—must soon bring about an entire revolution of opinion in favor of the grand principle of *the self-evolving powers of nature.*"‡

This transformation of phenomenal *laws* into self-evolving *powers* is certainly an abuse of the inductive principle. The sphere of phenomenal laws is too narrow for the interpretation of the whole order of Nature. It is as if the mechanical philosopher, arguing from the perfect adaptations and wonderful results of certain mechanical forces, should maintain that the universe is made up of such forces; whereas chemical affinity is a law or force of a higher order than the mechanical, and sometimes includes this; and then the chemist should say: "*I* have discovered the original and highest principles of nature, in the chemical forces of my laboratory;"

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* October, 1860, Art. Neo-Christianity.

† Recent Inquiries, p. 151

‡ Ibid., p. 157.

but vital powers are of a higher order than either mechanical or chemical forces, and include them both; and then the physiologist should say: "*I* have discovered the essential life of nature in these vital powers:"—and yet, what physiologist has given a "precise, tenable, and consistent" definition of *life?* And when we pass into Biology, and begin to discuss the soul as an animating principle or essence, we are already within the confines of that spiritual and invisible world, where we must admit the action of powers that our senses cannot measure. But to rest in particular laws is to rest upon the surface of things; or at least to carry our dissection of nature no deeper than the cuticle. And a materialistic philosophy is only superficial. As Bacon has said: "a little natural philosophy inclines men to atheism; but depth in philosophy always brings them about to religion. For while the mind looks upon second causes scattered, it may sometimes go no further; but when it beholds the chain of them collected and linked together, it must needs have recourse to Providence and a Deity."

To rest in ascertained physical laws as *first* causes, is much as if an inventor should become so enamored of the working of his own machine, as to rate it above the mind that had invented it; and should worship the product of his own hands as a creating force. Whereas the true logic of the machine is—if this adaptation of mechanical powers is so wonderful, how much more wonderful the mind that discovered or conceived it, and how infinitely greater than both the Author of that mind and of the physical forces which its ingenuity has brought together in the machine. Having admired first the crude forces and materials of nature, and next these as combined by invention, and then the genius of the inventor, can we stop short of the great thought of God? In the Patent Office one is continually reminded of the supremacy of the human intelligence over inert matter. Now, the universe is the "patent office" of the Creator, from whose material combinations He can no more be precluded than perpetual motion can be invented or evolved from mechanical forces.

The physical universe is a storehouse of immeasurable

treasures, shut up under a combination-lock; particular sciences are the prongs of the key which man adjusts to various tumblers, until he spells out the magic word and opens the lock. How childish, how absurd, to claim that these sciences, or the laws which they combine into a system, made the lock, and stored the treasury! Yet such is the logic of materialism; and that result is possible only to minds that move in the tread-mill of physical laws, till they imagine these to be the final seat and source of power.

A tendency toward materialism, in students of physical science, is found also in the pride of human reason in its own discoveries. In the ages of his ignorance man worshiped the powers and phenomena of nature as gods. But now that science has put him *en rapport* with these mysterious powers, so that the philosopher of our times sits *tetē-a-tetē* with Thor and Wodin, Osiris, Neptune, and Jupiter Tonans, the pride of this conquest over nature makes man averse to the thought of a higher power. The more he magnifies nature, the more he magnifies himself. When Galileo, by long straining his vision toward the distant glories of the heavens, had brought on total blindness, he said to a friend, "These heavens, this earth, this universe, which by powerful observation I had enlarged a thousand times beyond the belief of past ages, are henceforth shrunk into the narrow space which I occupy myself. So it pleases God; it shall, therefore, please me also." Galileo meekly acquiesced in this calamity as a divine dispensation. But there are scientists who shrink the universe into the narrow space which themselves occupy, yet do not know that they are blind. Their mental perception is coated with films of pride.

Science, of course, is to be determined as to its facts and laws, purely by observation and reflection. It lies wholly within the domain of Reason. Neither imagination nor faith can have part in its processes. But reason is the mere organ of scientific discovery. It creates no facts; it imparts no powers. In the domain of physical science man is only an observer; and whether his telescope, like Newton's, measure

nine inches, or, like Lord Rosse's, is elongated to sixty feet, he is but an observer still. The fact that Newton made his first reflector with his own hands, led a contemporaneous continental author to suppose that he was a maker of optical instruments;—"*Artifex quidam Anglus nomine Newton.*" Some modern scientists go to the opposite extreme of regarding him almost as the author of the great law which he enunciated—more an architect than a discoverer. It is a common opinion with such reasoners, that "the invention of printing was the chief cause of the Reformation, that the invention of the compass brought about the discovery of America, and that the vast changes in the military and political state of Europe since the middle ages, have been wrought by the invention of gunpowder. It would be almost as rational to say that the cock's crowing makes the sun rise. . . . . These very inventions had existed, the greatest of them for many centuries, in China, without producing any like result. . . . . There is not a whit to choose between the worship of steam, and that of the meanest Fetish in Africa. Nor is the worship of Man really nobler or wiser."*

Reason delights to conceive of itself as possessing a certain architectural power over the physical universe; and this pride of Reason tends to atheism. Yet how much more rational the homage that Newton and Kepler rendered to God as the author of that wondrous harmony of nature which they severally discovered. When Kepler, after nearly twenty years of laborious calculation, had discovered the three grand laws that regulate the orbits, the motions, and the periodic times of the planetary bodies, losing himself in the vastness of the Creator's glory, he exclaimed: "I think thy thoughts after thee, O God!" He concludes one of his astronomical works with the following prayer: "It remains only that I should now lift up to heaven my eyes and hands from the table of my studies, and humbly and devoutly supplicate the Father of lights. O thou, who by the light of nature dost enkindle in us a desire after the light of grace, that by this thou mayest trans-

* Hare's "Guesses at Truth," p. 70.

late us into the light of glory; I give thee thanks, O Lord and Creator, that thou hast gladdened me by thy creation, when I was enraptured by the work of thy hands."* Who dare affirm that these are words of cant or enthusiasm, or that such homage to the Creator is unworthy of science?

A tendency to materialism is doubtless fostered by an over-skeptical jealousy as to the subject-matter of science. The habit of ruling out from the sphere of physical science all moral and spiritual truth as irrelevant, leads to the corresponding habit of thinking and speaking upon scientific subjects in the language of materialists. There are some investigators, says Agassiz, to whom "the name of God appears out of place in a scientific work; as if the knowledge of secondary agencies constituted alone a worthy subject for their investigations, and as if nature could teach nothing about its author." But this is much as if the anatomist should confine himself to the description of the simple skeleton, without considering it as a frame-work for the activity of a living man, and by comparative anatomy tracing the superiority of man as a being; much as if the physiologist should describe the functions of vital organs, and studiously exclude all reference to the body as the residence of a living soul. Or it is as if we should expend all our praise upon the steam engine and the locomotive as machines, but never mention Watt or Stephenson because they are not parts of their own inventions, and therefore an allusion to their names would be irrelevant! Rather because the steam engine and the locomotive are such wonderful and invaluable inventions, do we give honor to the names of the inventors, and hand these down from age to age by history and monuments. And so the culminating point of a true physical science is reached, only when we take up this devout aspiration of David: "I will praise Thee, for I am fearfully and wonderfully made;—marvelous are Thy works; and that my soul knoweth right well."

Newton followed the inductive philosophy up to this high religious thought. He believed in God, not only as a Chris-

* Quoted in Buckland, Geology and Mineralogy, Vol. I, p. 9.

tian, but as a philosopher; and he says expressly, that "every true step made in inductive philosophy is to be highly valued, because it brings us nearer to the First Cause." As Lord Brougham so eloquently describes him: "after piercing the thickest veil that envelops nature—grasping and arresting in their course the most subtle of her elements and the swiftest—traversing the regions of boundless space—exploring worlds beyond the solar way—giving out the laws which bind the universe in eternal order—Newton rests, as by an inevitable necessity, upon the contemplation of the great First Cause, and holds it his highest glory to have made the evidence of his existence, and the dispensations of his power and of his wisdom better understood by men."*

Goodwin remarks, almost with a sneer, that "Physical science goes on unconcernedly pursuing its own sphere. Theology, the science whose object is the dealing with God as a moral being, maintains but a shivering existence, shouldered and jostled by the sturdy growth of modern thought, and bemoaning itself for the hostility which it encounters." How finely is this supercilious attempt of science to "shoulder" the Creator out of his own universe, met by a naturalist no whit inferior to Goodwin or to Darwin, who has said that "the laws of nature signify the enunciations of the method or will of God;" and "to him whose mind has become deeply imbued with science, nature becomes a living expression, as full as is possible in finite language, of the perfection of the supreme Architect;"†—or, as Agassiz expresses it, "systems of science are not the inventions of the human mind, but translations into human language of the thoughts of the Creator."

Whenever, therefore, we observe in cultivators of natural science a tendency to Materialism, we are justified in suspecting either the *superficial habit* of resting in perceived laws as original and efficient causes, or a *pride of intellect*, which ministers to its own glory in proportion as it excludes the

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* Brougham, Natural Theology.

† Prof. J. D. Dana's Address before the American Association.

thought of the Deity, or a *skepticism in the letter*, which beginning by excluding the name of God from the category of physical science, ends by excluding the idea of God from the soul itself.

But these tendencies toward Materialism lie more in the tone of mind assumed by the scientific investigator, than in the phenomena and laws of Nature, as classified by science. A profounder science grows reverent and religious. The true logical tendency of the study of nature is ever toward the recognition and acknowledgment of a personal God as the Creator of the universe. The admirable method which we trace in all organic structures, and in all the laws of nature, points to the existence of an intelligent and planning Mind as the First Cause of all things. We need not enter at length into the argument from Natural Theology for the existence and attributes of God; nor repeat the unanswered argument of Paley from design; *unanswered*, we say, for the sophistical reply of Hume, that "we have had no experience of the origin of worlds," such as we have in the products of "human art and contrivance"—is met at once by the fact that our belief in the existence of an intelligent designer in every case of perceived design, does not rest upon experience, but upon the perceived adaptation of means to an end. If from the bottom of a well in the prairies of Illinois an instrument or machine unknown to modern arts should be dug up, the moment we saw it we should say, This is proof that man was here before the present race came upon the soil. The mechanical contrivance, the perceived adaptation of means to an end, argues a planning *intelligence* in distinction from an established *law*.

Socrates anticipated both Paley and Hume by two thousand years, when he said, "Things which exist for some useful purpose must be the productions of intelligence;" and then asks, "does it not seem like the work of forethought to guard the eye, since it is tender, with eye-lids like doors, which, when it is necessary to use the sight, are set open, but in sleep are closed? To make the eye-lashes grow as a screen, that winds may not injure it? To make a coping on the parts above the eyes with the eye-brows, that the perspiration from the head

may not annoy them? To provide that the ears may receive all kinds of sounds, yet never be obstructed? and that the front teeth in all animals may be adapted to cut, and the back teeth to receive food from them and grind it;" and thus going on through the details of the animal economy, according to the crude anatomy and physiology of his times, Socrates asks, "Can you doubt whether such a disposition of things, made thus apparently with intention, is the result of chance or of intelligence? Do not these appear like the work of some wise-maker who studied the welfare of animals?"* When Socrates goes on to apply this argument to the evidence of design throughout the world and the universe, and asks, "can all this be maintained in order by something void of reason?"—an objector steps forward with Hume's argument and says, "I can hardly suppose that there is any ruling intelligence among that assemblage of bodies, for I do not *see* the directors, as I see the agent of things which are done here." Socrates replies, "Nor do you see your own soul, which is the director of your body; so that, by like reasoning, you may say that you yourself do nothing with understanding, but everything by chance." It is not experience but the *perception of design* which causes us to recognize a designer. It is not necessary that we should see any particular watch made in order to believe that every watch must have had a maker. Where there is so much evidence of design as we perceive in all organic structures, and in the laws of nature, chance is out of the question. The only alternative is between the materialism of mere physical laws, and the rational conception of an intelligent Creator and Governor of the universe. Which of these two views do the phenomena of nature warrant, or rather compel us to adopt?

The extent and variety of design apparent in nature forbid us to refer this to mere physical laws, and require us to recognize an intelligent Creator. Dr. Whewell lays it down as an aphorism of science that "the asumption of a Final Cause [or definite purpose] in the structure of each part of animals and plants is as inevitable as the assumption of an efficient cause for

* Mem. B. 1, C. IV, Sec. 4–10.

every event. The maxim that in organized bodies nothing is *in vain*, is as necessarily true as the maxim that nothing happens *by chance*."* And he adds that almost all the great discoveries in physiology have been made by the assumption of a *purpose* in animal structures. Harvey states that he was led to think of a circulation of the blood, because "he noticed that the valves in the veins of the body are so placed that they give a free passage to the blood towards the heart, but oppose the passage of the venous blood the contrary way;—he was thus incited to imagine that so provident a cause as Nature had not placed so many valves without design." Some method or purpose obviously intended in these valves led him to study what that purpose was, and so to make his great discovery. Many other discoveries in physiology have been made in the same way. Now if we found only an exact uniformity in organic structures and natural laws, we might be tempted to rest in the laws of phenomena as being also their causes. And, on the other hand, if we found in nature nothing but irregularity and diversity of operations and results, we might admit the idea of chance. But the unity amid diversity, and the diversity in unity, which we everywhere behold, compel us to recognize a planning and controlling mind. Whence comes it, that while "the vertebral plan" is the same in man and sparrow, and this unity of plan is carried out so far that "the arm of man and the wing of a sparrow correspond to each other in the most exact manner, bone for bone," yet both are modified with manifest contrivance, and "adapted to the nature and life of the creatures to which they severally belong, so that one is an arm and hand for taking and holding, and the other a wing for flying?" Are these the results of divergent physical laws? Nay, "not a sparrow falleth on the ground without your Father—and the very hairs of your head are all numbered."

Professor Agassiz, at the close of his beautiful and luminous survey of the unity of plan in the structure of the most diversified types throughout the animal and vegetable kingdoms, says, "And yet this logical connection, these beautiful har-

* *Novum Organon Renovatum*, Aphorism CV.

monies, this infinite diversity in unity, are represented by some as the result of forces exhibiting no trace of intelligence, no power of thinking, no faculty of combination, no knowledge of time and space. If there is anything which places man above all other beings in nature, it is precisely the circumstance that he possesses these noble attributes, without which, in their most exalted excellence and perfection, not one of these general traits of relationship, so characteristic of the great types of the animal and vegetable kingdoms, can be understood or even perceived. How, then, could these relations have been devised without similar powers? If all these relations are almost beyond the reach of the mental power of man, and if man himself is part and parcel of the whole system, how could this system have been called into existence, if there does not exist One Supreme Intelligence as the author of all things?"* To put the question in another shape. Man does not invent or create Nature; at the most, with great study, he can but understand Nature, and this only in part. Either then the laws of comparative anatomy, which a Cuvier and an Owen have traced and classified, have a higher intelligence than Cuvier and Owen, or there is a Supreme Intelligence, the author both of the laws and of the minds that study them. And if it requires a mind as capacious as that of Cuvier or Owen to comprehend the animal kingdom, what must be the capacity of the mind that ordained it! Near two thousand years ago Galen pronounced his work on anatomy "a religious hymn in honor of the Creator." And every museum of comparative anatomy adds new strophes to that hymn.

We cannot rest in physical laws as the ultimate powers in nature, because these laws themselves need frequent revision with the progress of scientific discovery. How many laws of physiology and health once laid down so gravely in medical works, have been made ludicrous by the advance of science! Who can read without a smile, much that Lord Bacon and Robert Boyle have put on record as physiological laws? What nonsense has been written concerning electric fluids and

* Essay on Classification, p. 35.

magnetic fluids as distinct material agents,—whereas all observation now points to the conclusion that magnetic and electric action are but "different effects of one common cause," as yet unknown? A discoverer proclaims some new law as the first cause of everything, and his successor shows that it was never the cause of anything but his own blunder. The old doctrine of mechanical forces to which physicists traced all action, is now giving way to the doctrine of polar forces as the solution of all the phenomena of material action. But who shall say that this is the final discovery? And is it worthy of the human mind to rest in what the next generation may reject as crudities, as if these were first causes—when it may ever rise toward that Infinite and Eternal Cause, which not all coming generations shall supersede or modify? It is a well-put aphorism of Whewell, that "in contemplating the series of causes which are themselves the effects of other causes, we are *necessarily* led to assume a Supreme Cause in the order of Causation, as we assume a First Cause in the order of Succession."*

The harmonious working of apparently conflicting laws and powers in Nature, and the agencies for remedy and restoration, require us to believe in an intelligent Creator and Ruler of all things. The curative processes of nature, the remedial agencies at work to repair waste, loss, and injury, the adaptation of the Materia Medica of the physical world to the diseases of mankind, and the law of conservation in the planetary motions, are striking evidences of the existence of God. If these are not the product of one planning mind, then there are antagonistic laws, which are either in danger of perpetual collision, or which work in harmony by a self-intelligence which must needs be divine. Is there one law of health, and another law of disease, and a third law of remedy, and do these three laws, seemingly adverse, meet in consultation, and agree that each shall have its turn at the patient? Does chance or natural *law* provide for such a triangular practice to accomplish the desired end?

Is not that very law of conservation in the cosmical mo-

* *Novum Organon Renovatum*, p. 247.

tions, which Baden Powell quotes as proof of the self-evolving powers of Nature, in reality one of the highest proofs of a far-seeing, all-controlling intelligence? It is impossible to ascribe such delicate adjustments, compensations, and even counteractions in the system, to anything short of one discerning, planning, directing Cause.

To sum up all, the higher the plane from which we take our observations of nature, and the wider the range of these observations, the more palpable does it become that there is no possible explanation of the order of nature in all her varying phenomena, save as a thought of the Divine mind put into expression by an act of his will. Agassiz gives it as the result of his study of Natural History, "that the most surprising feature of the animal kingdom seems to rest neither in its diversity, nor in the various degrees of complication of its structure, nor in the close affinity of some of its representatives, while others are so different, nor in the manifold relations of all of them to one another and the surrounding world; but in the circumstance, that beings, endowed with such different and such unequal gifts, should nevertheless constitute an harmonious whole, intelligibly connected in all its parts." And he argues that in our attempts to expound nature, we are only the unconscious interpreters of a divine conception; and when in our pride of philosophy we have thought that we were inventing systems of science, and classifying creation by the force of our own reason, "we have only followed and reproduced in our imperfect expressions, the plan whose foundations were laid in the dawn of creation, and the development of which we are laboriously studying." These are not the words of ignorance or of cant. They carry us back to that sublime conception of Plato that there was a pattern of *thought* in the mind of God, after which the worlds were made; they lead us as students of science to that devout aspiration of Kepler—"I think thy thoughts after thee, O God"—to that ascription of the Psalmist, "I will praise thee, for I am fearfully and wonderfully made. Marvelous are thy works and that my soul knows right well!" It is not merely that design proves the designer, but that the very thoughts of the Divine mind are impressed upon the laws of nature for man to study and interpret. So

that with the profound and eloquent historian of the Inductive Sciences,* we can say as the conclusion of the whole argument, "We cannot only hold with Galen, and Harvey, and all the great physiologists, that the organs of animals give evidence of a purpose; not only assert with Cuvier, that this conviction of a purpose can alone enable us to understand every living thing;—not only say with Newton, 'that every true step made in philosophy brings us nearer to the very First Cause, which certainly is not mechanical:'—but we can go much further, and declare still with Newton, that 'this beautiful system could have its origin no other way than by the purpose and command of an intelligent and powerful Being, who governs all things, not as the soul of the world, but as the Lord of the Universe; who is not only God, but Lord and Governor.'

"When we have advanced so far, there yet remains one step. We may recollect the prayer of one, the master in this school of the philosophy of science, 'This, also, we humbly and earnestly beg; that human things may not prejudice such as are divine;—neither that from the unlocking of the gates of sense, and the kindling of a greater natural light, anything may arise of incredulity or intellectual night towards divine mysteries; but rather that by our minds thoroughly purged and cleansed from fancy and vanity, and yet subject and perfectly given up to the divine oracles, there may be given unto faith the things that are faith's.' When we are thus prepared for a higher teaching, we may be ready to listen to a greater than Bacon, when he says to those who have sought their God in the material universe, 'Whom ye ignorantly worship, him declare I unto you.' And when we recollect how utterly inadequate all human language has been shown to be, to express the nature of that Supreme Cause of the Natural, and Rational, and Moral, and Spiritual world, to which our Philosophy points with trembling finger, and shaded eyes, we may receive, with the less wonder, but with the more reverence, the declaration which has been vouchsafed to us, 'In the beginning was the Word, and the Word was with God, and the Word was God.'"

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* Whewell, Nov. Org. Renovatum, p. 255.