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ARTICLE III.

RELIGION AND CHEMISTRY.¹

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No one who is acquainted with Professor Cooke's habits of thoroughness, accuracy, and fidelity as a teacher and lecturer will doubt that on the scientific side this volume is the best that it could be within its compass and for its purpose. As a compendious and lucid statement of the chemistry of the atmosphere, combining a precision worthy of the lecturer and a simplicity of illustration adapted to a popular audience, it merits our highest encomium. We cannot but admire the subtile skill and the comprehensive grasp with which he not only gathered up, but assimilated, a wide diversity of facts and laws from every realm of nature, intimately, but not obviously, related to the structure and functions of the atmosphere and its constituents, and has so colligated them that they must henceforth retain in the reader's mind the grouping into which they are here brought. This mode of treatment at once serves as a system of mnemonics for the learner, and, what is of immeasurably higher importance, leads his thought easily and naturally to that unity of plan and purpose in nature which revelation teaches, which true science postulates, and toward which the progress of scientific discovery constantly tends.

But it is as a treatise in the department of natural theology, that this volume claims to be judged. This is its prime purpose, and its value must rest on the author's success in this aim. It cannot, indeed, be claimed for him that

¹Religion and Chemistry; or, Proofs of God's Plan in the Atmosphere and its Elements. Ten Lectures delivered at the Brooklyn Institute, Brooklyn, N. Y., on the Graham Foundation. By Josiah P. Cooke, Jr., Irving Professor of Chemistry and Mineralogy in Harvard University. 8vo. pp. 348. New York: Charles Scribner. 1864.

he has approached the subject from the attitude of indifferentism. His lectures breathe throughout a believing and devout spirit. He has firm faith, not only in the primal truths of natural religion, but in the equally fundamental truths (and equally natural, as we believe) of the gospel, — in revelation, miracle, inspiration, redemption. The heads of his argument are well condensed in the following statement, near the close of his last lecture :

“In the first place, then, I believe that the existence of an intelligent author of nature, infinite in wisdom and absolute in power, may be proved from the phenomena of the material world with as much certainty as can any general truth of science. In the second place, I am of opinion that the facts of nature also prove — although the arguments adduced may be less convincing — that the author of nature is a personal being, and the one only and true God revealed to us in the Bible. Lastly, I think that the relations of the human mind to the material world, viewed in the light of modern science, give us strong reason to believe, on scientific grounds alone, that the universe is still sustained, in all its parts, by the same omnipotent and omniscient Will which first called it into being.

“Moreover, I am persuaded that science confirms and illustrates the priceless truth which Christ came on earth to reveal ; but I do not believe that the unaided intellect of man could ever have attained to certainty in regard to even the least of these truths, independently of revelation.”— pp. 345, 346.

It has become almost a fashion to sneer at “the argument from design.” We confess that we do not feel disposed to set it aside ; on the other hand, we doubt whether Paley and his followers have made as much of it as they might. It rests, indeed, on the subjective consciousness ; for that “design implies a designer,” is an intuition of the human intellect ; but because it is an intuition, we can no more question it than we can question the fact of our own existence.

It is, indeed, objected to the argument from design that it presupposes a knowledge of final causes, and that this knowledge can be confidently affirmed of no finite mind. We admit that we can, at most, only hazard plausible conjectures as to final causes in the creation. With the growth of intelligence and science, there has been a progressive

unifying and enlargement of man's conceptions as to the ends subserved by the universe, visible and invisible. In earlier periods, when incidental exceptions and evils occupied as large a space on the retina of philosophic vision as was occupied by beneficent provisions and uses, and when the comprehensive laws of nature had hardly begun to be registered, it was impossible to discern in the creation any higher purpose than its own continued existence and the perpetuation of its races of organized being. With the identification of general laws, the promotion of happiness came to be regarded as the ultimate end of nature. With the growth of Christian sentiments and culture, even happiness seems but an inferior good, and many devout minds refuse to recognize in all things that are, and that take place, any predominant or ultimate purpose other than holiness, — its manifestation in God, or its creation in man. But when we consider the immensity of the universe and the comparative littleness of our world and system, how can we rest even here? May not even holiness, human holiness at least, be not an end, but a means? May not man himself, though "crowned with glory and honor" as the head of the terrestrial creation, bear a relation to higher orders in other realms of being, somewhat analogous to that borne to him by the tribes of animated nature made subject to his sway? May not even his eternal salvation and blessedness — ends so far as he is concerned — be means to immeasurably more vast and glorious ends than he is now capable of conceiving? Or, on the other hand, how know we that there may not be a multiplicity of final causes? May we not have already carried our unifying process too far? It is at least conceivable that the final causes of many portions of the creation may be very near, for instance, that the desert may be made to blossom, with no reference to the contingent aesthetic or spiritual revenue which may accrue to intelligent beings, but merely to enshrine that undoubted attribute of the divine character, which is the infinite correlative to the love of beauty in man; or that many of the

lower orders of animals may have been created, not to minister to man's skill in subduing, or his comfort in using them, but with no purpose ulterior to their own enjoyment. In fine, we do not hold a position in which we can pronounce dogmatically as to final causes; and the highest wisdom resolves itself into the simplest utterance of Christian faith: "Of him, and through him, and to him are all things."

But the knowledge of final causes is not needed in order to prove design. The spinning-jenny would impress us none the less strongly with a sense of its inventor's genius and skill as applied to the production of cotton yarns, if we had no experience or knowledge of the manufacture of those yarns into cloth. Design is legitimately inferred from adaptation to a proximate end. From *adaptation*, we say, using the word in its active sense, as distinct from *adaptedness*. Between these two words lies the entire controversy between Lucretianism, ancient and modern, and Christian theism. The fitness of certain portions of nature to subserve certain proximate ends is admitted by all. The question is: Are these ends results or purposes? To take our illustration from processes of human industry, the teazle is employed to raise the nap on broadcloth. Here is a case in which the *adaptedness* is perfect; yet we cannot infer *adaptation* in the purpose of the Creator. The use may have resulted from the existence of the teazle, and yet not have been the object of express design on the part of the Author of nature. The use is, perhaps, not even an actual use, but a mere caprice, and the plant may subserve substantially useful purposes to us unknown. But no such questionings arise, when we contemplate the complex machinery of cards, spindles, looms, and vats, by which the fleece is converted into cloth. Here is conscious and designed *adaptation*; and it can be accounted for on no other hypothesis than the choice and collocation of a great diversity of means for the production of a definite end. In this case we should infer intelligent design, in the absence of all

historical evidence to that effect. Thus, did we find full sets of machinery in successful operation among a people utterly ignorant of mechanical principles, or (if we may be permitted the supposition) in a community of monkeys, capable of performing routine movements, but not of invention, we should have no doubt whatever that the machinery was devised by the cultivated intellect of a higher race of men or order of beings. Still more, could we make our explorations in another planet, and did we find there no race of beings capable of scientific thought, mechanical invention, or constructive industry, and yet saw woollen machinery in operation, we should conclude without hesitation, that intellectual forces from some other part of the universe had wrought in that planet.

But it may be said that in the case supposed we know *ab extra* the proximate end, and that it is only from our previous knowledge of the end that we can infer design as to the means. We deny this. We may legitimately infer the end from the uniform tendency of means to produce a specific end. Thus, were a thermometer placed in our hands without our previous knowledge of its purpose, and did we observe the uniform rise and fall of the mercury by the nicely graduated scale with every change of temperature, we should feel no less assured of the design with which the instrument was made, than if we had presided over its construction. In human affairs, wherever we discern the adaptation of selected and artificially arranged means to a definite end, we infer indifferently the designed end from the means, or the intent of the means from the end, and from both the action of designing mind.

The chemistry of the atmosphere furnishes numerous instances of the adaptation of means to subserve definite ends. Prominent among these ends is the sustenance of animal life, in all whose processes the atmosphere performs essential functions. The simple act of respiration represents one of the least of these functions. The circulation of the blood is sustained by the chemical action and inter-

action of the elements of the atmosphere and the fluids of the body. It is the atmospheric oxygen that consumes, and the atmospheric azote that supplies, the constantly-wasting and replenished tissue by which alone the organs and functions of the body are preserved in healthy activity. It is by the translucency of the atmosphere that we receive the light of the sun, and by its radiating properties that the light-beams are diffused and their calorific power made availing. The hydraulic properties of the atmosphere alone maintain the circuit of the waters from and to the ocean in vapor, mist, cloud, rain, and dew, through torrent, brook, and river, thus distributing the aqueous nourishment which in some form every living creature must have, and at the same time dissipating pestiferous agencies, which would nestle equally in unwashed air and in stagnant water. Then, again, all animals feed on vegetable substances, either directly or indirectly (for animal food is but vegetable substance transmuted into flesh and bone), and the atmosphere is the prime agent in vegetation at every stage. We must not forget, here, the office of the winter's snow, over a large portion of the earth, in preserving from else inevitable destruction the means of animal subsistence, — an office not incidental, but due to the presence of aqueous vapor as a constituent element of the atmosphere — the only one of its elements that can be liquefied or congealed by change of temperature. — In fine, the trite, yet most felicitous, figure of Dr. Watts, "the harp with thousand strings," falls far short of representing the multiform conditions on which animal life, reproduction, the continuity of species, and the preservation among them of relations not internecine, but mutually helpful, depend; and there is not one of these conditions which could be fulfilled independently of the atmosphere, — not one which would not fail, were there even a slight change or deficit in the constituent elements of the atmosphere, for instance, in the absence or the essential diminution of the very small proportion it contains of aqueous vapor or of carbonic acid.

Now, were atmospheric air the simple substance it seems,

or the element, incapable of analysis, which for many centuries it was supposed to be, we might not clearly infer design from its adaptedness to the purposes of animal life. But here there is an evident selection of materials, a careful apportionment, a system of checks, reactions, and compensations, a nice adjustment of atmospheric conditions and phenomena, if to no other purpose, to the use of sentient life. Of the two principal constituents of the atmosphere, oxygen would, indeed, seem the natural pabulum of life, as it forms the larger proportion of the substance of every living being; while nitrogen serves, so far as we can perceive, no other essential purpose in the economy of creation, but seems expressly devised to dilute and temper its associate element, and thus to convert into the breath of life that which else would waste like a consuming fire. Then, too, these elements are mixed and reciprocally interfused, under conditions which interdict their chemical combination,—a combination antecedently probable from a great variety of causes in a chance-created world, and the result of which would be blighting, murderous showers of nitric acid,—a substance, the occasional creation of which in minute quantities in thunder-storms, may well direct our attention to the balancing of the fearful force of atmospheric electricity by laws which cripple and confine its action. It is worthy of emphatic notice, too, that these gases are among the very few that are absolutely incapable of solution or congelation, so that as long as they remain intermixed and not combined, there must be, under all conditions of temperature, an elastic pabulum for the respiration and medium for the motion of living beings; while we can easily conceive of an atmosphere generally healthful and serviceable, which might be condensed in extreme cold, and fall in rain, snow, or hail. But a dry or an over-humid atmosphere would parch and wither, or *waterlog* and putrefy, the living tissue. Mark, then, the provision by which the air is kept always moist by aqueous exhalations, yet has only a limited capacity for vapor, so that it must always discharge

its superfluous moisture, — its capacity, however, increasing rapidly with the elevation of temperature, so that the hot breath of summer comes to us fraught with its own refreshing antidote. Equally, perhaps even more clearly, do we recognize a provident purpose in those elements which occur uniformly in the atmosphere in exceedingly minute proportions, which seem to be found there in consequence of no antecedent chemical relation or necessity, yet which have their essential functions in the animal economy. Carbonic acid constitutes in the air but one part in twenty-five hundred, yet in the present order of nature it could no more be dispensed with than oxygen, furnishing, as it does, not only the framework of all vegetation, but the fuel for the incessant combustion which sustains life, and entering largely into almost every form and process of nutriment for man and beast. The same might be said of ammonia, which is never absent from the atmosphere, is never found in open spaces in a proportion sufficient to be injurious or annoying, yet is never wanting for its indispensable services in the functions of vegetation, and through these in its ministry to sentient life.

The marks of design become still more manifest and impressive when we consider the atmosphere, with its constantly fluent and convertible elements, as a self-perpetuating system. Man has dreamed in vain, for centuries, of perpetual motion. No skill or genius can supply forces which will not exhaust themselves in their application, and renew themselves in a diminishing ratio. But here are vast quantities of oxygen, carbonic acid, ammonia, daily consumed, fixed, solidified, abstracted from atmospheric uses, and yet nowhere in free space can the slightest deficit be traced; nowhere is the balance disturbed; nowhere are the proportions deranged. So closely is the equilibrium of chemical action adjusted, that from day to day, from moment to moment, as much of each element is disengaged and restored to its gaseous state as is absorbed by the myriad mouths of animal, plant, and mineral that are open to consume it.

Unceasing waste, and yet unceasing fulness; a spending without exhaustion, a replenishing without excess,—is this supposable in an automatic system? If the remotest approach to this, the humblest and most awkward imitation of it in a human invention, implies conscious design, can the perfect realization of it imply less?

We thus discern in the atmosphere, not only *adaptedness* to the support of animal life, but a choice and collocation of means, and a system for their continuous and perpetual working, which can admit of no hypothesis other than conscious *adaptation* by a designing mind. Here, however, the development theory, in one or another of its Protean forms, is urged in rejoinder to the argument from design. The atmosphere, we are told, was not created to subserve the ends of animal existence; but it holds a foremost place among the proximate causes of life and of organized being. Let this be proved, and it only strengthens our argument. We admire the genius that spins and weaves our cotton; but we should almost worship the inventor of machinery which from certain chemical elements, in their crude state, could first make cotton, and then convert it into cloth. If in the former case we recognize one of the noblest triumphs of the human intellect, in the latter we should be prone to trace a more than human intelligence and inventive capacity. By parity of reason, if the atmosphere is adapted, not only to the continuance, but to the creation of organized being and sentient life, or fitted to bear a large part in the work of creation, we can only repeat all that we have said concerning design with tenfold emphasis, and with a conviction too profound to be either shaken or strengthened.

But while on this ground we have no quarrel with the development theory, and find ourselves raised by it to the contemplation of the one "Builder and Maker," no less than when we receive with the simple faith of an unreasoning child the cosmogony of the Bible, we cannot here trace the alleged relation of cause and effect, or even an approximation to it. True, the materials of which organized bodies

are made are most of them elements of the atmosphere, and all of them component parts of the substance of the earth; but equally so are the materials of which knives, coats, and hats are made; and if supplying the material involves creation, then is earth, air, or nature the universal cutler, tailor, and hatter. Historically, we cannot ascertain that terrestrial or atmospheric forces have ever created a single species (for of late we have heard nothing of the *acarus crossii*), or transmuted one species into another. There has been, indeed, sometimes an improvement of species; but the new varieties thus produced have not only, in every instance, retained the distinctive peculiarities of their own species, but have always manifested a strong tendency to revert to the normal type, insomuch that all the cases which have been cited to establish the doctrine of the improvement and elevation of species by "natural selection," are cases in which the spontaneous course of nature has been modified by the intervention of human breeders and cultivators. Then, again, we can trace no organizing power in nature. Suppose the world a *rasa tabula*, with all the existing elements *in situ*, nay, with all the inorganic combinations and processes that now compose its structure and mark its course, — air, ocean, mountain, plain, river, wind, rain, tempest, — we can detect no agency that could create a fern or an animalcule, not to say a tree or a man. Organized nature does not lie visible in inorganic nature, as a possible effect in a potential cause, as a plant in the seed, or an animal in the ovum. Moreover, had this energy ever resided in nature, there is no reason why its exercise should have wholly ceased. There are still improvable, or rather there are no unimprovable races; why then should the upward *misus* of all created beings have terminated before it could leave a record of itself? There is still sand-waste, rock, and reef on which the creative process might be renewed; why are not the generative forces of nature now at work in those regions? or how is it that when such desert domain is reclaimed, it does not clothe and people

itself with autochthonous plants and animals, instead of awaiting its seed and stock from other soils?

But while we can discern no creative capacity or tendency in nature, organic existence and animal life in all their forms manifest creative purpose. True, we know not the final cause of being as to any class of plants or animals; but with regard to every class with which we are conversant we can trace or imagine some proximate use or purpose, while, were there no other end to be subserved, well fed and sheltered sentient life is alone so great a boon as to be in itself an end worthy of omnipotent goodness. We have in the composition and laws of the atmosphere a system adapted with perfect precision to that of animal life,—a provision for the sustenance of a life to whose beginning the atmosphere bears no causative relation. In fine, the atmosphere and animal life are, as regards their origin, mutually independent. Neither can be shown, by any real or supposed analogy, fact, or law, to have been the creative cause of the other. Yet the adaptation of the one to the other is so close, manifold, and invariable, that we can no more resist the inference of provident design, than we can deny such design in those creations of human skill which bear visible tokens in their structure, their working, and their products, of the artificer's purpose.

We have said that in assuming the development theory we cannot escape the evidence of creative design. This theory, however, does not postulate the personality of the divine Being, as distinct from and independent of his works. Though not absolutely incompatible with theism of the Christian type, it has a strong proclivity toward pantheism. If brute matter by necessary laws has evolved order, organism, life, instinct, reason, soul, polity, love, religion, there must be an *anima mundi*, but it may be an *anima* inherent in and co-eternal with matter. It may be pervading intelligence, and yet not sovereign will. It may be a conservative principle, and yet not a controlling power. It may be the object of confidence as to the wise and benefi-

cent course of nature in its entireness, yet not as to the details which concern individual happiness and well-being. It may exercise no discretionary providence, may be imperious to prayer, may stand in no conscious relation to intelligent beings. Widely different from this is our view of the divine nature, when we substitute creation for development; when we trace mutual adaptation between portions and systems of the universe unconnected by any law of necessary causation. If there was no *a priori* necessity for the existence of things as they are, then the cause of their being must be extraneous to, independent of, other than the material forms or chaos which preceded them. If the first man, beast, bird, tree, fern, or animalcule did not come into being in accordance with laws coeval with and inherent in finite matter, the only alternative hypothesis is that of a non-material, freely-willing Creator, whose all-comprehensive and continuous purpose is the order and harmony of the universe.

The development theory (for it is one, though manifold) rests chiefly on the fallacy which confounds adaptedness with causation. Its formula, stripped of superfluous verbiage, and reduced to plain terms, is: "Because organized and sentient beings are so made and endowed that they can utilize the inorganic creation, therefore the inorganic creation is the sole cause of their existence,"—a truncated syllogism, whose suppressed major term is, "Whatever can avail itself of any utility is created by that in which the utility resides." This major term is equally absurd with its opposite, or even more absurd; for experience might suggest some cases in which the utilizer creates the utilities,—none in which the utilities create the utilizer. The carpenter may build the house, but the house cannot build the carpenter.

The phenomena of nature give us, then, not only luculent evidences of design, but equally clear proof of the existence of the designing mind, independently of the material universe. The unity of this designing mind, also, is a truth of

science, no less than of revelation. The filaments of a general plan may be traced in every department. Analogous numerical laws govern the grouping of the planets around the sun and of the leaves around the stem of a plant. Similar analogies are traced in the proportions in which elementary substances enter into chemical combinations. The same gravitation governs the world in its orbit and the stone in its fall. The telescope, as it probes inconceivable vastnesses and depths of space, and the microscope, as it brings to our cognizance the infinitesimal mysteries of creation, coincide in their revelations of order, harmony, mutual adaptation, benignant purpose. All seeming dissonances, when traced and analyzed, resolve themselves into a more sublime accord. Yet it is a multiform unity, one which often would fail to be discerned, were it not first believed; and this, not because there is any room for doubt, but on account of the breadth of the expanse and the multitudinousness of the subordinate systems, through which we are permitted to follow out the divine handwork, ever discovering new correspondences, analogies, and harmonies. Therefore is it, we believe, that the unity of God the Creator is announced in the opening sentence of revelation, while its development is evidently the prime purpose of the introductory chapters of Genesis, in which the inspired author strikes at the root of the prevailing forms of idolatry, first by specifying as the works of Jehovah the very objects that had received the adoration of the early races, and then by giving in detail the human parentage, age, and death of the founders of tribes, and the inventors of useful arts, who had also been deified. We doubt whether, without this revelation, man would have risen to the conception of the divine unity; but, this truth assumed, the entire progress of science has been toward its verification. We look upon the new doctrine of the correlation and mutual convertibility of force as the culmination of this prime truth of religion in the philosophy of nature. Our faith had prepared us to welcome this doctrine. Twenty years ago we

wrote: "In astronomy, it [science] has already belted the vast globe, the stars, the universe, with the inscription, 'God is one'; and now it is seeking marks of identity in heat, light, gravitation, the electric, the magnetic force, the vital principle, the medium of sensation and of voluntary motion, and will soon draw forth from these hidden powers, pervading all space and being, the echo of that sublime truth with which it has girdled the heavens." Meanwhile, there has been no retrogression on this route of discovery, no detection of unsuspected deficiency, of cross-purposes, thwarted aims, defeated ends; but more and more has man been enabled to discern how "one thing establisheth the good of another," to reduce diversities to unity, and discords to harmony.

At the same time, the progress of science has tended to establish, as a principle of sound philosophy, the truth that "all power belongeth unto God." Causation is, by common consent, resolved into antecedence and consequence. Efficient causes, that is, causes which have the inherent and underived power to produce their so-called effects, are no longer recognized. Even force is but a name for our ignorance; and the identity of the forces of nature only simplifies what we cannot explain.

"Names are not things," says Professor Cooke, "and we know nothing more of the cause which brings the apple to the ground because Newton has called it the force of gravitation, than we did before. He gave us the law of the motion, and predicted how every apple would fall, and how every planet would move throughout space, but the cause of the motion is as closely hidden as ever. In regard to the law of gravitation we know a great deal; but in regard to the force of gravitation — whatever we may think or believe about it — we know absolutely nothing, and the same is true of every other force." — p. 325.

What, then, is force but the omnipresence of God in nature? Where does our philosophy land us, but in the simple, unsophisticated faith of the Hebrew poets, to whom flames of fire were his messengers, who heard the voice of Jehovah upon the waters, who saw in the winds his chariot, in the depths and mysteries of creation the hidings of his power?

We cannot, then, elude the tokens in the universe of an Author of nature, intelligent in design, and possessed of competent power to embody his design in material forms. But this conception falls far short of infinity and eternity. Why may not a finite universe, which began to be, have had its origin in the will of a being himself subjected to the limitations of space and time? Machinery proves the prior existence of a mechanician, but it tells us nothing about him, except that he was a mechanician. We reply, as regards space, that *infinity* is a negative and a relative term. It denotes that in which we are incapable of imagining bounds or limits. Now in this sense the universe itself is infinite in the light of modern science. When in the field of the telescope worlds become countless as sand on the seashore; when the astronomer ascertains distances and orbits which our arithmetic cannot express; when we learn that rays from systems coeval with the human race may not yet have reached our planet,—we cease equally to conceive of actual limits, and to believe that there can be necessary limits, to the things that are made. We can conceive of no space beyond the verge of creation; we cannot believe that there is space beyond that verge which is not, equally with the space within it, subject to the Creator's control, and liable to be annexed to the created universe by his fiat. We cannot, indeed, comprehend infinity, any more than we can comprehend other negations; but we can apprehend in the universe a wisdom, skill, and power, the norms of which lie in our subjective consciousness; we can take these attributes, as displayed in creation, into our own conception, till they have filled, and tasked, and strained our apprehensive powers to their utmost tension and limit; and then, when they still exceed and overflow our ability to grasp them, and their reality sensibly surpasses our imagination, we call them infinite.

As regards eternity, the tokens of design in the universe lead us necessarily to the recognition of an intelligent First Cause." Had that First Cause a beginning? If so, there

must, *a fortiori*, have been an intelligent cause for his being. That there should ever have been a time when he sprang from nothingness into underived existence exceeds our power of belief, inasmuch as he would, in that case, be an effect without a cause, and the laws of mind preclude our conception of an effect without a cause. But if he had an intelligent cause of being, we are involved in the same trilemma with regard to this latter cause: either he sprang from nothing, which is inconceivable; or he had an intelligent cause of a still more remote order, which only carries the difficulty a stage further back; or he exists uncaused and eternally. To this last hypothesis we must resort, sooner or later; for an infinite series of finite causes does not meet the logical demand for an ultimate cause of the universe, each member of the series being an effect, and thus presupposing a cause. But here *eternity*, though not like *infinity* a negative term in its form, becomes a negative conception. The mind cannot contemplate existence except under the category of time; the theological counterpart to time, technically called the "eternal now," conveys no apprehensible idea; but we can in our thought take down the bars from time at either extremity,—ignore its beginning and its ending; and this *infinite*, boundless time is our only conception of eternity,—a conception which we, by logical necessity, attach to the existence of the designing First Cause.

We have thus seen that from the evidences of design in nature (not, we gratefully admit, without light from revelation, but using that light only to read what nature teaches), we rise to the belief of a sole, infinite, eternal, self-existent First Cause. Does natural religion go further than this, and verify also those moral attributes of the Deity, for which as Christians we resort, not so much to the mere words of revelation, as to the divine life in the flesh which those words record? We think that it does. To the eye and ear which Jesus has opened, nature manifests the same fatherhood, holiness, and perfect providence of God which are incarnated in Jesus.

The progress of physical science has been the perpetual disclosure of utilities and beneficent adaptations. There is no general law which is not benignant in its operation. There is no incidental evil which has not its disciplinary office for a race of free agents, — none which man may not evade by his forethought and discretion, or overcome by the healthful exercise of his powers, or utilize for the culture of his moral and spiritual faculties. Given, a race of beings to be trained, by voluntary obedience, to the highest condition of blessedness, we can find nothing in the universe which is not adapted to their education individually and collectively. The whole system is fatherly, — analogous to that adopted by the judicious parent, whose aim for his children is not ease and self-indulgence, but development and growth; not satisfaction in being, but joy in well-being; not the gratification of the appetites and susceptibilities, but the strengthening of the hardier sinews of the moral nature. The home guarded and governed by wise, paternal love is full of restraints, rebukes, annoyances, mortifications, to the wayward, disobedient, vicious child, while to the dutiful child it proffers all its endearments, privileges, and comforts. In like manner, the universal house of God is, more or less, a prison-house and a place of torment to his stubborn and rebellious child, while "all things work together for good to those that love God."

In this view of nature, as in the Christian revelation, the fatherhood of God is identical with his holiness. If there be any one aspect of man's relation to the universe which is patent, unvarying, and ubiquitous, it is the adaptation of the things that are made to cherish and reward goodness and virtue, and to bring failure, loss, and misery on vice and crime. To be sure, the reward is often deferred, yet is certain; retribution often seems lame, yet always overtakes its victim. But this interval, doubtful and contingent, is adapted to man's condition as a free agent; for without it there would be only a constrained conformity to law, no

deliberate choice of the right, no voluntary virtue. "The misery of man is great upon him," says the jaded sensualist, whose autobiography forms so instructive a portion of the sacred record; but human misery is solely the result of human guilt. Abject poverty, loathsome disease, suffering without comfort, offset, or remedy; war, with its Pandora dispensation of wretchedness; slavery, with its dire reaction on the dominant races,—these, and all other forms of widespread calamity, are the fruit of sin. The resources of the soil and of human industry would suffice for the sustenance and comfort of our race for millenniums of peaceful growth. The earth need not be refitted to be the congenial residence of renovated humanity. Now this condition of things indicates holy, equally with benevolent, design on the part of the Creator. It manifests his preference and love for moral goodness. It reveals him as a being who cannot look upon sin without abhorrence. It echoes from every department of nature the ascription of the ransomed host in heaven: "Holy, holy, holy Lord God Almighty."

Moreover, goodness in man is harmony with nature. All God's other works stand in their order, move on their appointed orbits, fulfil their uses. Human guilt strikes the only discordant notes in the universal lyre. In this orderly universe the supremely holy God is instructing, admonishing, and rebuking man,—manifesting his own eternal "beauty of holiness," and "calling on all men everywhere to repent." We cannot therefore but regard the nineteenth Psalm as profoundly true to the religion of nature. Unspiritual German critics have maintained that it has received its present shape by the awkward conglutination of two widely different psalms. They say that there is no poetical connection between the first part, which celebrates the glory of God in the universe, and the latter part, which relates to the law of God and the light it sheds on man's secret faults and presumptuous sins. But to him who has ever marked the signature of the divine holiness in nature, and been humbled by the faintness of its reflection in his own

soul, the psalm seems entirely homogeneous, and its flow of thought perfectly natural. What is deemed a harsh and abrupt transition is not even a transition, but the development of a continuous train of meditation. The glorious harmony of the material creation suggests the more exceeding glory of God's perfect law; the obedient courses of the heavens remind the devout observer of that which alone mars the symmetry of God's works — man's waywardness and guilt; the harp-note that strikes accordant melodies from bound to bound of the universe recalls the discordant strains of human passion, lust, and violence; so that nothing can be more consonant with the heart-logic of one who profoundly feels what he sings, than the passage from the sublime burst of adoration: "The heavens declare the glory of God," to the cry of the contrite soul: "Who can understand his errors? cleanse thou me from secret faults," and the lowly petition: "Let the words of my mouth and the meditation of my heart," like the beautiful order of creation, "be acceptable in thy sight, O Lord, my strength and my redeemer."

We now inquire: Is the divine providence an article of natural religion? And here the question is not whether man would have attained a satisfying faith in providence without revelation, but whether this truth is logically deducible from the phenomena and processes of the outward world. It cannot be denied that there are in nature numerous cases in which a general law is subjected to a specific modification, when the unmodified law would operate injuriously. To cite one well-known instance, in lieu of many, substances in general are expanded by heat and contracted by cold. Water obeys this law, except when near the freezing temperature. But if, in freezing, water occupied less space than in its liquid state, the superior specific gravity of ice would cause the sinking of each layer as it was formed, in well, river, lake, and ocean. The consequence of this in our latitude would be so profound a freezing during a single winter, that the suns of a score of summers would not restore any large body of water to its

liquid condition. But water expands as, from the temperature of 40° , it descends toward the freezing point, so that the exposed surface-water does not sink as it freezes, but forms a protecting crust for the water beneath. With reference to this and the other peculiar characteristics of water, we entirely agree with Professor Cooke, who writes :

“It is true that in the present state of science the anomalous expansion of water near the freezing point seems to be an exception to the general laws of nature ; but hereafter this very anomaly may appear to be the natural result of a more general law not yet discovered, or, like the perturbations in the orbits of the planets, may prove to be the strongest confirmation of the very law it now seems to invalidate. Moreover, I do not share in that indefinite dread of natural laws which troubles so many religious minds. To me the laws of nature afford the strongest evidences of the existence of a God, and in their uniformity I see merely the constant action of an omnipresent Creator, who acts with perfect regularity because he acts consistently and with infinite wisdom. I believe that all parts of nature are correlated by laws, and that the wider our knowledge becomes, the more universal these laws will appear. I do not, therefore, regard the constitution of water as something apart from law, and as the evidence of a power coming down, as it were, upon law to make an exception to it. This is making altogether too much of law. God is not bound by law. He acts wisely, beneficently, and with a definite plan, and the most we can claim for natural laws is, that they are our imperfect human expressions of this divine plan. Moreover, that is a far nobler view of God’s wisdom which supposes him to be able to harmonize special adaptations with general laws. What I find so remarkable in the constitution of water is, not that it is an exception to the general laws of nature, but that, while filling its place in the general plan, it has been endowed with such extreme properties, and that in each case the peculiar property has special adaptations at once so complex and so important. Not only has water this exceptional property of expanding when other liquids contract, but moreover, of all known substances, it has the greatest capacity for heat ; so also, when changing into vapor, it absorbs more heat than any other liquid ; again, it is far lighter in the solid than in the liquid state ; and lastly, it contains the largest amount of the heat of fusion as yet observed in any substance. All this may be in harmony with general laws. I have no doubt that it is ; but the existence of the law does not in the least impair the significance of the fact, that in each of these respects water has been peculiarly constituted. This one liquid of the globe, which covers more than three fourths of its surface, which circulates through all its channels, which percolates through all its pores, which constitutes three fourths

of all organized beings, has been endowed with these four pre-eminent qualities, on each of which the whole order of terrestrial nature may be said to depend. I cannot conceive of stronger evidence of design than this; and if these facts do not prove the existence of an intelligent Creator, then all nature is a deception, and our own faculties a lie."— pp. 160-162.

Now we have here, in the constitution of things, the perfect analogue of the Christian doctrine of providence. No intelligent Christian believes in the occurrence of hourly miracles in behalf of individual men,—in the setting aside of God's wonted modes of administration in answer to prayer, or for the special benefit of needy or deserving mortals. What we do believe is, the harmony of "special adaptations with general laws" in the government of human affairs. While the physiology of water seems an exceptional case in natural philosophy, it probably is not so to higher orders of intelligent beings. But it is an instance in which God has so adjusted the economy of nature as to subserve special uses, which could not be subserved under the laws which (with this one exception) seem to be universal; and, if we may apply to him our own inadequate terminology, he does this in accordance with more comprehensive laws, which man does not as yet, and perhaps may never, fully understand. In like manner when, by what appears to be an abnormal coincidence or succession of events, or by an unaccountable impression upon the mind of the person interested, impending peril is averted, or some blessing which was not to be anticipated is bestowed, whether in answer to prayer, or seemingly in recognition of some service or sacrifice, or to enable one man to confer essential benefits on his community, nation, or race,—we do not believe this to be an exceptional act in the divine administration. We have no doubt that it occurs under law, so far as that term (whose use, no doubt, savors of anthropomorphism) can be applicable to the divine Being. But it takes place under laws, physical, psychological, or both, which we do not yet, perhaps never may in

this world, comprehend in our philosophy, yet which may to superior beings, or to the redeemed in heaven, seem as natural as sunrise or the growth of the tree. And we submit that the cases of special adaptation in nature, of which the phenomena of water furnish striking, but not solitary examples, render corresponding special adaptations, that is, a discretionary providence in the administration of human affairs, antecedently probable.

We should reach the same conclusion from the very attributes of the Supreme Being as manifested in the universe. His omnipresence is a corollary from his existence, and equally from our non-discovery of efficient forces in nature. But his cannot be an inert presence. It is too absurd an hypothesis to be entertained for a moment, that the Will which called the worlds into being became otiant when they commenced their revolutions; still more so, that the sovereign Love which has provided for the sentient enjoyment of unnumbered races, and for the social, moral, and spiritual happiness of one, is indifferent to the beneficent ends to which all created things minister; and most absurd of all, that the Power and Wisdom which could organize the multitudinous whole of nature cannot so adjust its course, so determine and administer its laws (to speak after the manner of men), as to meet individual cases, and to secure an amount of enjoyment and happiness immeasurably greater than could result from general laws without "special adaptations." A God without providence is to us inconceivable. We say nothing of "particular providence,"—the term seems to us both unphilosophical and irreverent,—nor yet of "general providence," which, in the common acceptation of the phrase, denotes the absence of providence. But universal providence is as inseparable from rational theism as it is from the teachings of psalmist and prophet, apostle and Saviour.

As regards doctrines appertaining solely to man's spiritual being,—immortality, pardon, mediation, atonement, redemption,—it is entirely aside from our present purpose

to inquire whether we have an adequate intution of the truth independently of rovelation, or whether we are primarily and chiefly dependent on the written word even for what we call our intuitions ; though we would ask, in passing, how it is, on the former hypothesis, that clear and lofty views of spiritual truth are never found except on Christian soil, and that, with hardly an exception, men who have professed to hold such views on other grounds than those of Christian faith have been nurslings of the Bible, the children of the church, under her watch and ward till, in the conceit of wisdom, they spurned the mother that bore them. But our present concern is with external nature, not with the inspiration which is, or is not, in man. Now it is manifest that truths like those named above cannot be expressly included in or deduced from the phenomena of the visible universe ; yet we should antecedently expect that spiritual facts and laws would be more or less distinctly typified and prefigured in material forms ; and though types and analogies have no validity as positive proofs, they are often of inestimable worth in guiding inquiry and in answering objections.

Thus throughout all nature we mark the tendency of "mortality to be swallowed up of life." In numerous cases, what seems death is but a passage of the life into some more noble or more ample mode of being, — birth into another sphere, — an enlarged or multiplied vitality. And even when we cannot trace the continuity of life, death is its feeder, and every stage of dissolution and decomposition is prolific in vivifying energies, insomuch that wherever death abounds, life much more abounds. Phenomena of this class are well suited to suggest the possibility and inspire the hope of the continued or renewed life of man after death ; but so far are they from furnishing satisfactory grounds for this belief, that they do not even give it a definite shape. They lend their aid equally to the hypothesis of conscious immortality, to that of metempsychosis, and to that of the reabsorption of the individual life into its source.

But when revelation assures us of a literal resurrection and a personal immortality, these phenomena silence our scepticism, hardly leave room for the mingling of wonder with our adoring gratitude as we stand in faith by the broken sepulchre, and bring the most transcendently glorious miracle in the gospel history, with the eternal life which it authenticates, into the order of nature.

In like manner, we find in the outward universe numerous analogues of pardon and redemption. Nature is full of remedial functions, restorative agencies, curative processes. Lesions that seem fatal are survived by plants and animals. The wounded deer can find the healing herb. The maimed tree renews its truncated limbs. New members shoot from the bisected polyp. "There is a sin not unto death," might seem a pervading law of creation, to an unfallen or an obdurate soul. But he who bows in remorse and dread under the burden of his own guilt would find equally numerous and strong analogies to drive him to despair; or if not, nature would fail to point him to the specific balm for his wound, or to the physician that can heal the diseases of the spirit. But when he appears who alone "has power upon earth to forgive sin," then the hopeful analogies of nature cluster around his mission, and the grace of God incarnate in him has its multitudinous attestations in the benignant laws that renew blighted, diseased, and imperilled life through the whole realm of the divine providence.

Mediation, too, and vicariousness have their types in nature, — mediation, in the mutual offices by which God constantly ministers to his children and his creatures through one another, — vicariousness, in the many instances in human and animal physiology in which one part of the system suffers all the pain occasioned by the lesion of another part, and in which the healthy action of one organ replaces the suspended, or supplements the impaired, action of another. None of these provisions, indeed, could help man in his approach to God, or give him hope in his spiritual needs and liabilities. But they group themselves as illustrations

and confirmations of God's method with the sinner. They give a naturalness, and therefore an intrinsic probability, to the office of the "one Mediator between God and man," and to the divine appointment by which he "bore our griefs, carried our sorrows, and was bruised for our iniquities," so that "by his stripes we are healed."

Were we willing to transgress our proposed limits, we should here present the natural religion of the soul as bearing its emphatic testimony to the peculiar doctrines of Christianity. The soul's natural religion, however, is one, not of intuitions, but of questions, yearnings, and needs; not of dogmas, but of postulates; and the adaptation of the positive religion of the gospel to meet and satisfy this interrogative religion of the soul, constitutes the most valuable, convincing, and edifying portion of the internal evidences of Christianity. But we must not even enter on this rich field.

We beg leave to make an important discrimination with reference to what we have here written, partly for the truth's sake, and partly for consistency's sake, lest we may seem to have contradicted what we have written elsewhere. *Natural theology or religion* bears two widely different meanings. It may denote such knowledge of divine things as man could attain without revelation; or it may denote, in addition to this, what man can see in nature by the light of revelation. In the former sense our estimate of the contents of natural religion is exceedingly low. We believe that mankind would reach, with the progress of knowledge, the conception of Deity, that is, of creative intelligence, but not of a personal God; still less, of the moral attributes which the Bible reveals. It is of the actual contents of nature,—of the truths of which the material universe bears the clear and ineffaceable record,—not of man's power to peruse that record unaided, that we have spoken in the present Article. The book was "in the right hand of him that sat upon the throne," and men might read the writing on the covers, or catch a word here and there on the margin of the leaves; but until Christ came, "no man was able to open

the book, and to loose the seals thereof." In fine, with reference to almost all the fundamental truths, which are commonly, and, with the qualification indicated above, rightly regarded as within the province of natural religion, we would adopt, *mutatis mutandis*, the following statement of Professor Cooke with reference to the proof of the divine goodness in nature :

"I do not believe, in any sense, that nature proves the goodness of God. When the heart has been once touched by the love of God, as manifested on Calvary, the tokens of God's goodness are seen everywhere; but before this, nature, to one who has seen its terrors and felt its power, looks dark indeed; and the pretence that the material universe, unexplained by revelation, manifests a God of unmixed beneficence, not only does harm to religion, but places science in a false light. The most superficial observation shows that this is not true. Lightning and tempest, plague, pestilence, and famine, with all their awful accompaniments, are no less facts of nature than the golden sunset, the summer's breeze, and the ripening harvest; and who does not 'know that the whole creation groaneth and travaileth in pain together until now'? It does not change the terrible fact to say that nature has been disordered by man's sin; for sin is, itself, the greatest evil in the world, and its ghastly forms meet us at every step. So prominent, indeed, is the evil in nature, and so insidiously and mysteriously does it pervade the whole system, that an argument to prove the malignity of God could be made to appear quite as plausible as the arguments which are frequently urged to prove his pure beneficence; and wherever the unaided human intellect has attempted to make to itself a beneficent God, it has always made a malignant Deity as well. Nature manifests God's wrath no less than his love; and it is a false and sickly philosophy which attempts to keep the awful fact out of sight. God is our Father; but nature could not teach it, and 'the Word was made flesh' to declare it. God is love; but nature could not prove it, and the Lamb was 'slain from the foundation of the world' to attest it."—pp. 347, 348.

We have thus cursorily surveyed a large part of the field of argument and illustration opened by the admirable book which gave us our text, and to which we have constantly referred for the facts in physical science that we have adduced. It remains only to give a brief analysis of the work before us.

The author commences by defining the separate provinces and mutual relations of science and revelation, pointing out

the offices and the limitations of natural religion, and showing the competency of even inanimate nature to bear authentic testimony to creative design. He then adduces successively the testimony of the atmosphere as a composite whole, and of its several constituents, oxygen, water [aqueous vapor], carbonic acid, and nitrogen. He next considers the "argument from special adaptations,"—an argument which his subject enables him to urge with peculiar pertinency and power, so very numerous are the characteristics and phenomena of the atmosphere which fit it, expressly for vital uses, and which, however successfully science may force them into line with the whole constitution and course of nature, seem at first sight somewhat anomalous and abnormal. Then, as the essential complement and counterpart to this, Professor Cooke presents the "argument from general plan," showing the filaments of unity and continuousness of purpose, the tokens of the same mind, the vestiges of the same shaping thought, as they pervade, with mutual correspondences, all departments of nature. The work terminates with a lucid and explicit statement of the different methods of scientific and religious thought, of the inadequacy of the former to grapple with the great themes which appertain to man's interior and everlasting life, and the inadequacy of the latter, at the same time, to issue *ex cathedra* judgments in the realm of pure science, or on merely physical and material subjects, except in their psychological and religious bearings. We close by quoting from this part of the volume the following paragraph, to which it were well for both scientific men and theologians to give heed :

"I cannot but believe that the appearance of clashing between science and religion would be wholly avoided, if the teachers both of God's unwritten and of his written word would pay more regard to the necessary limitations of scientific and religious thought. On subjects where the methods of acquiring knowledge are so utterly unlike, where the relations of the knowledge to the human understanding are so different when gained, it is in vain to expect literal accordance. Science, both in its methods and its results, addresses the understanding exclusively; Christianity appeals

chiefly to the heart. Science aims to instruct; Christianity aims to persuade. Science is attained by study, and is possible only for the few; Christianity is a free gift from God to all men who will receive his Son. The results of science are fully comprehended, and can be expressed in definite terms; the truths of Christianity stand on a level above man's intellect, and can only be shadowed forth in types and symbols. The forms of science are constantly changing; the types and symbols of Christianity are permanent. Lastly, while the language of science may be so varied from time to time as to express accurately the current ideas, Christianity necessarily retains the forms under which it was first revealed. Under such conditions how can it be expected that the language of revelation should agree with the letter of science? You might as reasonably find fault with nature because its crystals are not perfect, as criticise the Bible because its language, although embodying divine truth, is not free from the necessary limitations and imperfections of the human medium of thought."—pp. 341, 342.

ARTICLE IV.

NEW ENGLAND THEOLOGY.

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[This is the Thirteenth of the Series of Articles representing the peculiar views of different theological sects or schools.]

THE doctrinal system termed "New England Theology," is a modified form of Calvinism. It originated in connection with that remarkable religious movement in our country, a little more than a century ago, called "the great awakening." Among the men who have contributed to its development and elucidation may be mentioned the two Edwardses, Belamy, Hopkins, West, Smalley, Spring, Emmons, Griffin, Dwight, Woods, Taylor, and Beecher. It has been variously designated. At first it was called "new light," or "new light divinity"; sometimes "Berkshire divinity" (from the fact that several eminent men who adopted it resided in Berkshire county, Mass.); often "Edwardean," or