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ARTICLE III.

THE NATURAL FOUNDATIONS OF THEOLOGY.

BY THOMAS HILL, D.D., LL.D., FORMERLY PRESIDENT OF HARVARD COLLEGE.

THE realm of truth extends indefinitely, probably infinitely, in all directions. We see in part, and we are not able to state, in verbal propositions, even the whole of that which we see. At a scientific meeting in Baltimore, Peirce demonstrated that it would take an able mathematician two hundred thousand million years to make a preliminary examination of a series of plane curves which he had pointed out. These were curves of the simplest laws; add the more complicated; take also those revealed by different methods of investigation; add those which are not confined to one plane; pass then to the laws of surfaces and solids, and it is evident that in geometry, the simplest of possible sciences, there is an opportunity for eternal occupation and delight to an intelligent spirit. The other departments of mathematics, algebra and arithmetic, are equally boundless in resources. The physical sciences, the historical group, the domains of psychology and metaphysics, and our gropings after ontology and theology, remain yet to shew us what infinite resources there are for intellectual occupation in the coming cycles of eternity. And all this truth which to eternity may be giving by its discovery fresh pleasures to the expanding mind, has been from eternity known to God. His knowledge embraces not only all the real, past and future, but all the possible, and all the impossible. To see the truth is to see as he sees it,—truth is conformity to his thought.

It is sometimes said that men cannot see truth, their views must inevitably be not only limited, but obscure, and therefore doubly erroneous. But this is a rhetorical overstatement, which, strictly interpreted, would deny its own

truth; no human statement can be made which does not imply the speaker's belief in its truth, and consequent belief that he sees truth. As far as man sees at all, he sees truth; and the addition of infinite knowledge would not destroy the truth already seen. God's thoughts embrace ours, but ours do not embrace his. Whatever the human intellect discovers in the relations of space and time, in the harmonies of the physical creation, or in the laws of its own thought, was known from eternity to the Creator; and it is a simple confusion of thought to object that this statement is anthropomorphic. Man is made in the image of God,—that is not saying that God is in the image of man.

In this infinite realm of truth there are ideas which affect us profoundly, without being consciously understood. Even the simple truths of geometry may thus address us. An artist may draw a beautiful form, an ellipse or spiral for example, from his sense of beauty, without any intellectual conception of the law of that form. All truth affects the feelings to some extent, but the feeling is not directly proportioned to the clearness of the perception. The intellectual perception of a form, embodying a law, and the pleasure arising from its beauty, are not only distinct states of consciousness, but, as such, are to some degree mutually exclusive. Beauty, as an objective reality, is the embodiment of a single idea in a varied or complex form; the beauty of a material object is directly proportioned to the simplicity of the law of its being, and to the complexity or variety of the manifestation; but our perception of the beauty does not depend on our perception of the law; a person without any musical learning, for example, may enjoy a symphony.

But other emotions, than those of a simple pleasure, may thus be awakened by objects that suggest no decidedly intellectual thought. All the nicest shades of human feeling are expressed by music with more precision and force than can be given to their utterance in words. Thus also the human face may express all the varying passions of the heart.

In these instances the expression of a thought is not rec-

ognized by the intellect, but is felt by the heart, as pleasure or other emotion. There are yet other expressions of thought, objects, and relations in the world which do more than excite emotion ; they awaken desire or stimulate volition.

From among these truths acting directly on the will with but a partial excitation of the intellect, let us select for consideration those which produce the conviction of duty — the sense of moral obligation. These moral emotions bear witness to the existence of other truths than those of space and time, matter and motion. Two series of facts of consciousness bear constant testimony against any sensational philosophy : first, the continual grasping of the mind after the Infinite ; secondly, the constant recognition of a distinction between right and wrong, and the moral approval or disapproval consequent upon that recognition. The sensational school would resolve the judgment of right into a judgment of utility. The most ingenious explanation of this kind makes the moral judgment merely a judgment of utility not consciously formed, but unconsciously inherited from an infinitely long line of ancestry, reaching to the ascidians. Our moral indignation at this confounding of utility with right, we are told, is an illusion ; by things useful, it is said, we mean those the utility of which we perceive ; by things that are right, we mean those whose utility has been perceived by a majority of our ancestors. This jugglery of words explains nothing. Men perceive, and cannot wholly close their eyes against perceiving, a difference between duty and interest, between usefulness and goodness, and the attempted explanations of the sensational school are, consciously or unconsciously, a denial of the veracity of human consciousness.

But as the perception of color is the implicit perception of a rhythm in the undulations of light ; and the perception of harmony is the implicit perception of law in tremors of the air ; this rhythm and law not being recognized by the intellect, but being felt as beauty ; so the perception of the right is an implicit perception of spiritual order, not recognized as law, but felt as duty. And as the physicist might or might not,

in the seventeenth century, have understood harmony and coloring, while still the unlearned truly saw and heard their beauty ; so the metaphysician of the nineteenth century may or may not analyse the spiritual order of the universe, while still the unlearned truly see and feel the reality and sanctity of moral obligation. Our judgments of right and wrong depend much upon our temperaments and upon our education ; our moral perceptions vary in clearness and precision, and need training ; but this no more militates against the reality of the objects of that perception, than the need of training in mathematical and physical science shows the non-existence of space and time, matter and motion.

The most general statement of the moral order is, perhaps, that given by Jouffroy, that our duty is to fulfil our destined end : the purpose of the Creator is law to the creature. The laws of life are the conditions on which life is given ; every violation of them cripples life ; their flagrant violation destroys life. The implicit perception of this law in regard to the will gives the conscious sense of duty ; the sense of obligation to obey the Creator. Yet this recognition of a destined end is not a full solution of the question of right. The forms of organic life are not beautiful because God chose them, but he chose those which were in themselves beautiful ; in like manner the spiritual order is not right simply because he chose it, but he chose it because it was right. He saw from eternity the beauty of moral order, and its absolute necessity for his creatures ; therefore he endowed us with this capacity for being impressed with the sense of obligation, when we catch, as it were, obscured glimpses of this eternal beauty.

Certain writers have separated our moral from our intellectual faculties, calling one the pure reason, the other practical understanding, or regulative principles ; but, in my judgment, the difference between ethics and mathematics lies rather in the objects which they discuss, than in the powers of the mind by which they are handled. In each science we build both upon intuitions and perceptions, and the main difference is in the sharpness of definition attainable

in the two departments. In certainty of sight and of deduction the two are equal ; in value ethics take precedence ; in sharpness of detail, the mathematics.

We cannot, while retaining consciousness, avoid considering conscious life higher than unconscious ; neither, so long as we see moral distinctions, can we avoid considering questions of duty paramount to all other questions. Conscious obedience to the Infinite Creator is the highest conceivable life ; conscious refusal to yield to his will is the supremest folly. The moral judgment is an implicit perception that his will rules in the spiritual world ; it is an implicit testimony to his existence. Thus conscience itself is an ambassador for Christ, beseeching us to be reconciled to God, as the only possible avenue to life, or escape from destruction. The New Testament, with its doctrine of atonement, of the reconciliation of man to God, does no violence to the highest moral sense, nor does it conflict with the highest idea of an unchangeable Creator, whose will and purpose is our only measure and rule of right ; just as his workmanship is our highest type and measure of beauty. The poets of all ages and all nations bewail man's fallen and abject condition ; the sublime apologue of the book of Genesis alone gives us a just explanation of that fall ; an explanation which will bear the most searching criticism of reason and the moral sense. That explanation (as I understand it, and as it seems to me any man who reflects upon the extreme antiquity of the document would understand it) consists in the statement that man is placed in the garden of this world, endowed with a limited freedom by which he may, if he chooses, become a co-worker with God and a partaker in divine joys ; and may, if he chooses, refuse thus to serve God, and seek only to gratify his own wishes. He chooses the latter, he thus goes wholly out of the way of life, and his only possible salvation is a complete change of direction, turning his face again toward Jerusalem, and renouncing his perilous descent to Jericho. So soon as this revelation of the fall of man from allegiance to God to the service of himself is announced to

us, our conscience bears testimony to it, and the exceeding guilt of sin is seen to consist in this virtual enmity against God. The conscience thus awakened becomes so much impressed with the guiltiness of sin, that it sometimes endorses the doctrine of the personal immortality of the soul, as the only means of vindicating the eternal justice of providence, which does not appear to award to men in this life the full measure of their deserts.

The sense of the certainty of retribution for sin sometimes leads to the doctrine that the effect of sin is inevitable, and that forgiveness is impossible. The difficulty of free and full forgiveness, from God or from man, is keenly felt, even when forgiveness is not pronounced impossible. Yet, on the other hand, there is a native admiration of mercy; so that mercy has been always accounted even more divine than justice. The Christian religion is not therefore, unreasonable or incredible in its offers of forgiveness; in its assurance that the sacrifice on Calvary may take away our sins. The inviolability of law does not imply the inevitability of punishment. It is certainly established, in medicine, that some poisons have efficacious antidotes, and that for certain diseases there are unfailing remedies. The inviolability of law, therefore, does not prevent medical skill from sometimes defending health against every permanent effect of poison or disease. The physical consequence of sin, in other words, may sometimes be avoided, despite the inviolability of physical law; sometimes not even a scar remains from a wound; nor a trace of weakness from the bed of sickness; why is it then impossible that the great physician can heal a soul from the leprosy of sin without leaving a scar or any sign of weakness?

In these articles upon the certainty of religious knowledge we have thus far been considering, principally, the intuitions of spiritual and moral truth. Let us turn to a more particular examination of the outward world, the testimony of the material, the visible, to the invisible and eternal. The arguments of theology founded on external nature have been usually divided into the two great classes, the teleological

and the morphological. The teleological argues from the adaptation of means to ends; the morphological from the conformity of parts to a general plan. This latter is thus the more general, embracing wider ranges of phenomena; it would discover instances in the outward world of conformity to *a priori* conceptions of order in space or time, and claim them as proof that this conformity is the expression of an intellectual conception of that order.

The modes of embodying or illustrating an idea may be very various. Take, for a simple example, the idea of division in extreme and mean ratio, that is to say, of division into two parts, such that the less shall have the same relation to the greater, that the greater does to the whole. We may approximate this division by dividing unity into the two fractions, .61803784 and .38196216, or express it exactly by saying the lesser fraction is half the difference between three and the square root of five. Or we may divide, by various geometrical devices, a straight line, or a curved line, or a surface, or a solid, or an angle, in the proposed proportion. Or we may take a unit of time, or of velocity, and let the velocity be in a right line, or in a circle, and devise mechanical means of the division. Or we may take a unit, not strictly susceptible of quantitative measurement, and enlarge thus our idea from mere ratio to general relation, and thus embody a division in extreme and mean ratio in a poem, a sonata, a novel, a drama; or in a political organization, in church or state.

Now any one of these modes of embodying that idea is also a mode of uttering, explaining, and illustrating the idea. The simplest mode is the geometrical, and the simplest possible would be the simplest among the subdivisions of the geometrical. The power of perceiving space is the lowest among the intellectual powers, and its culture serves as the foundation for all the superstructure of learning. Space is in itself infinite and without parts, and, therefore, would be wholly incapable of apprehension by the finite mind, but for our connection with matter and motion through the body. This embodiment of mechanical force in the physical frame,

force that can be manifested only in motion occupying both space and time; and the dependence even of conscious thought upon motion in the brain, thus weaving time into the very life of the soul; gives us the ability to recognize the presence of space and time, and to impose arbitrary divisions upon them. The first act of spontaneous muscular motion calls our attention to the existence of space, and the first intellectual exercise is the analysis of the perceptions thus gained. During the earliest years of childhood the recognition of things by their shapes occupies by far the largest share of a child's mental activity. From the analysis of space come the first lessons in precision and accuracy. Nor can the adult find any precision of thought to compare with the conception of a geometric locus. The point, the line, the surface, are absolute zeros in space; and the law of a locus, confining a point to a given line or given surface, allows of absolutely no variation, no play; it demands an obedience to which even the fidelity of the physical elements to law might be considered riotous license. Hence the shortest fragment of a curve contains the whole law; could the geometer know the exact path of a comet for the thousandth of a second, he could, from that, predict accurately its whole course and orbit in its journey of centuries through the remotest bounds of our system.

Yet this same science of geometry, which gives us our first lessons of precise accuracy, gives us also our first definite measure of the value of approximation. No material objects can perfectly fulfil a geometric law; yet an approximate fulfilment, by a model of stretched threads, or carved wood, or by lines drawn with pencil or with crayon, is an announcement of the law, which is to most persons clearer, more intelligible, than any announcement in written symbols. The points of space which exactly fulfil the law have no physical powers; they cannot attract particles to themselves; they are distinguishable from contiguous points only by a mental act of an intelligence that knows the law of the locus. When, therefore, we see the streak of chalk upon the black-

board, making even a rude approximation to a symmetrical form, we irresistibly infer that the chalk was guided by an intelligent hand, designedly embodying the law, held in the draughtsman's mind, either in an artistic, or in a scientific form.

This reasoning is as strictly just applied to natural as to artificial forms. There is no more power in points of space to attract atoms or molecules than to attract masses. The crystalline forms of minerals indicate the action of conscious intelligence precisely as the models of crystals in the cabinet do. That higher intelligence which guides the action of natural forces must, of course, view the laws of geometric loci in a very different manner from that of our feeble and slowly developed comprehension. But that higher intelligence has a perfect knowledge of such laws, not no knowledge; and the demonstration of this truth is found in the close conformity of crystals, and the more wonderful conformity of organic forms to geometric laws of symmetry.

It is from these diagrams of nature that men get their first suggestions of geometric beauty and law, and are stimulated to the invention of new laws. Nor can we fail to notice how frequently the law which men have invented, proves to have been already known and used in nature. The mathematician devises a geometric locus, or an algebraic formula from *a priori* considerations, and afterward discovers that he has been unwittingly solving a mechanical problem, or explaining the form of a real phenomenon. Thus, for example, in Peirce's Integral Calculus, published in 1843, is a problem invented and solved purely in the enthusiasm of following the analytic symbols; but in 1863 it proved to be a complete prophetic discussion and solution of the problem of two pendulums suspended from one horizontal cord. Thus also Galileo's discussion of the cycloid proved, long afterward, to be a key to problems concerning the pendulum, falling bodies, and resistance to transverse pressure. Four centuries before Christ, Plato and his scholars were occupied upon the ellipse as a purely geometric speculation, and Socrates seemed

inclined to reprove them for their waste of time. But in the seventeenth century after Christ, Kepler discovers that the Architect of the heavens had given us magnificent diagrams of the ellipse in the starry heavens; and, since that time, all the navigation and architecture and engineering of the nineteenth century have been built upon these speculations of Plato. Equally remarkable is the history of the idea of extreme and mean ratio. Before the Christian era, geometers had invented a process for dividing a line in this ratio, that they might use it in an equally abstract and useless problem — the inscribing a regular pentagon in a circle. But it was not until the middle of the present century that it was discovered that this idea is embodied in nature. It is hinted at in some animal forms, it is very thoroughly and accurately expressed in the angles at which the leaves of plants diverge as they grow from the stem; and it is embodied approximately in the revolutions of the planets about the sun. These three embodiments, moreover, have no apparent genetic or causal connection. Plants can scarcely, on the theory of progressive evolution, have come from a common ancestry with animals; nor can the revolutions of the planets be imagined as controlling the angles of the leaves of plants. Let us further observe that the nature of the unit is different in the two cases; in the plants, stationary angular distance around the stem; in the planets, angular velocity of motion. Nor have we, even in the case of plants, any clew to the proximate cause of the arrangement, beyond a vague analogy to a supposed law of the genesis of cells.

Now in all these cases of the embodiment in nature of an idea which men have developed, not by a study of the embodiment, but by an *a priori* speculation, there seems to us demonstrative evidence that man is made in the image of his Creator; that the thoughts and knowledge of God contain and embrace all possible *a priori* speculations of men. It is true that God's knowledge is infinite and beyond our utmost power of conception. But how can we compare the reasonings of Euclid upon extreme and mean ratio, with the

arrangement of leaves about the stem, and the revolutions of planets around the sun, and not feel that these phenomena of creation express Euclid's idea as exactly as diagrams or Arabic digits could do; and that this idea was, in some form, present in the creation?

Yet this is only a single one of very numerous examples. In Agassiz's Introduction to the Natural History of the United States, he brings, from the animal kingdom alone, a vast, almost innumerable, multitude of facts arranged to show the presence of ideas in the phenomena of animal life; and the result is a cumulative argument, irresistible to a mind capable of appreciating logical proof; demonstrating that the intellectual distinctions upon which the classification of animals proceeds, in species, genera, families, orders, classes, and departments, are not subjective distinctions in the naturalist's thought, but objective distinctions in the animals, proceeding from intellectual distinctions in the creative mind.

We are aware that this Introduction to the Essay on Classification has been severely criticised, on the ground that the only business of science is to formulate facts into the briefest and most comprehensive expressions. We deny altogether this definition of science, her work is incomparably higher; the prevalence of this error would presently crush out all physical science; just as the prevalence of a kindred error crushed out geometry among the Romans. Science is systematized knowledge; and the knowledge of principles, laws, and ideas, is incomparably better than the mere knowledge of the facts which embody them. An empirical formula may generalize the facts in the briefest manner, and yet it is unsatisfactory to a scientific mind. The object of science is to unfold the intellectual order and harmony of creation; and while it can be attained without distinct recognition of the Creative Wisdom, it cannot be attained by those who deny the presence of Creative Wisdom. Linnaeus and Cuvier made their grand discoveries only by aid of the assumption that everything in organic nature is perfectly adapted as a means to an end; and Agassiz's more powerful and subtle

instrument, by which he has made advances that carry him beyond the power of many of his fellow zoölogists even to appreciate, has been the more general axiom that all the forms of organic nature are intellectually related as parts of one intelligible plan.

Inorganic nature is also built on an intellectual scheme. The law of gravity by which its force varies as the square of the distance, is shown by the mathematician to produce better results than any other law—it is the simplest conceivable law of emanation; but we see no other causes for its selection, except these intellectual reasons. The symmetry of crystals and of the undulations of the ether are produced not only by attraction and elastic repulsion, but probably also by original symmetry in the atoms of matter. The phenomena of light demonstrate, at least, that the crystalline form is sometimes present in a clear solution of the solid in a liquid. The secret of the form is, therefore, in the molecule, and probably in the atom, and no explanation is probable except that of Newton, who assigns the atoms to the creation of God.

The “occasion for the hypothesis of a Deity” is still more urgent when we consider organic forms. A universal force, acting under general laws, would produce forms of stable equilibrium, limited in their variety. But the forms of organic life, of almost unlimited variety, are not in stable equilibrium; their structure is essentially one of rhythmic change; nay, they may even be considered as in a state of perpetual decay and repair; the universal forces of light, heat, and actinic power, tearing them down as fast as they build them up. The action of these forces varies in each kind of creature, and even in each individual; it is not guided by a general controlling force, but by an individualizing guidance of special law, without force, which is an indication, or rather demonstration, of the presence of thought.

A special evidence of the intellectual element in the laws of organic life is alluded to in the expression just used, of rhythmic change. From the egg or seed the organic being goes through a series of successive changes, various as the

variety of forms, until it reproduces the egg or seed. This regular progress of metamorphosis in the animal or plant, is as clearly intellectual, as impossible to explain on mechanical considerations only, as the rhythm of a musical melody, or of the pulsation of a message travelling over Morse's lines.

The gemmiferous multiplication of a polyp, the bulb-like buds of the red lily, show that there is no necessity in the nature of things that propagating organisms should have a difference of sex, and ordinarily multiply by the fecundation of ovules and ova. The existence of this kind of multiplication, therefore, in all the species of either one kingdom must be accounted an intellectual unity of plan, requiring the hypothesis of an intelligent cause; and such a hypothesis becomes more than doubly necessary by the presence of so closely analogous kinds of propagation in both kingdoms.

The teleological and morphological arguments are sometimes closely blended; we see both the idea embodied, and the purpose of its embodiment. But in other cases the perception of law or symmetry in a form may force upon us the conviction of design, when no purpose of the design may be visible. The exquisite forms of flowers, and of the markings upon insects are as clearly indicative of thought as any diagrams can be. Those who refuse assent to this morphologic argument, must either do so from the feeling that it is impious to attribute to the Infinite First Cause any finite ideas, or from the feeling that the natural form grows by a natural law.

But it appears to me a misconception of the morphological argument to suppose that it attributes human ideas to the Deity; it merely assumes that the human or finite idea was included in the divine ideal of creation. It is the manifestation of these ideas in nature which has always been the clearest guide and most powerful stimulus to the invention of *a priori* laws, as though one purpose of their manifestation had been this instruction or education of the human intellect. In regard to the other prejudice, that natural forms grow by natural law, we must remember that a law is not a force; it

is merely an order in which a force acts, and that order implies intelligence guiding the force. Points in space and instants in time have no distinction from each other, except in the election of the mind which sees them, and selects them for the purpose of expressing thought. Space and time have no power over matter; matter is obedient to spirit alone; and the arrangement of matter in order, whether symmetry of form or rhythm, is the result of its obedience to will guided by thought. Any other supposition to account for the cosmos, the universal order, seems to us wholly untenable. The attempt to refrain from accounting for the phenomena is vain, the mind is irresistibly impelled to attempt the solution of the problem; and the heart is thrilled with joy when the intellect announces, as the solution, that the First Cause is all wise and all good, as well as almighty.

Let us not forget that we are passing here, in a few pages, over a branch of argument capable of almost indefinite expansion. We have alluded only to form and rhythm; but morphological arguments might be drawn from the chemical relations of the elements to each other, to the organic world, and to our *a priori* conceptions of number. The relations of plants and animals to each other, and to inorganic matter, furnish numerous proofs that the world was arranged by divine wisdom; — the harmony between instinct and organization; the relations of instinct to reasoning; the connections between man and the lower animals; the interdependence of animals on each other, and also of many plants; the adaptation of the astronomical facts to those of terrestrial life; and each one of these subjects would furnish matter for many pages of exposition, were we disposed to expand the morphologic argument. Again, the higher field of human life would furnish many invincible proofs of the guidance of overruling wisdom. The relations of the sexes to each other; the variety of endowments among men, and differences in the degrees of endowment; the contrasts in national characteristics; the form of the continents, and arrangement of mountains, rivers, and seas; the variety of mineral and veg-

etable productions in different lands ; these are a few of the points in which the arrangements of the world, of men, and of nature, seem the result of intellectual plan or guidance ; neither the effects of chance, nor of obedience simply to general invariable laws. When, however, we assert that universal and invariable laws are not sufficient to account for the forms of nature, we do not mean to imply miracle—a suspension of the law of physical causation. All effects upon the earth are in some sense historical, and we can never, in the course of scientific investigation, put our finger upon a link in the series, and say : This was purely miraculous ; there was no secondary causation here. Even the change from the fauna and flora of one geological epoch to another was, probably, accomplished through some action of secondary causation ; although that action has left no trace of itself, and the speculations of the present century are as wild and unsatisfactory on the subject as those of Lucretius. The only visible connection between the epochs is the intellectual unity which binds the forms of organic life in the earlier to those in the later. That intellectual connection would not become null, nor lose its significance, should future scientific research reveal to us in reality, what the doctrine of natural selection idly claims to have revealed, the mode by which this connection was physically accomplished. If an effect is intellectual, composite, and harmoniously proportioned in its parts, then the First Cause was intelligent, whatever the intermediate steps of causation.

The morphological argument may, then, be thus generalized : When anything whatever is found to be so arranged as to express or embody an idea, the presumption is that the arrangement was made by an intelligent will ; and this presumption increases in strength with the complication of the arrangement, the complexity of the idea, and the fidelity of the arrangement to the idea ; increases with such rapidity that a very moderate degree of complexity and of fidelity makes the presumption become a certainty.

The teleological argument is drawn from marks of a design

beyond that of the expression of the idea, a design to effect an end. The world not only expresses the thoughts of the creative intelligence, but accomplishes the results that daily come to pass, so that there is an adaptation of means to ends everywhere visible. Theological thinkers, from at least the times of Socrates, have quoted these adaptations as illustrations of the divine wisdom. But the argument has been objected to, from the religious as well as the irreligious side, as irreverently likening the action of the Infinite God to the contrivances of men.

Yet when anything subserves a purpose, the presumption is that it was made for that purpose; and this presumption is stronger in proportion to the complication of the instrument or means, the complexity of the purpose, and the completeness of the adaptation to subserve the purpose; the presumption increasing so rapidly that with moderate complexity and completeness of adaptation the presumption becomes a certainty. Nor is there any valid objection to applying this argument to organic structures. Take, for illustration, Socrates' example, the human eye. Consider the sensitiveness of the retina, the transparency of the humors, the automatic variation of the pupil; the muscles and pulleys of various kinds; the protection by lids, lashes, and brows; the fountains for washing, the sewers for drainage; the use of the lid to wipe it; the excellence of the lenses, the approximate achromatism, the adjustable focal length, the stereoscopic effect of the binocular arrangement. As we run over this complicated series of the adaptations of the eye to sight, the presumption that eyes were made for seeing becomes an absolute certainty.

But the French encyclopedists answer: No, they were not made at all, they grew. And the men of the present day undertake to tell us how they grew; how the sensitiveness to light diffused over the whole surface of the zoöphyte, being a little more concentrated in spots upon some individuals gave them an advantage in seeking prey or avoiding danger, and thus, by natural selection, favored those that

tended to have eyes, and to multiply them, and this process after millions of repetitions gradually formed the perfected human eye. If these dreamy speculations were as true, as they seem to me false; if they were as well founded, as they seem to me absolutely baseless; they would not confute the teleological argument. Such a process of developments could not take place by chance; the result of the process is such as to show that intelligence presided over every step, whatever the steps may have been, and howsoever numerous.

The encyclopedists accused the theists of *petitio principii*, of assuming that the eye was made, and arguing from the manner of its making. To us it rather seems the encyclopedists begged the question, assuming that growth is not a building. In our judgment growth is a building. Men work with masses of finite size, nature works with infinitesimal bricks. When the sun,

infusing subtile heats,
Turns the sod to violets,

he makes himself a servant to the violet, who shows him where to deposite each atom of matter, so as to build the spade-shaped leaf, and the blue corolla, and the odorous nectar, while the sun complacently obeys. He that thinks to rob this process of its mystery by calling it simply growth, deceives himself with a word. Vegetable growth is the building up, and keeping in repair, by the blind forces of the sunbeam, of a complicated, but symmetrical, house for a plant to dwell in. Animal growth is building up, and keeping in repair, by the same forces, procured at second hand, through the destruction of plants, of a still more exquisite house for an animal to live in. The chemical forces have no choice in building a man or a zoöphyte; nor can they be guided by any merely mechanical pattern. In the ovule and in the ovum is contained what the highest microscopic power regards as a homogeneous fluid. Upon the outer wall of the sack containing it, comes another smaller sack, and rests there. The fluids in these two sacks probably intermix by endosmosis. But the matter thus received into the ovule or the ovum is

an infinitesimal amount of fluid, conveyed by filtration through two filters, each infinitely close in texture. Yet it distinctly modifies the form, coloring, size, and hardihood, of the organization that springs from the germ; and in the case of the animal determines, sometimes completely, the mental and moral character of the offspring. These effects can scarcely be imagined as the result of any merely physical properties in that minute drop of filtered liquid. The life of the body does not depend on the organization, but the organization on the life. The building of the body is the work of thought, which was originally conscious thought, even if now exercised by an unconscious soul.

But we are sometimes warned from teleological arguments, on very different grounds. We are told that if we argue divine benevolence and wisdom from natural adaptations, we should also argue malevolence and folly when things go amiss. We are warned that the moment a scientific man speaks of the purposes of creation, he has stepped out of his sphere, and is no longer to be trusted. These warnings come from a mistaken view of the subject. When an anatomist, convinced by the irresistible logic of facts, believes that the eye was made for seeing, he does not assume any knowledge of the divine purposes above what is revealed equally to all observers. He does not, therefore, by his religious inference, betray any self-conceit, or any bias that would bend facts to his fancy; he merely takes the position of Galen, of Cuvier, and of Agassiz. These men were aided to their great scientific discoveries by their theistic postulates; and the belief in theism cannot, therefore, be fatal to scientific accuracy and research. And as for arguing the divine malevolence from suffering, as readily as the divine benevolence from happiness, the assertion will not bear a moment's examination; the only logical inference on the teleologic ground would be that suffering is appointed by Infinite Love and Wisdom as a means to some higher good.

Persons of strong religious faith very often object to hearing any argument from final causes, because they deem it

derogatory to the dignity of faith, to suppose that she needs the aid of sight or logic; they also speak of the argument from design as implying that the Deity found difficulties, and contrived ways to evade them. The argument is thus trebly offensive to them; affronting faith, likening God to man, and forgetting his infinity. To which we would reply: that no teleologic argument is intended to verify, much less to supplant, the intuitions of faith, but as an independent source of religious knowledge, greatly strengthening and comforting souls deficient in those intuitions; nor does the argument liken the Deity to man, any more than any ascription of wisdom and love to him. All devout recognition of the being of God calls him wise and good. But what can I mean by calling him wise, if I am not permitted to recognize his wisdom in the perfect adaptation, throughout the universe, of means to ends; if I am not permitted to trace, in the countless evolutions of nature, the development of ideas? What can I mean by calling him good, if I am not permitted to recognize his beneficent purposes, and show to myself how marvellously all things unite in contributing to the welfare, the happiness, the instruction, the improvement of mankind? If some men find their adoration of the Infinite God grow more humble and more devout as they thus enjoy what they regard the highest privilege of their intellectual nature, in tracing the thoughts and purposes of God, then it ought not to be called an irreligious or irreverent work.

To say that the teleologic argument degrades the Infinite by assigning to it finite thoughts and purposes, is simply to fall into the vice of arguing from the Infinite. We are told that to say that he made the ear for hearing, the eye for seeing, is limiting the action of the Infinite in space and time; whereas the Infinite can act only throughout all space and all eternity at once. Now this objection does the very thing it falsely accuses the teleologic argument of doing: it limits and debars the Infinite from a possible mode of action; and from a mode which does not imply finitude in the actor. It is the objectors mere assumption that the teleologic argument

limits the action of the Infinite to the particular case before us. The inference that eyes were made for seeing does not involve the inference that eyes were made by a special or finite action. It only implies that if eyes were made by general laws, the Author of those laws foresaw and intended eyes to result; which is far from inconsistent with faith in the omniscience of the Deity.

If we were going to argue from infinity at all, a sounder line of argument would tend rather to justify teleologic arguments under one grand conception of predestination. For a law of nature is a thought, in conformity to which a multitude of particulars have been created and arranged; and it thus implies, not only a knowledge of the whole, but of each particular result of the general law. There is, therefore, no *a priori* reason why we should attempt to resist the strong presumption, the certainty, arising from morphological and teleological arguments. The human face is, perhaps, the most familiar object of sight that greets our eyes. For this reason we see suggestions of it in every object of varied outline, rocky cliffs, summer clouds, double flowers, coals upon the hearth, shadows from the firelight, etc. Yet if the suggestion merges into a faithful and spirited copy; if the anatomical detail of every part becomes approximately perfect, and the expression strongly human, we have a certainty that art has interfered, and that we are not looking at the creation of chance. When a piece of Grecian statuary is recovered from the bed of the Tiber there is no suspicion that it is a stalagmite from Antiparos. And if there be any doubt about this argument, arising from the fact that the statue is a copy of a work of nature, consider instead, a sonata or a symphony. This is not a copy of nature; but the perfection of its rhythmic symmetry and its aesthetic expression stamp it as infallibly the work of mind.

A French atheist is reported to have said: "Chance can do anything, if you only give it chances enough;" and added that, "with an infinite number of throws he could throw the Greek alphabet into the Iliad." For, he seemed to imply,

from an infinite number of throws, there results an infinite number of positions ; therefore all positions ; therefore the position in which the letters stand in the Iliad. But the first axiom is wrong ; an infinite number of throws will not give an infinite number of positions ; and the inferences are wrong ; the infinite number of positions would not give all positions. Give Diderot a selection of only those particular letters which are in the Iliad, and let him throw with inconceivable rapidity to all eternity, each throw would produce only a confused jumble of letters, without ever producing orderly sentences. Now in the book of the Cosmos, there are not only orderly and intelligible sentences, but it is all in order, there is no jumble ; and it is more impossible to imagine it springing from chance, than to imagine the Iliad thrown from a dice box ; or Beethoven's *Christus am Oehlberg* produced by a dance of cats upon the keyboard.

The teleologic argument in its narrower sense is equally strong. When in the excavations at Pompeii, or at Jerusalem or on the Euphrates, a house is uncovered filled with conveniences and tools of various kinds, it is absolutely impossible for a sane mind to entertain the question whether this is the work of intelligent skill ; we know it as we know our own existence. There is no simply intellectual or logical reason why our certainty should not be as great at finding ourselves in this house of the world, filled as it is with every conceivable convenience for us, and furnished with admirable tools wherewith to accomplish our work. Run rapidly, with the mind's eye, over some of these materials ; the metals, minerals, stones, rock-oil, coals, water, air, gases, all adapted to our needs ; sand, lime, clay, marbles, granites, sandstones, with various utilities ; the sun's light, heat, and actinic power, in his rays, and stored in the beds of coal and petroleum ; oceans, rivers, rains, and dews ; the plants and animals in their relation to us ; the human frame and its capacities for delicate operations ; consider all this adaptation ; not a thing out of place, not a thing ill adapted ; all, as far as we can discover, fitted perfectly for some end with infinite wisdom.

How can we resist the conclusion that it was by infinite wisdom? How can we resist the conclusion that the wonderfully complicated adaptation of so many means to these varied ends, keeping up the beautiful rhythmic succession of forms in plants and animals from generation to generation, is from the presence and guidance of Intelligent Thought?

The only reasons for dissatisfaction with the argument are moral, not intellectual. Logically the teleologic argument, like the morphologic, is impregnable; it is one of those cases, as satisfactory as any demonstration, in which the induction converges so rapidly towards certainty, as to produce justly the sense of certainty. The convergence in this case is manifold; the argument is drawn from an uncounted number of cases, each offering adaptations of great complexity and great perfection. The cases are also indefinitely varied in character; some referring to mechanical, some to chemical, to physiological, some even to intellectual and to moral ends, such as the education and refinement of man, and all these varied ends accomplished by a complex arrangement of well-adapted means. Such a convergence of numerous lines of the highest possible inductive proof can be brought for no other truth. Nor must we forget that, in regard to mechanical ends, the mathematician can frequently give *a priori* demonstrations that the means are the best possible. Thus it may be demonstrated that a division of the circumference in extreme and mean ratio, gives to the leaves of plants the fairest possible law of access to air and light; and gives to the planets the fairest possible chance of revolving around the sun undisturbed by their neighbors.

Logically the arguments from the external world are unassailable, and the being of an intelligent God is proved by an induction far stronger than that which sustains the law of gravitation or the correlation of forces. The lack of earnest conviction arises from moral causes, which may, perhaps, be classed under three heads: First, there is an illusion arising from the absence of any chaos to contrast with the Cosmos. The universal prevalence everywhere of this perfect harmony

and adaptation of part to part, produces the feeling that there must be a necessity for it. Men are like children, accustomed from birth to the luxuries of their father's house, until they think them things of course, and forget their obligation to his care and forethought in providing them. Secondly, there is in many hearts, undoubtedly, a sense of guilt, generating a half-unconscious fear; and that producing a willingness to find the proof of the existence of a righteous God defective. Even where the alienation from God is not sufficient to produce this reluctance to be convinced, it may be sufficient to produce exclusive devotion to other lines of thought, and consequent failure to appreciate the argument. But, thirdly, there are causes of dissatisfaction with the arguments of Paley, of the Bridgewater Treatises, and the Graham Lectures, more creditable to a Christian community. With some there is a strength of religious faith, springing from direct intuitions, that lays hold of God so firmly as to need no support of consciously drawn inferences; with others there is an intense longing for assurance, a quivering, trembling, burning hope, which fears that, perhaps, so ineffably precious a doctrine as the presence of a God of infinite wisdom and love, caring not only for all, but for each, of his children cannot be true. Would that these timid, longing, loving, souls could attain to our conviction, that the presence of such a Father is demonstrated by every possibility of argument; and that the language of Herbert Spencer concerning the existence of an ultimate cause may be justly used concerning the existence of God in the highest, the holiest, the most loving and tender sense, in which the happiest experience of a soul reconciled by Christ and sanctified by the Spirit can speak of him; namely, that we have a higher warrant for believing in God than for believing in any other truth whatever.