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A table of contents for *Bibliotheca Sacra* can be found here:

https://biblicalstudies.org.uk/articles_bib-sacra_01.php

tion. But the chief advantage of this study I would seek in its moral effect, that there may be awakened in the youth a reverence for the world of mind which is stamped on the monuments of ancient and modern times, and a desire to obtain possession of this wealth ; that this desire may spring up as a germ, to find in more mature years full satisfaction.

ARTICLE VI.

CAUSE AND EFFECT.

BY REV. JOHN BASCOM, PROFESSOR IN WILLIAMS COLLEGE.

It is not uncommon in philosophy to build structures on foundations whose existence is denied. His action, who, mounted on a pyramid of boxes, requested his companion to pluck away the first and pass it up, that he might by means of it climb higher, though too coarse a joke for practical life, is often realized with the more subtle, illusory supports of metaphysics. The juggler, at the end of a surprising performance, shows his hands still tied as satisfactory proof that he has had no part in it ; yet remove him bodily and his tricks are sure to go with him. Many a fine-spun philosophical theory is indebted for its very existence to faculties whose function and office it is its chief business to disprove. Bind the mental powers beyond escape that have played an unobserved part in the construction of these hypotheses, and they would lose all coherence and firmness, and pass from sight like vapor.

The illustration of this class of theories which we have more particularly in mind, is that which denies the validity of the notion of cause and effect ; which regards it as merely the unverified force assumed in explanation of the observed fact of stated antecedents. Sequence is all that is seen, all that is known, and any notion of a necessary link between

the consequent and the antecedent, a dependence on the one upon the other, is a mere notion arising in the mind as something beyond what it knows—a fictitious solution which it gives to phenomena in themselves naked and void of the idea. This denial is most essential and central to idealism, and leads to those other denials which so completely divorce this philosophy from common experience, sympathy, and even comprehension. This school of metaphysicians emasculate knowledge at once by this rejection of the primary nexus of things. They may go on with Mill to construct a logic of the inductive sciences; yet these sciences will owe their entire interest and growth to the discarded idea of cause and effect, to a belief in forces that may be known, and whose action may be duly experienced. They may proceed with Herbert Spencer to give first principles, to treat psychology and biology, and still their language will be dripping full of the rejected notion of efficient forces. It is superfluous to give passages from writers of this class implying this idea of force, when their entire works, with the exception of a few eccentric and guarded definitions, are filled with them; when it is impossible for them to use current or to invent and steadily employ a new speech excluding the speech notion of causation.

We may define matter as “the permanent possibility of certain phenomena,” but we shall never handle it, use it, scientifically investigate and discuss it, without regarding it as in the exercise of forces which produce these phenomena, without distinguishing between effects and their causes, between sensations and that which occasions them. Take from thought, these, its habitual forms of discrimination, and how instantly would all its subject-matter fall together, collapse into chaos, the waters above and below the firmament rushing again to each other’s embrace, surging confusedly and wildly, with no lines or currents of forces, and, hence, with no distinctions by which the mind could grasp and understand the scene before it! We may define mind as “a series of phenomena in consciousness,” but the moment we

discuss these phenomena, and combine them into a science, we shall do so by virtue of a permanent interior nexus between them all; we shall think of them as faculties and capacities, the power of something to act and to suffer action. Responsibility, merit, guilt, growth, retrogression, attention, recollection, will all instantly and necessarily cause to appear in our philosophy the idea of an agent whose conditions and acts these are. Forbid us this, and our philosophy flutters a little in a few faint definitions, and then either falls, or surreptitiously slips its wings from their confinement, and soars, forgetful with what it soars. So, too, we may in the frenzy of speculation arrive with Spencer at this definition of life: "A continuous adjustment of internal relations to external relations," thus looking at what life does, not at what life is. But this definition will not prevent our speaking a little later of "the connection of cause and effect," our "ascribing results to a play of forces," our adding "to assert otherwise is to assert that there can be an effect without a cause, which is to deny the persistence of force." Science is indeed impossible without the practical recognition of the notion of cause and effect, involving, as it does, that of force. Put in its place that of a fixed sequence, and the calculations of mechanics would rest on a pure fiction; equally would those of natural philosophy be resolved into mere phantoms, shadows of the mind. Astronomy, hydraulics, optics, accoustics, would present no forces, and hence no opportunity for marking the laws of their action. The permanence and transmutations of the power expressed in heat, light, electricity, chemical, mechanical action, would become a delusion. All that would remain to science would be the statics of the world, to mark position in space and time, and external resemblances, while dynamics, — movements, events, and dependences, — as implying occult and denied causes, would be removed beyond its pale. There would be no opportunity to distinguish between conditions and causes, between accidental accompaniments of force and its true exponents. The only query would be the constancy of connections, and this,

not as indicating dependence, but as a mere statement of facts. It is impossible at once to conceive how utterly dissolved and lost thought would be by the practical acceptance of such an hypothesis. A shadow flits on the ground before us ; we may not ascribe it to the flight of the bird in the air above. We suffer from a sudden fall ; the connection is merely one of time. We send an invitation to our neighbor, and he responds to it ; there is, however, no connection between the two events. The link is everywhere lost, and there is no more intrinsic relation in one line of events than another. Iron is not stronger than clay ; the sensations which suggest the metal happen to be accompanied by those which suggest strength.

To proceed, then, in an investigation of the inductive sciences while denying the validity of the notion of cause and effect, is to substitute the tricks of a metaphysical juggler for open, sincere effort ; is to affirm the value of results reached by faculties whose existence or truthfulness has been denied.

The nature, office, and limits of this important, regulative idea, of which all make use, though many deny its validity, we propose to discuss.

The nature of a cause is essentially that of force. Whenever we observe phenomena we inevitably regard them as effects ; that is, as occasioned by something unseen, unheard, unfelt, back of them. Our idea is never exhausted by what is actually lodged in the organ of sense. This is the ground of a further and inevitable conclusion to something which has not itself appeared in sensation, but still beyond and out of the organ, has occasioned the feeling in it. These forces, these causes, are always present, yet always deeper, more central, than the phenomena under which they lie. Of these we never have a direct knowledge. We are immediately cognizant of effects, not of causes. A cause in order to be known must affect an organ, and this effect is not identical with the cause. The sensation is not the very object of perception, but that by which we reach an external cause

not in itself cognizable by sensation. Now, though the same thing is at once cause and effect,—an effect as related to what precedes it, a cause, as to what succeeds it—it does not thence follow that we know it as a cause. Suspend a series of ivory balls in contact, and midway in that series remove one, leaving a vacancy. Now let the outer one be dropped against its fellow; in its motion we see the effects of the force of gravitation, not the force itself. The power passing unobserved through several balls, reaches the one next the vacancy. This swings across it, and transfers the force into the last half of the series. The motion across the interval is an effect in reference to the force entering the ball, and a cause as transmitting that force to the next ball in the series. Now the transfer of force, that by which it is a cause, cannot be seen, while the motion, that by which it is an effect, is visible. Thus under all effects runs a stream of causes, as below the surface of the muddy water pours on the unseen volume of the river.

Some may claim a direct cognition of force in volition. We are conscious of volition, a mental act, but not of the force let slip thereby to play on the physical mechanism of nerves and muscles. The sensations occasioned by this force may appear in consciousness, and we be able distinctly to mark the series of effects which attend its progress, but the force itself, aside from these, its continuous results, we know not. We may observe the path of the electric current by the trail of light it leaves behind; but the very force is no more observed than when it steals along in darkness. Indeed, we cannot always tell whether the volition, however intense it may be, will be followed by the proposed movement. Some paralysis may have intervened, and our effort is a mere experiment, to see whether the hidden connection is restored. So, too, we are conscious of tense, strained muscles in resisting pressure, but not of the opposing force, otherwise than as drawing forth this exertion, and procuring the accompanying sensations. Indeed, volition, sensations, are the limits of our direct knowledge; these alone enter consciousness;

but these are not the force, but the traces and conditions of the force. A philosophy receiving the notion of cause and effect believes in a more hidden, central power connecting these, and rising into consciousness only indirectly, inferentially, through them. Simple sensation is not a thing to be understood without some force occasioning it, and pure force is not a thing to be known, felt, save as it gives rise to a sensation. A surface cannot exist without a body; but the surface hides the body which gives rise to it. Effects cannot exist without causes; but they conceal the causes they express. They are the film for the senses, for sight, touch, and taste, left behind, or rather thrown up and out, in the flow of the true dynamic powers of the world.

Herein we do not recognize the correctness of those who, with Sir William Hamilton, claim an immediate knowledge of matter. Indeed, few philosophers who have recognized intuitive ideas have put them to so little service, have so failed to develop their office, have been so frequently embarrassed by the want of them, or resorted to such poor subterfuges to escape them, as Hamilton. He would displace this fundamental idea of cause and effect by the weakness of the mind, its inability to conceive a beginning or an end, and hence its tendency always to place something before the first and after the last thing. This very inability is itself due to the presence of the notion under discussion, and here again the phenomena resulting from a power are made to discredit the power itself.

We pass the many points of controversy involved in what has been already said, hoping best to meet them by displacement, by constructing and presenting a philosophy strong in itself. The proof of the validity of the original intuitive character of this notion of cause and effect is that relied on for this whole class of ideas, and in this case especially clear, the instantaneous, universal, and inevitable way in which the mind always interjects the notion as a link between consecutive phenomena. No greater and more destructive change could take place in all language and thought, philo-

sophical and common, than this of reducing sequences to a mere connection of time. This hidden framework of force which the mind supplies, which it hides under and in matter, thoughts, events, is the universe as we conceive it. Without it, all is resolved into a wreath of smoke. Even by the criterion of truth proposed by Spencer, that the judgment which returns the most often is the one most to be believed, none can be stronger, more truthful, than this of causation. It accompanies and interprets every event of life, every theory of science, and gives even to fiction its coherence. If, then, a conclusion so constant and universal is yet without foundation, the mind in making this assertion destroys its power of judgment, since no judgment can be more firm or constant in the thoughts of men than the one denied. If I am not to seek for causes, I have cut the thread of the labyrinth of physical phenomena, and may as well go in one direction as another, and whithersoever I go, I can reach no conclusion so strong as the one my scepticism has just snapped asunder. But if this notion is reached at all, it must be reached directly, intuitively. This fact, those who ground knowledge on experience seem generally to acknowledge, by so framing their definitions of matter and mind as to escape its recognition.

Without dwelling longer on the source of the idea, we proceed to point out what it involves, and the office it performs. The notion of causation is briefly expressed in the proposition, that every effect must have a cause. Herein is contained the assertion, that the cause is exactly commensurate with the effect, for if not, some part of the effect is without a cause. The effect, that is, the entire effect, is also the precise equivalent of the cause; were it not, some portions of the force would have been lost, that is, ceased to exist, and that, too, without any phenomena. To assert that this part of the force ever existed would be a judgment without a reason, a conclusion without a premise, since we have no phenomena whatever on which to base our predication. The sameness of forces in their results, that each cause must

in each of several cases be followed by like results, that is, the general uniformity of nature, is also deducible from the above statement of causation. If the same cause is followed by different results in different cases, this change of effects would be without a cause, and the original idea therein violated. Diversity of results implies diversity of causes, and we do not anticipate change, therefore, except as we see reasons for change in a change of causes. The permanence of forces would also seem to be involved in this first axiom of the mind, since the entire force passes without gain or loss into the effect. How far the flow can be reversed, and under what circumstances the force expressed in the effect can return and be re-expressed in the cause, is a matter of experience, and not of *a priori* judgment; exactly as what the given effects of any cause shall be is learned by observation, and not by any intuitive knowledge of the force concerned. This is not directly cognized in its existence or in any of its transitions; it itself is always a matter of inference, and is only known through its effects. The initial starting-points of all things are invisible and intangible, reached by the mind, and not by the senses. The very first phenomena, those with which our senses begin, come to us as a result, a consequent and not an antecedent, an index of something deeper than themselves.

We now turn to the office of this regulative idea, and begin with its chief field, the external, physical world. It is by it that we arrive at matter. All the ingenuity of Hamilton fails to show that we know matter; indeed, the doctrine involves him in contradictions and inextricable confusion. The sensation does not go beyond itself, its own content, the effect on its own receptive surface. Nothing could be well more unintelligible and inconceivable than to suppose this, as has generally been felt. Nothing but a desire to establish the existence of matter in connection with a failure to recognize those ideas on which the proof rests, ever led to the assertion of a direct perception of matter as matter, a statement that is virtually taken back by other doctrines of those

who seem to hold it. A simple sensation is the merest starting-point of knowledge. It exists in very low, if not the lowest, forms of animal life. To transform these sensations into judgments is quite a different thing from experiencing them. A judgment must have two members, and both of them cannot be sensations. Two sensations cannot of themselves coalesce in a judgment. Judging is a deeper, more interior, more intellectual act than simple feeling, belonging to a clam as well as to man. Something must be affirmed of the sensations, some dependence or relation between them, and this something does not come from the sensations, but is brought to them from the mind. A single sensation gives an occasion to rational powers for judgment; first, that it itself is; second, that the person experiencing it is; third, that the object occasioning it is. In forming these propositions, the mind brings forward two regulative ideas, that of existence, and that of cause and effect. Without these notions the conclusions cannot be reached; with them they must be reached. The existence, then, of matter as an external cause of sensations, is a simple, direct, inevitable inference, which the mind makes in virtue of its own comprehending, rationalizing power. It thus ceases to move blindly, instinctively, under sensations as simple effects on itself, but takes up into the light of a reasoning mind the notion of things and of their relations.

The only difference, then, between sensations and perceptions is, that the last are crowded with judgments, while the first are naked phenomena. Nor ought it to surprise us that the first and simplest sensation instantly weds itself to an inference, when our later sensations, like those of sight, are full of instantaneous and unconscious judgments, by which the size, form, and position of surrounding objects are explained to us. If we can at once convert a plain surface, like that of an engraving, into all the innumerable and complex relations of a landscape, and yet not be aware of the process, much more may we enclose in the sense of touch, the simple judgment of an external cause, and still overlook

the mind's action therein. On this instant, inevitable inference we believe the proof of the existence of matter to rest, and to rest as securely as if the eye saw it, or the ear heard it, or the hand felt it. Sensation is but the testimony of a faculty, and this unequivocal, constant, reiterated assertion of the mind itself is nothing less.

One of the distinctions of the qualities of matter much insisted on, and made by Hamilton to assume new importance, is that between primary and secondary qualities. The first are those without which matter cannot exist; the second, its variable attributes. Hamilton also adds, as another distinction, that the first are objects of sensation, the second of perception. If we apply as above the notion of cause and effect, this second distinction at once disappears, since all attributes or forces of matter are objects of inference, that is, of perception. We believe, also, that there is no ground for the first distinction. The qualities usually given as primary, are extension and solidity. Now extension in the abstract does not belong to matter. If it is regarded at all as a quality of matter, it can only be so in some specific, ever-varying, concrete form. Extension as a quality of a rock before me is not the same as that which belongs to the fragment in my hand. Extension in the abstract is not a quality of anything; for an abstract quality, that it may be abstract, is distinguished from every special manifestation of it. The ball has a certain extension, and certainly no other extension as a quality can be affirmed of it. But this extension which belongs to it cannot, if we accept it as a quality, meet the criterion of primary qualities, that they are necessary to the very existence of matter. The ball might be larger or smaller and still retain its being. But we think that use of language bad and deceptive which speaks of extension as an attribute of matter. It is no more so than time. Why do we not enumerate duration as well as extension among primary qualities, since some portion of time, equally with some part of space, is a condition of the existence of anything? The relation which duration and

extension actually sustain to matter is that of conditions of its existence, not qualities. The qualities of matter, whatever in any given case they may be—and no one collection or bundle of them is necessary as opposed to any other collection or bundle,—require as the antecedent condition of their manifestation both space and time. The actual parts of these in any given case occupied are the extension and duration of the thing considered—relations incident to the manifestation of its qualities, but not the very qualities themselves, nor any portion of them. Eighty cubical inches are not an attribute of the book before me, but extension to that degree is a condition of the manifestation of its attributes, precisely as fifty or one hundred years duration, more or less, are also a condition. The regulative idea of space is disguised under the term “extension,” and then referred as a quality to matter, whereas extension, a portion of space, cannot be understood without a prior notion of space, and this constitutes a general condition for all existence.

We will simply add in passing, to prevent confusion, that it has recently been asserted in an able Article in the North American Review that we cannot speak of a portion of space. This we suppose to be true, only as we unite another idea with that of space, namely, that of the infinite. We cannot with propriety talk of a part of infinite space, since a part implies a measured whole, and a whole contradicts the idea of the infinite. This fact, however, does not prevent our employing, with significance and propriety, the term “extension,” meaning thereby an area of two or three dimensions in space. Contradiction and confusion creep into language only when such an area is spoken of as a part of space in such a way as to involve the inference of a limited whole.

Passing to the second primary quality of matter, solidity, we find it open to much the same kind of criticism. The solidity of steel and air are very different; there is a force of resistance, but a very diverse force, in each. The precise power of steel is the quality of steel, and this in kind is not requisite to the existence of matter, but only to that particu-

lar form of matter known as steel. The abstract quality known as solidity, and supposed to be ever necessary for matter, is in fact found in no one thing, but only some measure of force, some degree of resistance, not necessary to all things, but peculiar to the thing considered. Here, again, a regulative idea has been turned from its precise office, and been attributed to matter. The idea of a cause and of a force are the same. We know both and either only as the active agent of changes, of effects. But the notion of a resisting force is that of solidity. We attribute solidity to matter, only because it develops under pressure the power or force of resistance. We must remember that solidity as a primary quality of matter is an ambiguous word, that it is not opposed to fluidity, but to what may be called compressibility. A body when confined that it may be a body, must show some measure of incompressibility. The piston must not sink in the cylinder containing it without resistance. Now this force of resistance, some measure of which must belong to all matter, that it may show itself as matter, is an inference under the idea of causation, is supplied by the mind as the source or cause of those permanent phenomena which belong to matter. It is not, therefore, so much a quality of matter—one among the many effects produced by matter, and lodged as sensations in some of our various organs—as it is matter itself, inferred from the qualities we have observed. We give more prominence to this notion of resistance because it responds to our last and most scrutinizing search after the subtler forms of matter. We may infer a force equally from sight, hearing, smell, taste, but these being intermittent phenomena, depending on the presence of certain conditions, do not serve as final tests of the presence of matter. The force of resistance, however, we should remember, is not a matter of sensation, nor frequently even directly inferable from sensation. Solidity, as opposed to perfect fluidity, we test at once by the muscular sense, but the gases offer no resistance till closely imprisoned, and then not to the hand, except through a sliding-plate or

piston-head. Their resistance, then, is most manifestly inferred through a series of phenomena in which sight and muscular effort take part, and many judgments are involved. It is plainly absurd, then, in this case to say with Hamilton, that primary qualities are directly known by sensation.

The true statement we deem to be this: that under the notion of cause and effect, the condition of matter is a force, and the conditions of a force are space and time. Dr. Hickok's definition of matter, that it is a space-filling force, arises under a rigorous and correct use of regulative ideas. As the notion of causation leads us to the idea of matter, it would seem alone capable of guiding us to a conception of its nature. All that we know of it in itself is, that it is the source of our sensations; and as these imply the action of force or forces upon us, that matter is the permanent centre or source of these forces. We are herein guided to a notion of matter which makes it active rather than passive, a perpetual exertion of power. As in the explanation of mental action, we have been misled by the analogies of matter, so in this instance our conception of physical existence has been unfavorably affected by our knowledge of mental states. In these, as far as the will and the mental, muscular action consequent thereon are concerned, there is a series of active and passive states. Repose, a relatively passive condition, seems to be that into which our activities are constantly lapsing, constantly returning. It is to this condition of rest, revealed in consciousness, that we are disposed to resemble the states of matter; and its mere existence therefore does not impress us with a sense of power: A steam-engine in full operation, strained to its utmost limit, the steam hissing with serpent tongue from every crevice, gives an impression of great forces, yet these forces were just as truly in the iron and the brass, just as active there before they were subjected to this strain as after. Matter presents the equilibrium of intense action; it is the interlock of tremendous powers, and a conception of causes, arrived at legitimately in sole and single view of the effects which express them, would lead us

to conceive matter as a permanent putting forth of unmeasurable power. We need force, great force, and nothing but force, to explain the phenomena of the external world, its gravitation, cohesion, chemical affinities, thermal effects. Whatever other conception we strive to form of matter, we must from it develop these forces, and find no use for anything beyond them. Hence the necessary, and no more than necessary, notion of matter, is that of force or forces in the constant creation of its phenomena.

We have dwelt on this idea of matter as developed by causation, because it has important bearings on philosophical problems. Martineau, one of the ablest of the intuitive school, suggests that matter in its primary qualities may be eternal, and that the wisdom and government of God are shown in its secondary qualities, and in its arrangements. We remember also, that from Plato down, the eternity of matter has often seemed an admissible concession. Under the notion of causation we believe it to be wholly and absolutely inadmissible, and that such a surrender would ultimately bring with it the entire independence and self-existence of the physical universe. How the primary qualities of matter, so-called, can exist without the secondary, is certainly a mystery; and if we accept what has been said above, that primary qualities merely mark the general conditions of every form of actual matter, that they should so exist we shall regard an impossibility. We must have concrete, actual matter or nothing, and whatever the form of this matter — solid, liquid, gaseous, or more elementary than anything yet known — it must still possess forces, and these must have their laws, and therein the seed-germ of the universe may be found independently of God. Matter can mean nothing without the qualities of matter, and these qualities are the expression of forces, and these forces, as now locked in the various kinds of matter, are able under their own laws to initiate a universe. If, therefore, matter itself does not require a God, what in the physical creation does require him? Must we be left to the establishment of special providences in order to prove the being of a God?

We need to rid the mind of two notions resting on analogies taken from our own action; that matter is passive, inert, able of itself to be and be forever, — something requiring no explanation; and that God needs something to work with, to work on, and that matter, therefore, is a necessary condition of his activity. If matter does involve an instant and constant expenditure of power, then, above all things, it demands an explanation and source — some being on whom the force can rest back, by whom it can be renewed. If matter in its qualities, forces, involves order, — measured, systematic, related action; if it holds inlocked a physical universe, then, does this thought, this wisdom, uttered in and through matter itself, springing from it centrally, rather than laid upon it outwardly, require explanation, and bear back the mind to a personal, intelligent being, the seat of this reason, the source of the wise way in which these forces are matched one against another, are bound one with another.

Equally also do we need to correct the second anthropomorphic notion, that God requires something on which to work. This something must have forces, or it would be nothing, and these forces must have a law of action, steady existence, or it would be worse than nothing; and yet so existing and present to the creative hand, it could only be acted on externally, mechanically, as man builds a house of stone. If any new forces are to be added to this crude, original matter, the same power that could do this could have made them all. Thus we are forced to the conclusion, either that this universe whose life, whose laws are in itself, exists aside from God, — unless we except some external shaping which we nowhere find, and nowhere see to be necessary, — that it exists solely through and by God, his wisdom and power and providence interior to it. We cannot combine the two conceptions. The power by which he does a part enables him to do the whole, and compels us to assign the whole to him. A right conception of matter, resting on the notion of causation, we believe most necessary to the argument for the being of God.

There are also theories of life as well as cosmical theories whose fallacies are best seen in connection with causation.

We know causes only through effects; new effects, therefore, demand new, or at least modified causes, that is causes into which some new element enters. To ascribe new effects to old causes is unphilosophical, since such a reference leaves a portion of the phenomena unexplained, and just that portion which is of peculiar interest. The cohesive and crystalline, chemical and vital forces, are not identical, since their phenomena are not so, and there is no advance of knowledge in assigning the higher results to the lower cause, unless that new element or new condition of its action be pointed out, or at the least be fully admitted. Those generalizations which strive to pack and crowd phenomena into receptacles too small for them, to refer them to sources which hitherto and elsewhere exhibit no such results, retard rather than aid science. Doubtless chemical affinity has much to do with vital action, but it is not life, and cannot be made to cover its facts. At all events, till this is done, and chemical action is shown to be equivalent to vital action, a tacit denial of the latter in favor of the former is an ungrounded and delusive generalization. The newness in the effects demands, evinces, a like newness in the causes.

The theories of progressive development would signally fail of some of the purposes for which they are sought and used, if the notion of causation was held in rigid consistency. Spontaneous generation, so-called, if established, would either become a miracle, a case of present creation, or we should be forced to the less easy and natural conclusion, that certain elements of matter held in their original constitution a germ of life. If there appear in these sealed jars, from which all spores have been excluded, infusoria, this is an effect which must have a cause. It will not do by the term "spontaneous" to evade the task of assigning their cause. If there is here an uncaused event, the thread of science is cut, and may pull out through the whole fabric into which it has been so carefully woven by previous investigation. If, as the result

of research, we are at length to arrive at no cause, we might as well have started with no cause, and dismissed inquiry at the outset. We have climbed all the way by these rounds of causation, and now, if the ladder stops in mid-air, we are nowhere, and have our labor for our pains. Or, rather, as that on which we stand is no better than the thin air we grasp at, we ought to fall at once to the ground, and, bruised and confounded, deny the existence of science.

Which, then, of these two alternatives would science accept, if so-called spontaneous generation were established; instant creation, or the putting forth of a new force, lodged and latent from the beginning in matter? A new effect is here, and must have a new cause. We may refer it either to the immediate agency of God, or to his earlier agency; but to this, sooner or later, it must be traced. Those who wish him at the farthest remove, may inject all his works bodily between us and himself. To those who love his presence, it is as optional, as philosophically open, to refer the phenomena to his present agency.

Thus also is it with the later steps of a development theory. When a new effect is reached, this is to be explained, and must be explained, by immediate intervention, or by a final reference of the entire, completed results as potentially contained, to the very first of the series of causes. A change of external conditions cannot produce new forms of life, except as the plastic power, life, is such a cause in its first ordination and nature as to be able to concur with the appropriate circumstances in securing all those marvellous results about us. If this theory is thought the simpler and better—that every form of life was contained in the very first germ of life, perfectly enwrapped as in an adequate, an ample cause, a true cause,—very well. The marvel of God's workmanship is not made the less thereby. But do not let us think this, that we can cut away causes by small whittlings, and at length reach little or nothing as the source of all things. Possibly, we believe not, the organic universe admits of such compression that it can ultimately be squeezed into a cell-germ, but be-

yond this we cannot go. We cannot press it out of existence without destroying all our previous work. This germ must be, and must remain pregnant with the organic kingdoms, or the notion of causation is denied. We might as well strive to crowd matter by an hydraulic press into nonentity, as push causation out at the back door of the universe. If the thing pressed comes to nothing, the press itself must keep it company.

Nor can we any more destroy the plan of the universe, the idea of design in it, by the use of such phrases as "natural selection." We may adopt one or another explanation of the forces and order of the universe; these forces and that order are not annihilated by the theory, and must still be referred to adequate and appropriate causes. If we accept the cumbersome notion of progress—that each form of life varies at random, and that consequent varieties are saved and propagated according to their adaptations to the world, their intrinsic power of life under the circumstances, we have yet those chance varieties to account for, and also those circumstances which select the best. These are no more causeless than is the sieve which divides the chaff and the grain. The only difference between this and other theories lies in the directness of the processes involved, their probability and proof. The wisdom and causation are in the universe, and must be accounted for. One farmer fans his wheat in a mill, another may shake it in a pan, or pour it in water that the husks may rise, or drop it in the wind that they may be driven away; we may call the latter processes "natural selection" if we will, but they include design nevertheless. The more obviously would this be true, if the difference of weight, the water, and the wind were ordained by man.

These remote, secondary causes are subjected to a very heavy strain; cells, microscopic and indistinguishable, are made to develop, in a few months, forms of life most diverse and complicated—man in one direction, the fowl, the fish, or the quadruped in another. With what mighty energies are these mere specks of matter charged! What complicated

parts they are to unfold! What new forms of action to assume in different portions and stages of the process! A theory which finds, locked in this infinitesimal cell the whole man, his systems, organs, functions, nay more, perchance, a race, a nation, the inhabitants of a globe, that shall, in successive generations leap from this microcosm, carries to my mind great weight, yet does not, cannot, escape the necessity of complete, adequate causation. We would rather look on life as a subtile, invisible force, moulding the plastic material subject to it, but neither fully contained in or expressed by any or all of that material. It does not so well agree with our notion of causation that the acorn before us may produce a thousand bushels of acorns, each as complete, as powerful, as itself; that a thousand years from now its energies, its mechanical operations, expanded in vast forests, may be expressed in figures altogether beyond our apprehension. Think as we will about this, causation remains, and all effects are to be traced to their appropriate sources.

We now pass to the connection of causation with liberty. Liberty is approached long before it is reached. Causative force is communicated through a nervous system, though this is ultimately to be the instrument of volition. Simple, reflex action, by which a sensation reaches a nervous centre and returns as movement, is as strictly in the line of cause and effect as a telegraphic communication. Nor does the process seem to be modified in character when these ganglions, gathered into one and furnished with many and perfect senses, secure the connection by a conscious recognition of objects of desire. The rush of the animal towards its food is occasioned by subtler causes, but as truly caused as when he is pushed from it again by a stronger brute. Impressions which pass into consciousness, but execute themselves without the mediation of true volition, are no more free than the involuntary start or closing of the eye in presence of instant danger. Choice arrests sensations in consciousness, cuts them from their appropriate effects, and then takes up their line of action, or substitutes for it another, or withholds its

instruments from all effort. There is in a choice an acting from within on the nervous centre and system, and therein a true origination of movement. The causal chain starts with volition, and is arrested in its backward stretch by it. Sensations, feelings, are occasions, not causes of choice.

If it shall be shown that each thought, resolve, effort, liberates by destruction of nervous tissue just as much force as is used by it, nevertheless, the power to liberate and direct force remains with the will. The manufacturer dips his wheel into the stream, and thus gets force, but he employs that force for what purpose he chooses. The will plays upon the forces subject to it, but in the ways and for the ends it pleases. There is here no measurement of causes by effects. The volition does not, even for that time, measure or express the power lodged in the will. This might have issued in other directions, or more strongly in this direction. The will is not a cause receiving so much power and transmitting as much, but an independent source of movement, measured by the effects neither in the kind or degree of its force.

One other relation of this regulative idea is to God. The argument for a first cause is the one chiefly relied on to prove the divine existence. We believe this proof sound in substance, though not in form. To reach the divine architect we need other regulative ideas than that of causation. By this we can merely travel up and down in the world, not transcend it. When we weary of this, when the mind puts to itself the comprehensive inquiry, whence this universe as a whole, the idea of liberty and of the infinite come forward to make answer. Causation finds arrest in liberty, and a final arrest in an infinite spiritual personality. This motion, brought to the universe itself, gives the same complete explanation that a single cause does to a single effect. It is this idea that is intended by the language, a first-cause, and therefore, in substance; the proof is sound. In form it is false, since a true first-cause cannot be developed out of the idea of causation, and close analysis, therefore, will reveal the fallacies and inadequacy of the argument. Causation is

the regulative idea of physical science, but cannot transcend the world, or float itself in the upper atmosphere of our spiritual life. Here liberty holds sway, and thence lets drop its edicts on the forces beneath.

The creation of God is as diversified as the rational faculties that are to find play therein. The short, close, interlocked steps of reasoning are provided for. The earth is given us on which we may walk; that rings, if we strike it not too thoughtfully, solid beneath our feet; whose paths we can trace and retrace at our pleasure; that imparts through our senses an impression of actuality and debility which it is difficult to attach to the unseen. Here that which is most fixed, slow, and creeping in our endowments is disciplined. Causation, issuing from exact, immediate premises into exact, immediate conclusions, becomes the field of faculties which with microscopic observation push a slow, laborious, yet triumphant, way through the world. But the power to walk does not preclude the power to fly. Intuition and faith have also their element. They can strike an atmosphere felt, yet unseen. Freer connections, conclusions less closely girded in the premises, a spiritual life of more liberal possibilities, are open to them, escaping the steady, successive foot-falls in the sequence of purely physical events. God forbid that in our admiration of the certainty and success of lower faculties we should overlook or despise higher ones, not less just, though more rapid and grand in their movements.

The physical universe is a third thing between us and God, not, indeed, closing the direct path to himself, but lying to one side, as a common field in which we and he work together. Fixed causation enables us to do this, to calculate effects and graduate causes. Without this medium, any permanent communion and partnership with God would seem impossible. The finite, fixed, definite, are the conditions of our labor, and God here furnishes them. Relax the law of causation, and confusion, irresolution, unreliability enter. Make it more severe and extended, and opportunity,

responsibility, virtue, are proportionately lost. Make the dependence of effects on causes fixed and permanent, and faith, prayer, perish. God gives us what we must do, and yet leaves us what we may ask. He sends us into his field, but closes not his ear to the exigencies that arise there, stern exigencies that must be met on both sides with causation and liberty, with work and prayer, with forethought and faith.

Those who humble themselves to the world, measure themselves by it, suffer its forces to run through them, and flood their nobler nature, do, indeed, lose the power to tread the spiritual path to God, lose the ideas requisite for a true apprehension of him; but these forgotten keys are not the less in their bosom, though matter shut them round like dungeon walls. With a little penetration they may reach a stream of forces subtler than the effects they float; they may find these arrested, turned, impelled, by divine law; above all, they may experience that great need and yearning of their spirits for something stronger, higher, holier, than themselves, pushing them to the last interrogatory: Whence and why all this? But for one who uses the world as not abusing it, who is not smothered by it, who does not suffer its damps to extinguish the clear light within him, no nobler, more heroic discipline and growth can be conceived, than it affords. Rigor and clemency, discouragement and hope, defeat and victory, the natural and supernatural,—an upward way passing more and more into light and life, make it the fitting passage from sin to holiness, a seemly probation for one who is to win and establish a spiritual manhood, a manhood equally of faith as of action.

Wisdom is justified of her children.