Chapter V.

Of The Law Of Universal Causation.

§ 1. The phenomena of nature exist in two distinct relations to one another; that of simultaneity, and that of succession. Every phenomenon is related, in a uniform manner, to some phenomena that co-exist with it, and to some that have preceded and will follow it.

Of the uniformities which exist among synchronous phenomena, the most important, on every account, are the laws of number; and next to them those of space, or, in other words, of extension and figure. The laws of number are common to synchronous and successive phenomena. That two and two make four, is equally true whether the second two follow the first two or accompany them. It is as true of days and years as of feet and inches. The laws of extension and figure (in other words, the theorems of geometry, from its lowest to its highest branches) are, on the contrary, laws of simultaneous phenomena only. The various parts of space, and of the objects which are said to fill space, co-exist; and the unvarying laws which are the subject of the science of geometry, are an expression of the mode of their co-existence.

This is a class of laws, or in other words, of uniformities, for the comprehension and proof of which it is not necessary to suppose any lapse of time, any variety of facts or events succeeding one another. The propositions of geometry are independent of the succession of events. All things which possess extension, or, in other words, which fill space, are subject to geometrical laws. Possessing extension, they possess figure; possessing figure, they must possess some figure in particular, and have all the properties which geometry assigns to that figure. If one body be a sphere and another a cylinder, of equal height and diameter, the one will be exactly two-thirds of the other, let the nature and quality of the material be what it will. Again, each body, and each point of a body, must occupy some place or position among other bodies; and the position of two bodies relatively to each other, of whatever nature the bodies be, may be unerringly inferred from the position of each of them relatively to any third body.

In the laws of number, then, and in those of space, we recognize in the most unqualified manner, the rigorous universality of which we are in quest. Those laws have been in all ages the type of certainty, the standard of comparison for all inferior degrees of evidence. Their invariability is so perfect, that it renders us unable even to conceive any exception to them; and philosophers have been led, though (as I have endeavored to show) erroneously, to consider their evidence as lying not in experience, but in the original constitution of the intellect. If, therefore, from the laws of space and number, we were able to deduce uniformities of any other description, this would be conclusive evidence to us that those other uniformities possessed the same rigorous certainty. But this we can not do. From laws of space and number alone, nothing can be deduced but laws of space and number.

Of all truths relating to phenomena, the most valuable to us are those which relate to the order of their succession. On a knowledge of these is founded every reasonable anticipation of future facts, and whatever power we possess of influencing those facts to our advantage. Even the laws of geometry are chiefly of practical importance to us as being a portion of the premises from which the order of the succession of phenomena may be inferred. Inasmuch as the motion of bodies, the action of forces, and the propagation of influences of all sorts, take place in certain lines and over definite spaces, the properties of those lines and spaces are an important part of the laws to which those phenomena are themselves subject. Again, motions, forces, or other influences, and times, are numerable quantities; and the properties of number are applicable to them as to all other things. But though the laws of number and space are important elements in the ascertainment of uniformities of succession, they can do nothing toward it when taken by themselves. They can only be made instrumental to that purpose when we combine with them additional premises, expressive of uniformities of succession already known. By taking, for instance, as premises these propositions, that bodies acted upon by an instantaneous force move with uniform velocity in straight lines; that bodies acted upon by a continuous force move with accelerated velocity in straight lines; and that bodies acted upon by two forces in

different directions move in the diagonal of a parallelogram, whose sides represent the direction and quantity of those forces; we may by combining these truths with propositions relating to the properties of straight lines and of parallelograms (as that a triangle is half a parallelogram of the same base and altitude), deduce another important uniformity of succession, viz., that a body moving round a centre of force describes areas proportional to the times. But unless there had been laws of succession in our premises, there could have been no truths of succession in our conclusions. A similar remark might be extended to every other class of phenomena really peculiar; and, had it been attended to, would have prevented many chimerical attempts at demonstrations of the indemonstrable, and explanations which do not explain.

It is not, therefore, enough for us that the laws of space, which are only laws of simultaneous phenomenon, and the laws of number, which though true of successive phenomena do not relate to their succession, possess the rigorous certainty and universality of which we are in search. We must endeavor to find some law of succession which has those same attributes, and is therefore fit to be made the foundation of processes for discovering, and of a test for verifying, all other uniformities of succession. This fundamental law must resemble the truths of geometry in their most remarkable peculiarity, that of never being, in any instance whatever, defeated or suspended by any change of circumstances.

Now among all those uniformities in the succession of phenomena, which common observation is sufficient to bring to light, there are very few which have any, even apparent, pretension to this rigorous indefeasibility: and of those few, one only has been found capable of completely sustaining it. In that one, however, we recognize a law which is universal also in another sense; it is co-extensive with the entire field of successive phenomena, all instances whatever of succession being examples of it. This law is the Law of Causation. The truth that every fact which has a beginning has a cause, is co-extensive with human experience.

This generalization may appear to some minds not to amount to much, since after all it asserts only this: "it is a law, that every event depends on some law:" "it is a law, that there is a law for every thing." We must not, however, conclude that the generality of the principle is merely verbal; it will be found on inspection to be no vague or unmeaning assertion, but a most important and really fundamental truth.

§ 2. The notion of Cause being the root of the whole theory of Induction, it is indispensable that this idea should, at the very outset of our inquiry, be, with the utmost practicable degree of precision, fixed and determined. If, indeed, it were necessary for the purpose of inductive logic that the strife should be quelled, which has so long raged among the different schools of metaphysicians, respecting the origin and analysis of our idea of causation; the promulgation, or at least the general reception, of a true theory of induction, might be considered desperate for a long time to come. But the science of the Investigation of Truth by means of Evidence, is happily independent of many of the controversies which perplex the science of the ultimate constitution of the human mind, and is under no necessity of pushing the analysis of mental phenomenon to that extreme limit which alone ought to satisfy a metaphysician.

I premise, then, that when in the course of this inquiry I speak of the cause of any phenomenon, I do not mean a cause which is not itself a phenomenon; I make no research into the ultimate or ontological cause of any thing. To adopt a distinction familiar in the writings of the Scotch metaphysicians, and especially of Reid, the causes with which I concern myself are not *efficient*, but *physical* causes. They are causes in that sense alone, in which one physical fact is said to be the cause of another. Of the efficient causes of phenomena, or whether any such causes exist at all, I am not called upon to give an opinion. The notion of causation is deemed, by the schools of metaphysics most in vogue at the present moment, to imply a mysterious and most powerful tie, such as can not, or at least does not, exist between any physical fact and that other physical fact on which it is invariably consequent, and which is popularly termed its cause: and thence is deduced the supposed necessity of ascending higher, into the essences and inherent constitution of things, to find the true cause, the cause which is not only followed by, but actually produces, the effect. No such necessity exists for the purposes of the present inquiry, nor will any such doctrine be found in the following pages. The only notion of a cause, which the theory of induction requires, is such a notion as can be gained from experience. The Law of

Causation, the recognition of which is the main pillar of inductive science, is but the familiar truth, that invariability of succession is found by observation to obtain between every fact in nature and some other fact which has preceded it; independently of all considerations respecting the ultimate mode of production of phenomena, and of every other question regarding the nature of "Things in themselves."

Between the phenomena, then, which exist at any instant, and the phenomena which exist at the succeeding instant, there is an invariable order of succession; and, as we said in speaking of the general uniformity of the course of nature, this web is composed of separate fibres; this collective order is made up of particular sequences, obtaining invariably among the separate parts. To certain facts, certain facts always do, and, as we believe, will continue to, succeed. The invariable antecedent is termed the cause; the invariable consequent, the effect. And the universality of the law of causation consists in this, that every consequent is connected in this manner with some particular antecedent, or set of antecedents. Let the fact be what it may, if it has begun to exist, it was preceded by some fact or facts, with which it is invariably connected. For every event there exists some combination of objects or events, some given concurrence of circumstances, positive and negative, the occurrence of which is always followed by that phenomenon. We may not have found out what this concurrence of circumstances may be; but we never doubt that there is such a one, and that it never occurs without having the phenomenon in question as its effect or consequence. On the universality of this truth depends the possibility of reducing the inductive process to rules. The undoubted assurance we have that there is a law to be found if we only knew how to find it, will be seen presently to be the source from which the canons of the Inductive Logic derive their validity.

§ 3. It is seldom, if ever, between a consequent and a single antecedent, that this invariable sequence subsists. It is usually between a consequent and the sum of several antecedents; the concurrence of all of them being requisite to produce, that is, to be certain of being followed by, the consequent. In such cases it is very common to single out one only of the antecedents under the denomination of Cause, calling the others merely Conditions. Thus, if a person eats of a particular dish, and dies in consequence, that is, would not have died if he had not eaten of it, people would be apt to say that eating of that dish was the cause of his death. There needs not, however, be any invariable connection between eating of the dish and death; but there certainly is, among the circumstances which took place, some combination or other on which death is invariably consequent: as, for instance, the act of eating of the dish, combined with a particular bodily constitution, a particular state of present health, and perhaps even a certain state of the atmosphere; the whole of which circumstances perhaps constituted in this particular case the *conditions* of the phenomenon, or, in other words, the set of antecedents which determined it, and but for which it would not have happened. The real Cause, is the whole of these antecedents; and we have, philosophically speaking, no right to give the name of cause to one of them, exclusively of the others. What, in the case we have supposed, disguises the incorrectness of the expression, is this: that the various conditions, except the single one of eating the food, were not *events* (that is, instantaneous changes, or successions of instantaneous changes) but *states*, possessing more or less of permanency; and might therefore have preceded the effect by an indefinite length of duration, for want of the event which was requisite to complete the required concurrence of conditions: while as soon as that event, eating the food, occurs, no other cause is waited for, but the effect begins immediately to take place: and hence the appearance is presented of a more immediate and close connection between the effect and that one antecedent, than between the effect and the remaining conditions. But though we may think proper to give the name of cause to that one condition, the fulfillment of which completes the tale, and brings about the effect without further delay; this condition has really no closer relation to the effect than any of the other conditions has. All the conditions were equally indispensable to the production of the consequent; and the statement of the cause is incomplete, unless in some shape or other we introduce them all. A man takes mercury, goes out-of-doors, and catches cold. We say, perhaps, that the cause of his taking cold was exposure to the air. It is clear, however, that his having taken mercury may have been a necessary condition of his catching cold; and though it might consist with usage to say that the cause of his attack was exposure to the air, to be accurate we ought to say that the cause was exposure to the air while under the effect of mercury.

If we do not, when aiming at accuracy, enumerate all the conditions, it is only because some of them will in

most cases be understood without being expressed, or because for the purpose in view they may without detriment be overlooked. For example, when we say, the cause of a man's death was that his foot slipped in climbing a ladder, we omit as a thing unnecessary to be stated the circumstance of his weight, though quite as indispensable a condition of the effect which took place. When we say that the assent of the crown to a bill makes it law, we mean that the assent, being never given until all the other conditions are fulfilled, makes up the sum of the conditions, though no one now regards it as the principal one. When the decision of a legislative assembly has been determined by the casting vote of the chairman, we sometimes say that this one person was the cause of all the effects which resulted from the enactment. Yet we do not really suppose that his single vote contributed more to the result than that of any other person who voted in the affirmative; but, for the purpose we have in view, which is to insist on his individual responsibility, the part which any other person had in the transaction is not material.

In all these instances the fact which was dignified with the name of cause, was the one condition which came last into existence. But it must not be supposed that in the employment of the term this or any other rule is always adhered to. Nothing can better show the absence of any scientific ground for the distinction between the cause of a phenomenon and its conditions, than the capricious manner in which we select from among the conditions that which we choose to denominate the cause. However numerous the conditions may be, there is hardly any of them which may not, according to the purpose of our immediate discourse, obtain that nominal pre-eminence. This will be seen by analyzing the conditions of some one familiar phenomenon. For example, a stone thrown into water falls to the bottom. What are the conditions of this event? In the first place there must be a stone, and water, and the stone must be thrown into the water; but these suppositions forming part of the enunciation of the phenomenon itself, to include them also among the conditions would be a vicious tautology; and this class of conditions, therefore, have never received the name of cause from any but the Aristotelians, by whom they were called the *material* cause, *causa materialis*. The next condition is, there must be an earth: and accordingly it is often said, that the fall of a stone is caused by the earth; or by a power or property of the earth, or a force exerted by the earth, all of which are merely roundabout ways of saying that it is caused by the earth; or, lastly, the earth's attraction; which also is only a technical mode of saying that the earth causes the motion, with the additional particularity that the motion is toward the earth, which is not a character of the cause, but of the effect. Let us now pass to another condition. It is not enough that the earth should exist; the body must be within that distance from it, in which the earth's attraction preponderates over that of any other body. Accordingly we may say, and the expression would be confessedly correct, that the cause of the stone's falling is its being *within the sphere* of the earth's attraction. We proceed to a further condition. The stone is immersed in water: it is therefore a condition of its reaching the ground, that its specific gravity exceed that of the surrounding fluid, or in other words that it surpass in weight an equal volume of water. Accordingly any one would be acknowledged to speak correctly who said, that the cause of the stone's going to the bottom is its exceeding in specific gravity the fluid in which it is immersed.

Thus we see that each and every condition of the phenomenon may be taken in its turn, and, with equal propriety in common parlance, but with equal impropriety in scientific discourse, may be spoken of as if it were the entire cause. And in practice, that particular condition is usually styled the cause, whose share in the matter is superficially the most conspicuous, or whose requisiteness to the production of the effect we happen to be insisting on at the moment. So great is the force of this last consideration, that it sometimes induces us to give the name of cause even to one of the negative conditions. We say, for example, The army was surprised because the sentinel was off his post. But since the sentinel's absence was not what created the enemy, or put the soldiers asleep, how did it cause them to be surprised? All that is really meant is, that the event would not have happened if he had been at his duty. His being off his post was no producing cause, but the mere absence of a preventing cause: it was simply equivalent to his non-existence. From nothing, from a mere negation, no consequences can proceed. All effects are connected, by the law of causation, with some set of *positive* conditions; negative ones, it is true, being almost always required in addition. In other words, every fact or phenomenon which has a beginning, invariably arises when some certain combination of positive facts exists, provided certain other positive facts do not exist.

There is, no doubt, a tendency (which our first example, that of death from taking a particular food, sufficiently illustrates) to associate the idea of causation with the proximate antecedent *event*, rather than with any of the antecedent *states*, or permanent facts, which may happen also to be conditions of the phenomenon; the reason being that the event not only exists, but begins to exist immediately previous; while the other conditions may have pre-existed for an indefinite time. And this tendency shows itself very visibly in the different logical fictions which are resorted to, even by men of science, to avoid the necessity of giving the name of cause to any thing which had existed for an indeterminate length of time before the effect. Thus, rather than say that the earth causes the fall of bodies, they ascribe it to a *force* exerted by the earth, or an *attraction* by the earth, abstractions which they can represent to themselves as exhausted by each effort, and therefore constituting at each successive instant a fresh fact, simultaneous with, or only immediately preceding, the effect. Inasmuch as the coming of the circumstance which completes the assemblage of conditions, is a change or event, it thence happens that an event is always the antecedent in closest apparent proximity to the consequent: and this may account for the illusion which disposes us to look upon the proximate event as standing more peculiarly in the position of a cause than any of the antecedent states. But even this peculiarity, of being in closer proximity to the effect than any other of its conditions, is, as we have already seen, far from being necessary to the common notion of a cause; with which notion, on the contrary, any one of the conditions, either positive or negative, is found, on occasion, completely to accord.(114)

The cause, then, philosophically speaking, is the sum total of the conditions, positive and negative taken together; the whole of the contingencies of every description, which being realized, the consequent invariably follows. The negative conditions, however, of any phenomenon, a special enumeration of which would generally be very prolix, may be all summed up under one head, namely, the absence of preventing or counteracting causes. The convenience of this mode of expression is mainly grounded on the fact, that the effects of any cause in counteracting another cause may in most cases be, with strict scientific exactness, regarded as a mere extension of its own proper and separate effects. If gravity retards the upward motion of a projectile, and deflects it into a parabolic trajectory, it produces, in so doing, the very same kind of effect, and even (as mathematicians know) the same quantity of effect, as it does in its ordinary operation of causing the fall of bodies when simply deprived of their support. If an alkaline solution mixed with an acid destroys its sourness, and prevents it from reddening vegetable blues, it is because the specific effect of the alkali is to combine with the acid, and form a compound with totally different qualities. This property, which causes of all descriptions possess, of preventing the effects of other causes by virtue (for the most part) of the same laws according to which they produce their own,(115) enables us, by establishing the general axiom that all causes are liable to be counteracted in their effects by one another, to dispense with the consideration of negative conditions entirely, and limit the notion of cause to the assemblage of the positive conditions of the phenomenon: one negative condition invariably understood, and the same in all instances (namely, the absence of counteracting causes) being sufficient, along with the sum of the positive conditions, to make up the whole set of circumstances on which the phenomenon is dependent.

§ 4. Among the positive conditions, as we have seen that there are some to which, in common parlance, the term cause is more readily and frequently awarded, so there are others to which it is, in ordinary circumstances, refused. In most cases of causation a distinction is commonly drawn between something which acts, and some other thing which is acted upon; between an *agent* and a *patient*. Both of these, it would be universally allowed, are conditions of the phenomenon; but it would be thought absurd to call the latter the cause, that title being reserved for the former. The distinction, however, vanishes on examination, or rather is found to be only verbal; arising from an incident of mere expression, namely, that the object said to be acted upon, and which is considered as the scene in which the effect takes place, is commonly included in the phrase by which the effect is spoken of, so that if it were also reckoned as part of the cause, the seeming incongruity would arise of its being supposed to cause itself. In the instance which we have already had, of falling bodies, the question was thus put: What is the cause which makes a stone fall? and if the answer had been "the stone itself," the expression would have been in apparent contradiction to the meaning of the word cause. The stone, therefore, is conceived as the patient, and the earth (or, according to the common and most unphilosophical practice, an occult quality of the earth) is represented as the agent or cause. But that there is

nothing fundamental in the distinction may be seen from this, that it is quite possible to conceive the stone as causing its own fall, provided the language employed be such as to save the mere verbal incongruity. We might say that the stone moves toward the earth by the properties of the matter composing it; and according to this mode of presenting the phenomenon, the stone itself might without impropriety be called the agent; though, to save the established doctrine of the inactivity of matter, men usually prefer here also to ascribe the effect to an occult quality, and say that the cause is not the stone itself, but the *weight* or *gravitation* of the stone.

Those who have contended for a radical distinction between agent and patient, have generally conceived the agent as that which causes some state of, or some change in the state of, another object which is called the patient. But a little reflection will show that the license we assume of speaking of phenomena as *states* of the various objects which take part in them (an artifice of which so much use has been made by some philosophers, Brown in particular, for the apparent explanation of phenomena), is simply a sort of logical fiction, useful sometimes as one among several modes of expression, but which should never be supposed to be the enunciation of a scientific truth. Even those attributes of an object which might seem with greatest propriety to be called states of the object itself, its sensible qualities, its color, hardness, shape, and the like, are in reality (as no one has pointed out more clearly than Brown himself) phenomena of causation, in which the substance is distinctly the agent, or producing cause, the patient being our own organs, and those of other sentient beings. What we call states of objects, are always sequences into which the objects enter, generally as antecedents or causes; and things are never more active than in the production of those phenomena in which they are said to be acted upon. Thus, in the example of a stone falling to the earth, according to the theory of gravitation the stone is as much an agent as the earth, which not only attracts, but is itself attracted by, the stone. In the case of a sensation produced in our organs, the laws of our organization, and even those of our minds, are as directly operative in determining the effect produced, as the laws of the outward object. Though we call prussic acid the agent of a person's death, the whole of the vital and organic properties of the patient are as actively instrumental as the poison, in the chain of effects which so rapidly terminates his sentient existence. In the process of education, we may call the teacher the agent, and the scholar only the material acted upon; yet in truth all the facts which pre-existed in the scholar's mind exert either co-operating or counteracting agencies in relation to the teacher's efforts. It is not light alone which is the agent in vision, but light coupled with the active properties of the eye and brain, and with those of the visible object. The distinction between agent and patient is merely verbal: patients are always agents; in a great proportion, indeed, of all natural phenomena, they are so to such a degree as to react forcibly on the causes which acted upon them: and even when this is not the case, they contribute, in the same manner as any of the other conditions, to the production of the effect of which they are vulgarly treated as the mere theatre. All the positive conditions of a phenomenon are alike agents, alike active; and in any expression of the cause which professes to be complete, none of them can with reason be excluded, except such as have already been implied in the words used for describing the effect; nor by including even these would there be incurred any but a merely verbal impropriety.

§ 5. There is a case of causation which calls for separate notice, as it possesses a peculiar feature, and presents a greater degree of complexity than the common case. It often happens that the effect, or one of the effects, of a cause, is, not to produce of itself a certain phenomenon, but to fit something else for producing it. In other words, there is a case of causation in which the effect is to invest an object with a certain property. When sulphur, charcoal, and nitre are put together in certain proportions and in a certain manner, the effect is, not an explosion, but that the mixture acquires a property by which, in given circumstances, it will explode. The various causes, natural and artificial, which educate the human body or the human mind, have for their principal effect, not to make the body or mind immediately do any thing, but to endow it with certain properties--in other words, to give assurance that in given circumstances certain results will take place in it, or as consequences of it. Physiological agencies often have for the chief part of their operation to *predispose* the constitution to some mode of action. To take a simpler instance than all these: putting a coat of white paint upon a wall does not merely produce in those who see it done, the sensation of white; it confers on the wall the permanent property of giving that kind of sensation. Regarded in reference to the sensation, the putting on

of the paint is a condition of a condition; it is a condition of the wall's causing that particular fact. The wall may have been painted years ago, but it has acquired a property which has lasted till now, and will last longer; the antecedent condition necessary to enable the wall to become in its turn a condition, has been fulfilled once for all. In a case like this, where the immediate consequent in the sequence is a property produced in an object, no one now supposes the property to be a substantive entity "inherent" in the object. What has been produced is what, in other language, may be called a state of preparation in an object for producing an effect. The ingredients of the gunpowder have been brought into a state of preparation for exploding as soon as the other conditions of an explosion shall have occurred. In the case of the gunpowder, this state of preparation consists in a certain collocation of its particles relatively to one another. In the example of the wall, it consists in a new collocation of two things relatively to each other--the wall and the paint. In the example of the molding influences on the human mind, its being a collocation at all is only conjectural; for, even on the materialistic hypothesis, it would remain to be proved that the increased facility with which the brain sums up a column of figures when it has been long trained to calculation, is the result of a permanent new arrangement of some of its material particles. We must, therefore, content ourselves with what we know, and must include among the effects of causes, the capacities given to objects of being causes of other effects. This capacity is not a real thing existing in the objects; it is but a name for our conviction that they will act in a particular manner when certain new circumstances arise. We may invest this assurance of future events with a fictitious objective existence, by calling it a state of the object. But unless the state consists, as in the case of the gunpowder it does, in a collocation of particles, it expresses no present fact; it is but the contingent future fact brought back under another name.

It may be thought that this form of causation requires us to admit an exception to the doctrine that the conditions of a phenomenon--the antecedents required for calling it into existence--must all be found among the facts immediately, not remotely, preceding its commencement. But what we have arrived at is not a correction, it is only an explanation, of that doctrine. In the enumeration of the conditions required for the occurrence of any phenomenon, it always has to be included that objects must be present, possessed of given properties. It is a condition of the phenomenon explosion that an object should be present, of one or other of certain kinds, which for that reason are called explosive. The presence of one of these objects is a condition immediately precedent to the explosion. The condition which is not immediately precedent is the cause which produced, not the explosion, but the explosive property. The conditions of the explosion itself were all present immediately before it took place, and the general law, therefore, remains intact.

§ 6. It now remains to advert to a distinction which is of first-rate importance both for clearing up the notion of cause, and for obviating a very specious objection often made against the view which we have taken of the subject.

When we define the cause of any thing (in the only sense in which the present inquiry has any concern with causes) to be "the antecedent which it invariably follows," we do not use this phrase as exactly synonymous with "the antecedent which it invariably *has* followed in our past experience." Such a mode of conceiving causation would be liable to the objection very plausibly urged by Dr. Reid, namely, that according to this doctrine night must be the cause of day, and day the cause of night; since these phenomena have invariably succeeded one another from the beginning of the world. But it is necessary to our using the word cause, that we should believe not only that the antecedent always *has* been followed by the consequent, but that, as long as the present constitution of things(116) endures, it always *will* be so. And this would not be true of day and night. We do not believe that night will be followed by day under all imaginable circumstances, but only that it will be so *provided* the sun rises above the horizon. If the sun ceased to rise, which, for aught we know, may be perfectly compatible with the general laws of matter, night would be, or might be, eternal. On the other hand, if the sun is above the horizon, his light not extinct, and no opaque body between us and him, we believe firmly that unless a change takes place in the properties of matter, this combination of antecedents will be followed by the consequent, day; that if the combination of antecedents could be indefinitely prolonged, it would be always day; and that if the same combination had always existed, it would always have been day, quite independently of night as a previous condition. Therefore is it that we do not call night the cause, nor

even a condition, of day. The existence of the sun (or some such luminous body), and there being no opaque medium in a straight line(117) between that body and the part of the earth where we are situated, are the sole conditions; and the union of these, without the addition of any superfluous circumstance, constitutes the cause. This is what writers mean when they say that the notion of cause involves the idea of necessity. If there be any meaning which confessedly belongs to the term necessity, it is *unconditionalness*. That which is necessary, that which *must* be, means that which will be, whatever supposition we may make in regard to all other things. The succession of day and night evidently is not necessary in this sense. It is conditional on the occurrence of other antecedents. That which will be followed by a given consequent when, and only when, some third circumstance also exists, is not the cause, even though no case should ever have occurred in which the phenomenon took place without it.

Invariable sequence, therefore, is not synonymous with causation, unless the sequence, besides being invariable, is unconditional. There are sequences, as uniform in past experience as any others whatever, which yet we do not regard as cases of causation, but as conjunctions in some sort accidental. Such, to an accurate thinker, is that of day and night. The one might have existed for any length of time, and the other not have followed the sooner for its existence; it follows only if certain other antecedents exist; and where those antecedents existed, it would follow in any case. No one, probably, ever called night the cause of day; mankind must so soon have arrived at the very obvious generalization, that the state of general illumination which we call day would follow from the presence of a sufficiently luminous body, whether darkness had preceded or not.

We may define, therefore, the cause of a phenomenon, to be the antecedent, or the concurrence of antecedents, on which it is invariably and *unconditionally* consequent. Or if we adopt the convenient modification of the meaning of the word cause, which confines it to the assemblage of positive conditions without the negative, then instead of "unconditionally," we must say, "subject to no other than negative conditions."

To some it may appear, that the sequence between night and day being invariable in our experience, we have as much ground in this case as experience can give in any case, for recognizing the two phenomena as cause and effect; and that to say that more is necessary--to require a belief that the succession is unconditional, or, in other words, that it would be invariable under all changes of circumstances, is to acknowledge in causation an element of belief not derived from experience. The answer to this is, that it is experience itself which teaches us that one uniformity of sequence is conditional and another unconditional. When we judge that the succession of night and day is a derivative sequence, depending on something else, we proceed on grounds of experience. It is the evidence of experience which convinces us that day could equally exist without being followed by night, and that night could equally exist without being followed by day. To say that these beliefs are "not generated by our mere observation of sequence,"(118) is to forget that twice in every twenty-four hours, when the sky is clear, we have an *experimentum crucis* that the cause of day is the sun. We have an experimental knowledge of the sun which justifies us on experimental grounds in concluding, that if the sun were always above the horizon there would be day, though there had been no night, and that if the sun were always below the horizon there would be night, though there had been no day. We thus know from experience that the succession of night and day is not unconditional. Let me add, that the antecedent which is only conditionally invariable, is not the invariable antecedent. Though a fact may, in experience, have always been followed by another fact, yet if the remainder of our experience teaches us that it might not always be so followed, or if the experience itself is such as leaves room for a possibility that the known cases may not correctly represent all possible cases, the hitherto invariable antecedent is not accounted the cause; but why? Because we are not sure that it *is* the invariable antecedent.

Such cases of sequence as that of day and night not only do not contradict the doctrine which resolves causation into invariable sequence, but are necessarily implied in that doctrine. It is evident, that from a limited number of unconditional sequences, there will result a much greater number of conditional ones. Certain causes being given, that is, certain antecedents which are unconditionally followed by certain consequents; the mere co-existence of these causes will give rise to an unlimited number of additional

uniformities. If two causes exist together, the effects of both will exist together; and if many causes co-exist, these causes (by what we shall term hereafter the intermixture of their laws) will give rise to new effects, accompanying or succeeding one another in some particular order, which order will be invariable while the causes continue to co-exist, but no longer. The motion of the earth in a given orbit round the sun, is a series of changes which follow one another as antecedents and consequents, and will continue to do so while the sun's attraction, and the force with which the earth tends to advance in a direct line through space, continue to co-exist in the same quantities as at present. But vary either of these causes, and this particular succession of motions would cease to take place. The series of the earth's motions, therefore, though a case of sequence invariable within the limits of human experience, is not a case of causation. It is not unconditional.

This distinction between the relations of succession which, so far as we know, are unconditional, and those relations, whether of succession or of co-existence, which, like the earth's motions, or the succession of day and night, depend on the existence or on the co-existence of other antecedent facts--corresponds to the great division which Dr. Whewell and other writers have made of the field of science, into the investigation of what they term the Laws of Phenomena, and the investigation of causes; a phraseology, as I conceive, not philosophically sustainable, inasmuch as the ascertainment of causes, such causes as the human faculties can ascertain, namely, causes which are themselves phenomena, is, therefore, merely the ascertainment of other and more universal Laws of Phenomena. And let me here observe, that Dr. Whewell, and in some degree even Sir John Herschel, seem to have misunderstood the meaning of those writers who, like M. Comté, limit the sphere of scientific investigation to Laws of Phenomena, and speak of the inquiry into causes as vain and futile. The causes which M. Comté designates as inaccessible, are efficient causes. The investigation of physical, as opposed to efficient, causes (including the study of all the active forces in Nature, considered as facts of observation) is as important a part of M. Comté's conception of science as of Dr. Whewell's. His objection to the *word* cause is a mere matter of nomenclature, in which, as a matter of nomenclature, I consider him to be entirely wrong. "Those," it is justly remarked by Mr. Bailey,(119) "who, like M. Comté, object to designate *events* as causes, are objecting without any real ground to a mere but extremely convenient generalization, to a very useful common name, the employment of which involves, or needs involve, no particular theory." To which it may be added, that by rejecting this form of expression, M. Comté leaves himself without any term for marking a distinction which, however incorrectly expressed, is not only real, but is one of the fundamental distinctions in science; indeed it is on this alone, as we shall hereafter find, that the possibility rests of framing a rigorous Canon of Induction. And as things left without a name are apt to be forgotten, a Canon of that description is not one of the many benefits which the philosophy of Induction has received from M. Comté's great powers.

§ 7. Does a cause always stand with its effect in the relation of antecedent and consequent? Do we not often say of two simultaneous facts that they are cause and effect--as when we say that fire is the cause of warmth, the sun and moisture the cause of vegetation, and the like? Since a cause does not necessarily perish because its effect has been produced, the two things do very generally co-exist; and there are some appearances, and some common expressions, seeming to imply not only that causes may, but that they must, be contemporaneous with their effects. *Cessante causâ cessat et effectus*, has been a dogma of the schools: the necessity for the continued existence of the cause in order to the continuance of the effect, seems to have been once a generally received doctrine. Kepler's numerous attempts to account for the motions of the heavenly bodies on mechanical principles, were rendered abortive by his always supposing that the agency which set those bodies in motion must continue to operate in order to keep up the motion which it at first produced. Yet there were at all times many familiar instances of the continuance of effects, long after their causes had ceased. A *coup de soleil* gives a person brain-fever: will the fever go off as soon as he is moved out of the sunshine? A sword is run through his body: must the sword remain in his body in order that he may continue dead? A plowshare once made, remains a plowshare, without any continuance of heating and hammering, and even after the man who heated and hammered it has been gathered to his fathers. On the other hand, the pressure which forces up the mercury in an exhausted tube must be continued in order to sustain it in the tube. This (it may be replied) is because another force is acting without intermission, the force of gravity, which would restore it to its level, unless counterpoised by a force equally constant. But again: a tight bandage

causes pain, which pain will sometimes go off as soon as the bandage is removed. The illumination which the sun diffuses over the earth ceases when the sun goes down.

There is, therefore, a distinction to be drawn. The conditions which are necessary for the first production of a phenomenon, are occasionally also necessary for its continuance; though more commonly its continuance requires no condition except negative ones. Most things, once produced, continue as they are, until something changes or destroys them; but some require the permanent presence of the agencies which produced them at first. These may, if we please, be considered as instantaneous phenomena, requiring to be renewed at each instant by the cause by which they were at first generated. Accordingly, the illumination of any given point of space has always been looked upon as an instantaneous fact, which perishes and is perpetually renewed as long as the necessary conditions subsist. If we adopt this language we avoid the necessity of admitting that the continuance of the cause is ever required to maintain the effect. We may say, it is not required to maintain, but to reproduce, the effect, or else to counteract some force tending to destroy it. And this may be a convenient phraseology. But it is only a phraseology. The fact remains, that in some cases (though those are a minority) the continuance of the conditions which produced an effect is necessary to the continuance of the effect.

As to the ulterior question, whether it is strictly necessary that the cause, or assemblage of conditions, should precede, by ever so short an instant, the production of the effect (a question raised and argued with much ingenuity by Sir John Herschel in an Essay already quoted),(120) the inquiry is of no consequence for our present purpose. There certainly are cases in which the effect follows without any interval perceptible by our faculties; and when there is an interval, we can not tell by how many intermediate links imperceptible to us that interval may really be filled up. But even granting that an effect may commence simultaneously with its cause, the view I have taken of causation is in no way practically affected. Whether the cause and its effect be necessarily successive or not, the beginning of a phenomenon is what implies a cause, and causation is the law of the succession of phenomena. If these axioms be granted, we can afford, though I see no necessity for doing so, to drop the words antecedent and consequent as applied to cause and effect. I have no objection to define a cause, the assemblage of phenomena, which occurring, some other phenomenon invariably commences, or has its origin. Whether the effect coincides in point of time with, or immediately follows, the hindmost of its conditions, is immaterial. At all events, it does not precede it; and when we are in doubt, between two co-existent phenomena, which is cause and which effect, we rightly deem the question solved if we can ascertain which of them preceded the other.

§ 8. It continually happens that several different phenomena, which are not in the slightest degree dependent or conditional on one another, are found all to depend, as the phrase is, on one and the same agent; in other words, one and the same phenomenon is seen to be followed by several sorts of effects quite heterogeneous, but which go on simultaneously one with another; provided, of course, that all other conditions requisite for each of them also exist. Thus, the sun produces the celestial motions; it produces daylight, and it produces heat. The earth causes the fall of heavy bodies, and it also, in its capacity of a great magnet, causes the phenomena of the magnetic needle. A crystal of galena causes the sensations of hardness, of weight, of cubical form, of gray color, and many others between which we can trace no interdependence. The purpose to which the phraseology of Properties and Powers is specially adapted, is the expression of this sort of cases. When the same phenomenon is followed (either subject or not to the presence of other conditions) by effects of different and dissimilar orders, it is usual to say that each different sort of effect is produced by a different property of the cause. Thus we distinguish the attractive or gravitative property of the earth, and its magnetic property: the gravitative, luminiferous, and calorific properties of the sun: the color, shape, weight, and hardness of a crystal. These are mere phrases, which explain nothing, and add nothing to our knowledge of the subject; but, considered as abstract names denoting the connection between the different effects produced and the object which produces them, they are a very powerful instrument of abridgment, and of that acceleration of the process of thought which abridgment accomplishes.

This class of considerations leads to a conception which we shall find to be of great importance, that of a Permanent Cause, or original natural agent. There exist in nature a number of permanent causes, which have

subsisted ever since the human race has been in existence, and for an indefinite and probably an enormous length of time previous. The sun, the earth, and planets, with their various constituents, air, water, and other distinguishable substances, whether simple or compound, of which nature is made up, are such Permanent Causes. These have existed, and the effects or consequences which they were fitted to produce have taken place (as often as the other conditions of the production met), from the very beginning of our experience. But we can give no account of the origin of the Permanent Causes themselves. Why these particular natural agents existed originally and no others, or why they are commingled in such and such proportions, and distributed in such and such a manner throughout space, is a question we can not answer. More than this: we can discover nothing regular in the distribution itself; we can reduce it to no uniformity, to no law. There are no means by which, from the distribution of these causes or agents in one part of space, we could conjecture whether a similar distribution prevails in another. The co-existence, therefore, of Primeval Causes ranks, to us, among merely casual concurrences: and all those sequences or co-existences among the effects of several such causes, which, though invariable while those causes co-exist, would, if the co-existence terminated, terminate along with it, we do not class as cases of causation, or laws of nature: we can only calculate on finding these sequences or co-existences where we know by direct evidence, that the natural agents on the properties of which they ultimately depend, are distributed in the requisite manner. These Permanent Causes are not always objects; they are sometimes events, that is to say, periodical cycles of events, that being the only mode in which events can possess the property of permanence. Not only, for instance, is the earth itself a permanent cause, or primitive natural agent, but the earth's rotation is so too: it is a cause which has produced, from the earliest period (by the aid of other necessary conditions), the succession of day and night, the ebb and flow of the sea, and many other effects, while, as we can assign no cause (except conjecturally) for the rotation itself, it is entitled to be ranked as a primeval cause. It is, however, only the *origin* of the rotation which is mysterious to us: once begun, its continuance is accounted for by the first law of motion (that of the permanence of rectilinear motion once impressed) combined with the gravitation of the parts of the earth toward one another.

All phenomena without exception which begin to exist, that is, all except the primeval causes, are effects either immediate or remote of those primitive facts, or of some combination of them. There is no Thing produced, no event happening, in the known universe, which is not connected by a uniformity, or invariable sequence, with some one or more of the phenomena which preceded it; insomuch that it will happen again as often as those phenomena occur again, and as no other phenomenon having the character of a counteracting cause shall co-exist. These antecedent phenomena, again, were connected in a similar manner with some that preceded them; and so on, until we reach, as the ultimate step attainable by us, either the properties of some one primeval cause, or the conjunction of several. The whole of the phenomena of nature were therefore the necessary, or, in other words, the unconditional, consequences of some former collocation of the Permanent Causes.

The state of the whole universe at any instant, we believe to be the consequence of its state at the previous instant; insomuch that one who knew all the agents which exist at the present moment, their collocation in space, and all their properties, in other words, the laws of their agency, could predict the whole subsequent history of the universe, at least unless some new volition of a power capable of controlling the universe should supervene.(121) And if any particular state of the entire universe could ever recur a second time, all subsequent states would return too, and history would, like a circulating decimal of many figures, periodically repeat itself:

Jam redit et virgo, redeunt Saturnia regna.... Alter erit tum Tiphys, et altera quæ vehat Argo Delectos heroas; erunt quoque altera bella, Atque iterum ad Trojam magnus mittetur Achilles.

And though things do not really revolve in this eternal round, the whole series of events in the history of the universe, past and future, is not the less capable, in its own nature, of being constructed *a priori* by any one whom we can suppose acquainted with the original distribution of all natural agents, and with the whole of their properties, that is, the laws of succession existing between them and their effects: saving the far more

than human powers of combination and calculation which would be required, even in one possessing the data, for the actual performance of the task.

§ 9. Since every thing which occurs is determined by laws of causation and collocations of the original causes, it follows that the co-existences which are observable among effects can not be themselves the subject of any similar set of laws, distinct from laws of causation. Uniformities there are, as well of co-existence as of succession, among effects; but these must in all cases be a mere result either of the identity or of the co-existence of their causes: if the causes did not co-exist, neither could the effects. And these causes being also effects of prior causes, and these of others, until we reach the primeval causes, it follows that (except in the case of effects which can be traced immediately or remotely to one and the same cause) the co-existences of phenomena can in no case be universal, unless the co-existences of the primeval causes to which the effects are ultimately traceable can be reduced to a universal law: but we have seen that they can not. There are, accordingly, no original and independent, in other words no unconditional, uniformities of co-existence, between effects of different causes; if they co-exist, it is only because the causes have casually co-existed. The only independent and unconditional co-existences which are sufficiently invariable to have any claim to the character of laws, are between different and mutually independent effects of the same cause; in other words, between different properties of the same natural agent. This portion of the Laws of Nature will be treated of in the latter part of the present Book, under the name of the Specific Properties of Kinds.

§ 10. Since the first publication of the present treatise, the sciences of physical nature have made a great advance in generalization, through the doctrine known as the Conservation or Persistence of Force. This imposing edifice of theory, the building and laying out of which has for some time been the principal occupation of the most systematic minds among physical inquirers, consists of two stages: one, of ascertained fact, the other containing a large element of hypothesis.

To begin with the first. It is proved by numerous facts, both natural and of artificial production, that agencies which had been regarded as distinct and independent sources of force--heat, electricity, chemical action, nervous and muscular action, momentum of moving bodies--are interchangeable, in definite and fixed quantities, with one another. It had long been known that these dissimilar phenomena had the power, under certain conditions, of producing one another: what is new in the theory is a more accurate estimation of what this production consists in. What happens is, that the whole or part of the one kind of phenomena disappears, and is replaced by phenomena of one of the other descriptions, and that there is an equivalence in quantity between the phenomena that have disappeared and those which have been produced, insomuch that if the process be reversed, the very same quantity which had disappeared will re-appear, without increase or diminution. Thus the amount of heat which will raise the temperature of a pound of water one degree of the thermometer, will, if expended, say in the expansion of steam, lift a weight of 772 pounds one foot, or a weight of one pound 772 feet: and the same exact quantity of heat can, by certain means, be recovered, through the expenditure of exactly that amount of mechanical motion.

The establishment of this comprehensive law has led to a change in the language in which the scientific world had been accustomed to speak of what are called the Forces of nature. Before this correlation between phenomena most unlike one another had been ascertained, their unlikeness had caused them to be referred to so many distinct forces. Now that they are known to be convertible into one another without loss, they are spoken of as all of them results of one and the same force, manifesting itself in different modes. This force (it is said) can only produce a limited and definite quantity of effect, but always does produce that definite quantity; and produces it, according to circumstances, in one or another of the forms, or divides it among several, but so as (according to a scale of numerical equivalents established by experiment) always to make up the same sum; and no one of the manifestations can be produced, save by the disappearance of the equivalent quantity of another, which in its turn, in appropriate circumstances, will re-appear undiminished. This mutual interchangeability of the forces of nature, according to fixed numerical equivalents, is the part of the new doctrine which rests on irrefragable fact.

To make the statement true, however, it is necessary to add, that an indefinite and perhaps immense interval of time may elapse between the disappearance of the force in one form and its re-appearance in another. A stone thrown up into the air with a given force, and falling back immediately, will, by the time it reaches the earth, recover the exact amount of mechanical momentum which was expended in throwing it up, deduction being made of a small portion of motion which has been communicated to the air. But if the stone has lodged on a height, it may not fall back for years, or perhaps ages, and until it does, the force expended in raising it is temporarily lost, being represented only by what, in the language of the new theory, is called potential energy. The coal imbedded in the earth is considered by the theory as a vast reservoir of force, which has remained dormant for many geological periods, and will so remain until, by being burned, it gives out the stored-up force in the form of heat. Yet it is not supposed that this force is a material thing which can be confined by bounds, as used to be thought of latent heat when that important phenomenon was first discovered. What is meant is that when the coal does at last, by combustion, generate a quantity of heat (transformable like all other heat into mechanical momentum, and the other forms of force), this extrication of heat is the re-appearance of a force derived from the sun's rays, expended myriads of ages ago in the vegetation of the organic substances which were the material of the coal.

Let us now pass to the higher stage of the theory of Conservation of Force; the part which is no longer a generalization of proved fact, but a combination of fact and hypothesis. Stated in few words, it is as follows: That the Conservation of Force is really the Conservation of Motion; that in the various interchanges between the forms of force, it is always motion that is transformed into motion. To establish this, it is necessary to assume motions which are hypothetical. The supposition is, that there are motions which manifest themselves to our senses only as heat, electricity, etc., being molecular motions; oscillations, invisible to us, among the minute particles of bodies; and that these molecular motions are transmutable into molar motions (motions of masses), and molar motions into molecular. Now there is a real basis of fact for this supposition: we have positive evidence of the existence of molecular motion in these manifestations of force. In the case of chemical action, for instance, the particles separate and form new combinations, often with a great visible disturbance of the mass. In the case of heat, the evidence is equally conclusive, since heat expands bodies (that is, causes their particles to move *from* one another); and if of sufficient amount, changes their mode of aggregation from solid to liquid, or from liquid to gaseous. Again, the mechanical actions which produce heat--friction, and the collision of bodies--must from the nature of the case produce a shock, that is, an internal motion of particles, which indeed, we find, is often so violent as to break them permanently asunder. Such facts are thought to warrant the inference, that it is not, as was supposed, heat that causes the motion of particles, but the motion of particles that causes heat; the original cause of both being the previous motion (whether molar or molecular--collision of bodies or combustion of fuel) which formed the heating agency. This inference already contains hypothesis; but at least the supposed cause, the intestine motion of molecules, is a *vera causa*. But in order to reduce the Conservation of Force to Conservation of Motion, it was necessary to attribute to motion the heat propagated, through apparently empty space, from the sun. This required the supposition (already made for the explanation of the laws of light) of a subtle ether pervading space, which, though impalpable to us, must have the property which constitutes matter, that of resistance, since waves are propagated through it by an impulse from a given point. The ether must be supposed (a supposition not required by the theory of light) to penetrate into the minute interstices of all bodies. The vibratory motion supposed to be taking place in the heated mass of the sun, is considered as imparted from that mass to the particles of the surrounding ether, and through them to the particles of the same ether in the interstices of terrestrial bodies; and this, too, with a sufficient mechanical force to throw the particles of those bodies into a state of similar vibration, producing the expansion of their mass, and the sensation of heat in sentient creatures. All this is hypothesis, though, of its legitimacy as hypothesis, I do not mean to express any doubt. It would seem to follow as a consequence from this theory, that Force may and should be defined, matter in motion. This definition, however, will not stand, for, as has already been seen, the matter needs not be in *actual* motion. It is not necessary to suppose that the motion afterward manifested, is actually taking place among the molecules of the coal during its sojourn in the earth;(122) certainly not in the stone which is at rest on the eminence to which it has been raised. The true definition of Force must be, not motion, but Potentiality of Motion; and what the doctrine, if established, amounts to, is, not that there is at all times the same quantity

of actual motion in the universe; but that the possibilities of motion are limited to a definite quantity, which can not be added to, but which can not be exhausted; and that all actual motion which takes place in Nature is a draft upon this limited stock. It needs not all of it have ever existed as actual motion. There is a vast amount of potential motion in the universe in the form of gravitation, which it would be a great abuse of hypothesis to suppose to have been stored up by the expenditure of an equal amount of actual motion in some former state of the universe. Nor does the motion produced by gravity take place, so far as we know, at the expense of any other motion, either molar or molecular.

It is proper to consider whether the adoption of this theory as a scientific truth, involving as it does a change in the conception hitherto entertained of the most general physical agencies, requires any modification in the view I have taken of Causation as a law of nature. As it appears to me, none whatever. The manifestations which the theory regards as modes of motion, are as much distinct and separate phenomena when referred to a single force, as when attributed to several. Whether the phenomenon is called a transformation of force or the generation of one, it has its own set or sets of antecedents, with which it is connected by invariable and unconditional sequence; and that set, or those sets, of antecedents are its cause. The relation of the Conservation theory to the principle of Causation is discussed in much detail, and very instructively, by Professor Bain, in the second volume of his Logic. The chief practical conclusion drawn by him, bearing on Causation, is, that we must distinguish in the assemblage of conditions which constitutes the Cause of a phenomenon, two elements: one, the presence of a force; the other, the collocation or position of objects which is required in order that the force may undergo the particular transmutation which constitutes the phenomenon. Now, it might always have been said with acknowledged correctness, that a force and a collocation were both of them necessary to produce any phenomenon. The law of causation is, that change can only be produced by change. Along with any number of stationary antecedents, which are collocations, there must be at least one changing antecedent, which is a force. To produce a bonfire, there must not only be fuel, and air, and a spark, which are collocations, but chemical action between the air and the materials, which is a force. To grind corn, there must be a certain collocation of the parts composing a mill, relatively to one another and to the corn; but there must also be the gravitation of water, or the motion of wind, to supply a force. But as the force in these cases was regarded as a property of the objects in which it is embodied, it seemed tautology to say that there must be the collocation *and* the force. As the collocation must be a collocation of objects possessing the force-giving property, the collocation, so understood, included the force.

How, then, shall we have to express these facts, if the theory be finally substantiated that all Force is reducible to a previous Motion? We shall have to say, that one of the conditions of every phenomenon is an antecedent Motion. But it will have to be explained that this needs not be *actual* motion. The coal which supplies the force exerted in combustion is not shown to have been exerting that force in the form of molecular motion in the pit; it was not even exerting pressure. The stone on the eminence *is* exerting a pressure, but only equivalent to its weight, not to the additional momentum it would acquire by falling. The antecedent, therefore, is not a force in action; and we can still only call it a property of the objects, by which they would exert a force on the occurrence of a fresh collocation. The collocation, therefore, still includes the force. The force said to be stored up, is simply a particular property which the object has acquired. The cause we are in search of, is a collocation of objects possessing that particular property. When, indeed, we inquire further into the cause from which they derive that property, the new conception introduced by the Conservation theory comes in: the property is itself an effect, and its cause, according to the theory, is a former motion of exactly equivalent amount, which has been impressed on the particles of the body, perhaps at some very distant period. But the case is simply one of those we have already considered, in which the efficacy of a cause consists in its investing an object with a property. The force said to be laid up, and merely potential, is no more a really existing thing than any other properties of objects are really existing things. The expression is a mere artifice of language, convenient for describing the phenomena: it is unnecessary to suppose that any thing has been in continuous existence except an abstract potentiality. A force suspended in its operation, neither manifesting itself by motion nor by pressure, is not an existing fact, but a name for our conviction that in appropriate circumstances a fact would take place. We know that a pound weight, were it to fall from the earth into the sun, would acquire in falling a momentum equal to millions of pounds; but we do not credit the

pound weight with more of actually existing force than is equal to the pressure it is now exerting on the earth, and that is exactly a pound. We might as well say that a force of millions of pounds exists in a pound, as that the force which will manifest itself when the coal is burned is a real thing existing in the coal. What is fixed in the coal is only a certain property: it has become fit to be the antecedent of an effect called combustion, which partly consists in giving out, under certain conditions, a given definite quantity of heat.

We thus see that no new general conception of Causation is introduced by the Conservation theory. The indestructibility of Force no more interferes with the theory of Causation than the indestructibility of Matter, meaning by matter the element of resistance in the sensible world. It only enables us to understand better than before the nature and laws of some of the sequences.

This better understanding, however, enables us, with Mr. Bain, to admit, as one of the tests for distinguishing causation from mere concomitance, the expenditure or transfer of energy. If the effect, or any part of the effect, to be accounted for, consists in putting matter in motion, then any of the objects present which has lost motion has contributed to the effect; and this is the true meaning of the proposition that the cause is that one of the antecedents which exerts active force.

§ 11. It is proper in this place to advert to a rather ancient doctrine respecting causation, which has been revived during the last few years in many quarters, and at present gives more signs of life than any other theory of causation at variance with that set forth in the preceding pages.

According to the theory in question, Mind, or to speak move precisely, Will, is the only cause of phenomena. The type of Causation, as well as the exclusive source from which we derive the idea, is our own voluntary agency. Here, and here only (it is said), we have direct evidence of causation. We know that we can move our bodies. Respecting the phenomena of inanimate nature, we have no other direct knowledge than that of antecedence and sequence. But in the case of our voluntary actions, it is affirmed that we are conscious of power before we have experience of results. An act of volition, whether followed by an effect or not, is accompanied by a consciousness of effort, "of force exerted, of power in action, which is necessarily causal, or causative." This feeling of energy or force, inherent in an act of will, is knowledge *a priori*; assurance, prior to experience, that we have the power of causing effects. Volition, therefore, it is asserted, is something more than an unconditional antecedent; it is a cause, in a different sense from that in which physical phenomena are said to cause one another: it is an Efficient Cause. From this the transition is easy to the further doctrine, that Volition is the *sole* Efficient Cause of all phenomena. "It is inconceivable that dead force could continue unsupported for a moment beyond its creation. We can not even conceive of change or phenomena without the energy of a mind." "The word *action*" itself, says another writer of the same school, "has no real significance except when applied to the doings of an intelligent agent. Let any one conceive, if he can, of any power, energy, or force inherent in a lump of matter." Phenomena may have the semblance of being produced by physical causes, but they are in reality produced, say these writers, by the immediate agency of mind. All things which do not proceed from a human (or, I suppose, an animal) will proceed, they say, directly from divine will. The earth is not moved by the combination of a centripetal and a projectile force; this is but a mode of speaking, which serves to facilitate our conceptions. It is moved by the direct volition of an omnipotent Being, in a path coinciding with that which we deduce from the hypothesis of these two forces.

As I have so often observed, the general question of the existence of Efficient Causes does not fall within the limits of our subject; but a theory which represents them as capable of being subjects of human knowledge, and which passes off as efficient causes what are only physical or phenomenal causes, belongs as much to Logic as to metaphysics, and is a fit subject for discussion here.

To my apprehension, a volition is not an efficient, but simply a physical cause. Our will causes our bodily actions in the same sense, and in no other, in which cold causes ice, or a spark causes an explosion of gunpowder. The volition, a state of our mind, is the antecedent; the motion of our limbs in conformity to the volition, is the consequent. This sequence I conceive to be not a subject of direct consciousness, in the sense

intended by the theory. The antecedent, indeed, and the consequent, are subjects of consciousness. But the connection between them is a subject of experience. I can not admit that our consciousness of the volition contains in itself any *a priori* knowledge that the muscular motion will follow. If our nerves of motion were paralyzed, or our muscles stiff and inflexible, and had been so all our lives, I do not see the slightest ground for supposing that we should ever (unless by information from other people) have known any thing of volition as a physical power, or been conscious of any tendency in feelings of our mind to produce motions of our body, or of other bodies. I will not undertake to say whether we should in that case have had the physical feeling which I suppose is meant when these writers speak of "consciousness of effort:" I see no reason why we should not; since that physical feeling is probably a state of nervous sensation beginning and ending in the brain, without involving the motory apparatus: but we certainly should not have designated it by any term equivalent to effort, since effort implies consciously aiming at an end, which we should not only in that case have had no reason to do, but could not even have had the idea of doing. If conscious at all of this peculiar sensation, we should have been conscious of it, I conceive, only as a kind of uneasiness, accompanying our feelings of desire.

It is well argued by Sir William Hamilton against the theory in question, that it "is refuted by the consideration that between the overt fact of corporeal movement of which we are cognizant, and the internal act of mental determination of which we are also cognizant, there intervenes a numerous series of intermediate agencies of which we have no knowledge; and, consequently, that we can have no consciousness of any causal connection between the extreme links of this chain, the volition to move and the limb moving, as this hypothesis asserts. No one is immediately conscious, for example, of moving his arm through his volition. Previously to this ultimate movement, muscles, nerves, a multitude of solid and fluid parts, must be set in motion by the will, but of this motion we know, from consciousness, absolutely nothing. A person struck with paralysis is conscious of no inability in his limb to fulfill the determinations of his will; and it is only after having willed, and finding that his limbs do not obey his volition, that he learns by this experience, that the external movement does not follow the internal act. But as the paralytic learns after the volition that his limbs do not obey his mind; so it is only after volition that the man in health learns, that his limbs do obey the mandates of his will."(123)

Those against whom I am contending have never produced, and do not pretend to produce, any positive evidence(124) that the power of our will to move our bodies would be known to us independently of experience. What they have to say on the subject is, that the production of physical events by a will seems to carry its own explanation with it, while the action of matter upon matter seems to require something else to explain it; and is even, according to them, "inconceivable" on any other supposition than that some will intervenes between the apparent cause and its apparent effect. They thus rest their case on an appeal to the inherent laws of our conceptive faculty; mistaking, as I apprehend, for the laws of that faculty its acquired habits, grounded on the spontaneous tendencies of its uncultured state. The succession between the will to move a limb and the actual motion is one of the most direct and instantaneous of all sequences which come under our observation, and is familiar to every moment's experience from our earliest infancy; more familiar than any succession of events exterior to our bodies, and especially more so than any other case of the apparent origination (as distinguished from the mere communication) of motion. Now, it is the natural tendency of the mind to be always attempting to facilitate its conception of unfamiliar facts by assimilating them to others which are familiar. Accordingly, our voluntary acts, being the most familiar to us of all cases of causation, are, in the infancy and early youth of the human race, spontaneously taken as the type of causation in general, and all phenomena are supposed to be directly produced by the will of some sentient being. This original Fetichism I shall not characterize in the words of Hume, or of any follower of Hume, but in those of a religious metaphysician, Dr. Reid, in order more effectually to show the unanimity which exists on the subject among all competent thinkers.

"When we turn our attention to external objects, and begin to exercise our rational faculties about them, we find that there are some motions and changes in them which we have power to produce, and that there are many which must have some other cause. Either the objects must have life and active power, as we have, or

they must be moved or changed by something that has life and active power, as external objects are moved by us.

"Our first thoughts seem to be, that the objects in which we perceive such motion have understanding and active power as we have. 'Savages,' says the Abbé Raynal, 'wherever they see motion which they can not account for, there they suppose a soul.' All men may be considered as savages in this respect, until they are capable of instruction, and of using their faculties in a more perfect manner than savages do.

"The Abbé Raynal's observation is sufficiently confirmed, both from fact, and from the structure of all languages.

"Rude nations do really believe sun, moon, and stars, earth, sea, and air, fountains, and lakes, to have understanding and active power. To pay homage to them, and implore their favor, is a kind of idolatry natural to savages.

"All languages carry in their structure the marks of their being formed when this belief prevailed. The distinction of verbs and participles into active and passive, which is found in all languages, must have been originally intended to distinguish what is really active from what is merely passive; and in all languages, we find active verbs applied to those objects, in which, according to the Abbé Raynal's observation, savages suppose a soul.

"Thus we say the sun rises and sets, and comes to the meridian, the moon changes, the sea ebbs and flows, the winds blow. Languages were formed by men who believed these objects to have life and active power in themselves. It was therefore proper and natural to express their motions and changes by active verbs.

"There is no surer way of tracing the sentiments of nations before they have records, than by the structure of their language, which, notwithstanding the changes produced in it by time, will always retain some signatures of the thoughts of those by whom it was invented. When we find the same sentiments indicated in the structure of all languages, those sentiments must have been common to the human species when languages were invented.

"When a few, of superior intellectual abilities, find leisure for speculation, they begin to philosophize, and soon discover, that many of those objects which at first they believed to be intelligent and active are really lifeless and passive. This is a very important discovery. It elevates the mind, emancipates from many vulgar superstitions, and invites to further discoveries of the same kind.

"As philosophy advances, life and activity in natural objects retires, and leaves them dead and inactive. Instead of moving voluntarily, we find them to be moved necessarily; instead of acting, we find them to be acted upon; and Nature appears as one great machine, where one wheel is turned by another, that by a third; and how far this necessary succession may reach, the philosopher does not know."(125)

There is, then, a spontaneous tendency of the intellect to account to itself for all cases of causation by assimilating them to the intentional acts of voluntary agents like itself. This is the instinctive philosophy of the human mind in its earliest stage, before it has become familiar with any other invariable sequences than those between its own volitions or those of other human beings and their voluntary acts. As the notion of fixed laws of succession among external phenomena gradually establishes itself, the propensity to refer all phenomena to voluntary agency slowly gives way before it. The suggestions, however, of daily life continuing to be more powerful than those of scientific thought, the original instinctive philosophy maintains its ground in the mind, underneath the growths obtained by cultivation, and keeps up a constant resistance to their throwing their roots deep into the soil. The theory against which I am contending derives its nourishment from that substratum. Its strength does not lie in argument, but in its affinity to an obstinate tendency of the infancy of the human mind.

That this tendency, however, is not the result of an inherent mental law, is proved by superabundant evidence. The history of science, from its earliest dawn, shows that mankind have not been unanimous in thinking either that the action of matter upon matter was not conceivable, or that the action of mind upon matter was. To some thinkers, and some schools of thinkers, both in ancient and in modern times, this last has appeared much more inconceivable than the former. Sequences entirely physical and material, as soon as they had become sufficiently familiar to the human mind, came to be thought perfectly natural, and were regarded not only as needing no explanation themselves, but as being capable of affording it to others, and even of serving as the ultimate explanation of things in general.

One of the ablest recent supporters of the Volitional theory has furnished an explanation, at once historically true and philosophically acute, of the failure of the Greek philosophers in physical inquiry, in which, as I conceive, he unconsciously depicts his own state of mind. "Their stumbling-block was one as to the nature of the evidence they had to expect for their conviction.... They had not seized the idea that they must not expect to understand the processes of outward causes, but only their results; and consequently, the whole physical philosophy of the Greeks was an attempt to identify mentally the effect with its cause, to feel after some not only necessary but natural connection, where they meant by natural that which would *per se* carry some presumption to their own mind.... They wanted to see some *reason* why the physical antecedent should produce this particular consequent, and their only attempts were in directions where they could find such reasons."(126) In other words, they were not content merely to know that one phenomenon was always followed by another; they thought that they had not attained the true aim of science, unless they could perceive something in the nature of the one phenomenon from which it might have been known or presumed *previous to trial* that it would be followed by the other: just what the writer, who has so clearly pointed out their error, thinks that he perceives in the nature of the phenomenon Volition. And to complete the statement of the case, he should have added that these early speculators not only made this their aim, but were quite satisfied with their success in it; not only sought for causes which should carry in their mere statement evidence of their efficiency, but fully believed that they had found such causes. The reviewer can see plainly that this was an error, because *he* does not believe that there exist any relations between material phenomena which can account for their producing one another; but the very fact of the persistency of the Greeks in this error, shows that their minds were in a very different state: they were able to derive from the assimilation of physical facts to other physical facts, the kind of mental satisfaction which we connect with the word explanation, and which the reviewer would have us think can only be found in referring phenomena to a will. When Thales and Hippo held that moisture was the universal cause, and external element, of which all other things were but the infinitely various sensible manifestations; when Anaximenes predicated the same thing of air, Pythagoras of numbers, and the like, they all thought that they had found a real explanation; and were content to rest in this explanation as ultimate. The ordinary sequences of the external universe appeared to them, no less than to their critic, to be inconceivable without the supposition of some universal agency to connect the antecedents with the consequents; but they did not think that Volition, exerted by minds, was the only agency which fulfilled this requirement. Moisture, or air, or numbers, carried to their minds a precisely similar impression of making intelligible what was otherwise inconceivable, and gave the same full satisfaction to the demands of their conceptive faculty.

It was not the Greeks alone, who "wanted to see some reason why the physical antecedent should produce this particular consequent," some connection "which would *per se* carry some presumption to their own mind." Among modern philosophers, Leibnitz laid it down as a self-evident principle that all physical causes without exception must contain in their own nature something which makes it intelligible that they should be able to produce the effects which they do produce. Far from admitting Volition as the only kind of cause which carried internal evidence of its own power, and as the real bond of connection between physical antecedents and their consequents, he demanded some naturally and *per se* efficient physical antecedent as the bond of connection between Volition itself and its effects. He distinctly refused to admit the will of God as a sufficient explanation of any thing except miracles; and insisted upon finding something that would account *better* for the phenomena of nature than a mere reference to divine volition.(127)

Again, and conversely, the action of mind upon matter (which, we are now told, not only needs no explanation itself, but is the explanation of all other effects), has appeared to some thinkers to be itself the grand inconceivability. It was to get over this very difficulty that the Cartesians invented the system of Occasional Causes. They could not conceive that thoughts in a mind could produce movements in a body, or that bodily movements could produce thoughts. They could see no necessary connection, no relation *a priori*, between a motion and a thought. And as the Cartesians, more than any other school of philosophical speculation before or since, made their own minds the measure of all things, and refused, on principle, to believe that Nature had done what they were unable to see any reason why she must do, they affirmed it to be impossible that a material and a mental fact could be causes one of another. They regarded them as mere Occasions on which the real agent, God, thought fit to exert his power as a Cause. When a man wills to move his foot, it is not his will that moves it, but God (they said) moves it on the occasion of his will. God, according to this system, is the only efficient cause, not *quâ* mind, or *quâ* endowed with volition, but *quâ* omnipotent. This hypothesis was, as I said, originally suggested by the supposed inconceivability of any real mutual action between Mind and Matter; but it was afterward extended to the action of Matter upon Matter, for on a nicer examination they found this inconceivable too, and therefore, according to their logic, impossible. The *deus ex machinâ* was ultimately called in to produce a spark on the occasion of a flint and steel coming together, or to break an egg on the occasion of its falling on the ground.

All this, undoubtedly, shows that it is the disposition of mankind in general, not to be satisfied with knowing that one fact is invariably antecedent and another consequent, but to look out for something which may seem to explain their being so. But we also see that this demand may be completely satisfied by an agency purely physical, provided it be much more familiar than that which it is invoked to explain. To Thales and Anaximenes, it appeared inconceivable that the antecedents which we see in nature should produce the consequents; but perfectly natural that water, or air, should produce them. The writers whom I oppose declare this inconceivable, but can conceive that mind, or volition, is *per se* an efficient cause: while the Cartesians could not conceive even that, but peremptorily declared that no mode of production of any fact whatever was conceivable, except the direct agency of an omnipotent being; thus giving additional proof of what finds new confirmation in every stage of the history of science: that both what persons can, and what they can not, conceive, is very much an affair of accident, and depends altogether on their experience, and their habits of thought; that by cultivating the requisite associations of ideas, people may make themselves unable to conceive any given thing; and may make themselves able to conceive most things, however inconceivable these may at first appear; and the same facts in each person's mental history which determine what is or is not conceivable to him, determine also which among the various sequences in nature will appear to him so natural and plausible, as to need no other proof of their existence; to be evident by their own light, independent equally of experience and of explanation.

By what rule is any one to decide between one theory of this description and another? The theorists do not direct us to any external evidence; they appeal each to his own subjective feelings. One says, the succession C B appears to me more natural, conceivable, and credible *per se*, than the succession A B; you are therefore mistaken in thinking that B depends upon A; I am certain, though I can give no other evidence of it, that C comes in between A and B, and is the real and only cause of B. The other answers, the successions C B and A B appear to me equally natural and conceivable, or the latter more so than the former: A is quite capable of producing B without any other intervention. A third agrees with the first in being unable to conceive that A can produce B, but finds the sequence D B still more natural than C B, or of nearer kin to the subject-matter, and prefers his D theory to the C theory. It is plain that there is no universal law operating here, except the law that each person's conceptions are governed and limited by his individual experiences and habits of thought. We are warranted in saying of all three, what each of them already believes of the other two, namely, that they exalt into an original law of the human intellect and of outward nature one particular sequence of phenomena, which appears to them more natural and more conceivable than other sequences, only because it is more familiar. And from this judgment I am unable to except the theory, that Volition is an Efficient Cause.

I am unwilling to leave the subject without adverting to the additional fallacy contained in the corollary from

this theory; in the inference that because Volition is an efficient cause, therefore it is the only cause, and the direct agent in producing even what is apparently produced by something else. Volitions are not known to produce any thing directly except nervous action, for the will influences even the muscles only through the nerves. Though it were granted, then, that every phenomenon has an efficient, and not merely a phenomenal cause, and that volition, in the case of the peculiar phenomena which are known to be produced by it, is that efficient cause; are we therefore to say, with these writers, that since we know of no other efficient cause, and ought not to assume one without evidence, there *is* no other, and volition is the direct cause of all phenomena? A more outrageous stretch of inference could hardly be made. Because among the infinite variety of the phenomena of nature there is one, namely, a particular mode of action of certain nerves, which has for its cause, and as we are now supposing for its efficient cause, a state of our mind; and because this is the only efficient cause of which we are conscious, being the only one of which in the nature of the case we *can* be conscious, since it is the only one which exists within ourselves; does this justify us in concluding that all other phenomena must have the same kind of efficient cause with that one eminently special, narrow, and peculiarly human or animal, phenomenon? The nearest parallel to this specimen of generalization is suggested by the recently revived controversy on the old subject of Plurality of Worlds, in which the contending parties have been so conspicuously successful in overthrowing one another. Here also we have experience only of a single case, that of the world in which we live, but that this is inhabited we know absolutely, and without possibility of doubt. Now if on this evidence any one were to infer that every heavenly body without exception, sun, planet, satellite, comet, fixed star or nebula, is inhabited, and must be so from the inherent constitution of things, his inference would exactly resemble that of the writers who conclude that because volition is the efficient cause of our own bodily motions, it must be the efficient cause of every thing else in the universe. It is true there are cases in which, with acknowledged propriety, we generalize from a single instance to a multitude of instances. But they must be instances which resemble the one known instance, and not such as have no circumstance in common with it except that of being instances. I have, for example, no direct evidence that any creature is alive except myself, yet I attribute, with full assurance, life and sensation to other human beings and animals. But I do not conclude that all other things are alive merely because I am. I ascribe to certain other creatures a life like my own, because they manifest it by the same sort of indications by which mine is manifested. I find that their phenomena and mine conform to the same laws, and it is for this reason that I believe both to arise from a similar cause. Accordingly I do not extend the conclusion beyond the grounds for it. Earth, fire, mountains, trees, are remarkable agencies, but their phenomena do not conform to the same laws as my actions do, and I therefore do not believe earth or fire, mountains or trees, to possess animal life. But the supporters of the Volition Theory ask us to infer that volition causes every thing, for no reason except that it causes one particular thing; although that one phenomenon, far from being a type of all natural phenomena, is eminently peculiar; its laws bearing scarcely any resemblance to those of any other phenomenon, whether of inorganic or of organic nature.

NOTE SUPPLEMENTARY TO THE PRECEDING CHAPTER.

The author of the Second Burnett Prize Essay (Dr. Tulloch), who has employed a considerable number of pages in controverting the doctrines of the preceding chapter, has somewhat surprised me by denying a fact, which I imagined too well known to require proof--that there have been philosophers who found in physical explanations of phenomena the same complete mental satisfaction which we are told is only given by volitional explanation, and others who denied the Volitional Theory on the same ground of inconceivability on which it is defended. The assertion of the Essayist is countersigned still more positively by an able reviewer of the Essay:(128) "Two illustrations," says the reviewer, "are advanced by Mr. Mill: the case of Thales and Anaximenes, stated by him to have maintained, the one Moisture and the other Air to be the origin of all things; and that of Descartes and Leibnitz, whom he asserts to have found the action of Mind upon Matter the grand inconceivability. In counter-statement as to the first of these cases the author shows--what we believe now hardly admits of doubt--that the Greek philosophers distinctly recognized as beyond and above their primal material source, the {~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~}, or Divine Intelligence, as the efficient and originating Source of all; and as to

the second, by proof that it was the *mode*, not the *fact*, of that action on matter, which was represented as inconceivable."

A greater quantity of historical error has seldom been comprised in a single sentence. With regard to Thales, the assertion that he considered water as a mere material in the hands of {~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} rests on a passage of Cicero *de Naturâ Deorum*; and whoever will refer to any of the accurate historians of philosophy, will find that they treat this as a mere fancy of Cicero, resting on no authority, opposed to all the evidence; and make surmises as to the manner in which Cicero may have been led into the error. (See Rutter, vol. i., p. 211, 2d ed.; Brandis, vol. i., pp. 118-9, 1st ed.; Preller, *Historia Philosophiæ Græco-Romanæ*, p. 10. "Schiefe Ansicht, durchaus zu verwerfen;" "augenscheinlich folgernd statt zu berichten;" "quibus vera sententia Thaletis plane detorquetur," are the expressions of these writers.) As for Anaximenes, he even according to Cicero, maintained, not that air was the material out of which God made the world, but that the air was a god: "Anaximenes aëra deum statuit;" or, according to St. Augustine, that it was the material out of which the gods were made; "non tamen ab ipsis [Diis] aërem factum, sed ipsos ex aëre ortos credidit." Those who are not familiar with the metaphysical terminology of antiquity, must not be misled by finding it stated that Anaximenes attributed {~GREEK SMALL LETTER PSI~}{~GREEK SMALL LETTER UPSILON~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA WITH VARIA~} (translated *soul*, or *life*) to his universal element, the air. The Greek philosophers acknowledged several kinds of {~GREEK SMALL LETTER PSI~}{~GREEK SMALL LETTER UPSILON~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA WITH VARIA~}, the nutritive, the sensitive, and the intellective.(129) Even the moderns, with admitted correctness, attribute life to plants. As far as we can make out the meaning of Anaximenes, he made choice of Air as the universal agent, on the ground that it is perpetually in motion, without any apparent cause external to itself: so that he conceived it as exercising spontaneous force, and as the principle of life and activity in all things, men and gods inclusive. If this be not representing it as the Efficient Cause the dispute altogether has no meaning.

If either Anaximenes, or Thales, or any of their contemporaries, had held the doctrine that {~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} was the Efficient Cause, that doctrine could not have been reputed, as it was throughout antiquity, to have originated with Anaxagoras. The testimony of Aristotle, in the first book of his Metaphysics, is perfectly decisive with respect to these early speculations. After enumerating four kinds of causes, or rather four different meanings of the word Cause, viz., the Essence of a thing, the Matter of it, the Origin of Motion (Efficient Cause), and the End or Final Cause, he proceeds to say, that most of the early philosophers recognized only the second kind of Cause, the Matter of a thing, {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA WITH VARIA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER EPSILON WITH PSILI~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER UPSILON WITH DASIA AND OXIA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER ETA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH PSILI AND PERISPOMENI~}{~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA~} {~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER OMICRON WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER OMEGA WITH PSILI AND YPOGEGRAMMENI~}{~GREEK SMALL LETTER ETA WITH OXIA~}{~GREEK SMALL LETTER THETA~}{~GREEK SMALL LETTER ETA~}{~GREEK SMALL LETTER SIGMA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER ALPHA WITH PSILI~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ALPHA WITH VARIA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH DASIA AND PERISPOMENI~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK

SMALL LETTER IOTA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMEGA~}{~GREEK SMALL LETTER NU~}. As his first example he specifies Thales, whom he describes as taking the lead in this view of the subject, {~GREEK SMALL LETTER OMICRON WITH DASIA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ETA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER ALPHA WITH PSILI~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA~}{~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER OMICRON WITH VARIA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER PHI~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER SIGMA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER PHI~}{~GREEK SMALL LETTER IOTA WITH OXIA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER FINAL SIGMA~}, and goes on to Hippon, Anaximenes, Diogenes (of Apollonia), Hippasus of Metapontum, Heraclitus, and Empedocles. Anaxagoras, however (he proceeds to say), taught a different doctrine, as we *know*, and it is *alleged* that Hermotimus of Clazomenæ taught it before him. Anaxagoras represented, that even if these various theories of the universal material were true, there would be need of some other cause to account for the transformations of the materials, since the material can not originate its own changes: {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PSILI~} {~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER ALPHA WITH VARIA~}{~GREEK SMALL LETTER RHO~} {~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER ETA WITH VARIA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH OXIA~} {~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER EPSILON~} {~GREEK SMALL LETTER UPSILON WITH DASIA~}{~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH OXIA~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH VARIA~} {~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER BETA~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH DASIA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}; {~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER EPSILON WITH OXIA~}{~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER OMEGA~} {~GREEK SMALL LETTER DELTA~}{~GREEK KORONIS~} {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA WITH PSILI~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER EPSILON~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER XI~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PSILI AND OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER

EPSILON~} {~GREEK SMALL LETTER OMICRON WITH DASIA~} {~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER OMICRON WITH VARIA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER IOTA WITH PSILI AND OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~} {~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER BETA~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH DASIA~}{~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMEGA WITH PERISPOMENI~}{~GREEK SMALL LETTER NU~}, {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER EPSILON WITH VARIA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH PERISPOMENI~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER EPSILON WITH VARIA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER XI~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER IOTA WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ETA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER OMICRON WITH DASIA~} {~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER EPSILON WITH OXIA~} {~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER OMICRON WITH VARIA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER ALPHA WITH PSILI~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA~}, {~GREEK SMALL LETTER ALPHA WITH PSILI~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK KORONIS~} {~GREEK SMALL LETTER EPSILON WITH DASIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER OMICRON WITH OXIA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER IOTA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER BETA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER IOTA WITH PSILI AND OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~}, viz., the other kind of cause, {~GREEK SMALL LETTER OMICRON WITH PSILI AND OXIA~}{~GREEK SMALL LETTER THETA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER NU~} {~GREEK

SMALL LETTER ETA WITH DASIA~} {~GREEK SMALL LETTER ALPHA WITH PSILI~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA WITH VARIA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ETA WITH OXIA~}{~GREEK SMALL LETTER SIGMA~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER OMEGA~}{~GREEK SMALL LETTER FINAL SIGMA~}--an Efficient Cause. Aristotle expresses great approbation of this doctrine (which he says made its author appear the only sober man among persons raving, {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA WITH PSILI~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ETA WITH OXIA~}{~GREEK SMALL LETTER PHI~}{~GREEK SMALL LETTER OMEGA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH PSILI~}{~GREEK SMALL LETTER PHI~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ETA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER RHO~}{~GREEK KORONIS~} {~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH PSILI~}{~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI~} {~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER EPSILON WITH OXIA~}{~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER OMICRON WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~}); but while describing the influence which it exercised over subsequent speculation, he remarks that the philosophers against whom this, as he thinks, insuperable difficulty was urged, had not felt it to be any difficulty: {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER EPSILON WITH OXIA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH PSILI~}{~GREEK SMALL LETTER DELTA~}{~GREEK SMALL LETTER UPSILON~}{~GREEK SMALL LETTER SIGMA~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER NU~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH PSILI~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH DASIA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER IOTA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~}. It is surely unnecessary to say more in proof of the matter of fact which Dr. Tulloch and his reviewer disbelieve.

Having pointed out what he thinks the error of these early speculators in not recognizing the need of an efficient cause, Aristotle goes on to mention two other efficient causes to which they might have had recourse, instead of intelligence: {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA~}, chance, and {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~}, spontaneity. He indeed puts these aside as not sufficiently worthy causes for the order in the universe, {~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL

LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER DELTA~}{~GREEK KORONIS~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH DASIA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMEGA~}{~GREEK SMALL LETTER OMEGA WITH PERISPOMENI AND YPOGEGRAMMENI~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMEGA WITH YPOGEGRAMMENI~} {~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER IOTA WITH VARIA~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER ETA WITH PERISPOMENI AND YPOGEGRAMMENI~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA WITH YPOGEGRAMMENI~} {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER SIGMA~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER UPSILON WITH PERISPOMENI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} {~GREEK SMALL LETTER EPSILON WITH PSILI~}{~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER IOTA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER EPSILON WITH OXIA~}{~GREEK SMALL LETTER PSI~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER IOTA~} {~GREEK SMALL LETTER PI~}{~GREEK SMALL LETTER RHO~}{~GREEK SMALL LETTER ALPHA WITH PERISPOMENI~}{~GREEK SMALL LETTER GAMMA~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER ALPHA~} {~GREEK SMALL LETTER KAPPA~}{~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER LAMDA~}{~GREEK SMALL LETTER OMEGA WITH PERISPOMENI~}{~GREEK SMALL LETTER FINAL SIGMA~} {~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER IOTA WITH PSILI~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER EPSILON~}{~GREEK SMALL LETTER NU~}; but he does not reject them as incapable of producing *any* effect, but only as incapable of producing *that* effect. He himself recognizes {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER UPSILON WITH OXIA~}{~GREEK SMALL LETTER CHI~}{~GREEK SMALL LETTER ETA~} and {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~} as co-ordinate agents with Mind in producing the phenomena of the universe; the department allotted to them being composed of all the classes of phenomena which are not supposed to follow any uniform law. By thus including Chance among efficient causes, Aristotle fell into an error which philosophy has now outgrown, but which is by no means so alien to the spirit even of modern speculation as it may at first sight appear. Up to quite a recent period philosophers went on ascribing, and many of them have not yet ceased to ascribe, a real existence to the results of abstraction. Chance could make out as good a title to that dignity as many other of the mind's abstract creations: it had had a name given to it, and why should it not be a reality? As for {~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON WITH VARIA~} {~GREEK SMALL LETTER ALPHA~}{~GREEK SMALL LETTER UPSILON WITH PSILI~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER MU~}{~GREEK SMALL LETTER ALPHA WITH OXIA~}{~GREEK SMALL LETTER TAU~}{~GREEK SMALL LETTER OMICRON~}{~GREEK SMALL LETTER NU~}, it is recognized even yet as one of the modes of origination of phenomena by all those thinkers who maintain what is called the Freedom of the Will. The same self-determining power which that doctrine attributes to volitions, was supposed by the ancients to be possessed also by some other natural phenomena: a circumstance which throws considerable light on more than one of the supposed invincible necessities of belief. I have introduced it here, because this belief of Aristotle, or rather of the Greek philosophers generally, is as fatal as the doctrines of Thales and the Ionic school to the theory that the human mind is compelled by its constitution to conceive volition as the origin of all force, and the efficient cause of

all phenomena.(130)

With regard to the modern philosophers (Leibnitz and the Cartesians) whom I had cited as having maintained that the action of mind upon matter, so far from being the only conceivable origin of material phenomena, is itself inconceivable; the attempt to rebut this argument by asserting that the mode, not the fact, of the action of mind on matter was represented as inconceivable, is an abuse of the privilege of writing confidently about authors without reading them; for any knowledge whatever of Leibnitz would have taught those who thus speak of him, that the inconceivability of the mode, and the impossibility of the thing, were in his mind convertible expressions. What was his famous Principle of the Sufficient Reason, the very corner-stone of his Philosophy, from which the Pre-established Harmony, the doctrine of Monads, and all the opinions most characteristic of Leibnitz, were corollaries? It was, that nothing exists, the existence of which is not capable of being proved and explained *a priori*; the proof and explanation in the case of contingent facts being derived from the nature of their causes; which could not be the causes unless there was something in their nature showing them to be capable of producing those particular effects. And this "something" which accounts for the production of physical effects, he was able to find in many physical causes, but could not find it in any finite minds, which therefore he unhesitatingly asserted to be incapable of producing any physical effects whatever. "On ne saurait concevoir," he says, "une action réciproque de la matière et de l'intelligence l'une sur l'autre," and there is therefore (he contends) no choice but between the Occasional Causes of the Cartesians and his own Pre-established Harmony, according to which there is no more connection between our volitions and our muscular actions than there is between two clocks which are wound up to strike at the same instant. But he felt no similar difficulty as to physical causes; and throughout his speculations, as in the passage I have already cited respecting gravitation, he distinctly refuses to consider as part of the order of nature any fact which is not explicable from the nature of its physical cause.

With regard to the Cartesians (not Descartes; I did not make that mistake, though the reviewer of Dr. Tulloch's Essay attributes it to me) I take a passage almost at random from Malebranche, who is the best known of the Cartesians, and, though not the inventor of the system of Occasional Causes, is its principal expositor. In Part II., chap. iii., of his Sixth Book, having first said that matter can not have the power of moving itself, he proceeds to argue that neither can mind have the power of moving it. "Quand on examine l'idée que l'on a de tous les esprits finis, on ne voit point de liaison nécessaire entre leur volonté et le mouvement de quelque corps que ce soit, on voit au contraire qu'il n'y en a point, et qu'il n'y en peut avoir" (there is nothing in the idea of finite mind which can account for its causing the motion of a body); "on doit aussi conclure, si on vent raisonner selon ses lumières, qu'il n'y a aucun esprit créé qui puisse remuer quelque corps que ce soit comme cause véritable on principale, de même que l'on a dit qu'aucun corps ne se pouvait remuer soi-même:" thus the idea of Mind is according to him as incompatible as the idea of Matter with the exercise of active force. But when, he continues, we consider not a created but a Divine Mind, the case is altered; for the idea of a Divine Mind includes omnipotence; and the idea of omnipotence does contain the idea of being able to move bodies. Thus it is the nature of omnipotence which renders the motion of bodies even by the Divine Mind credible or conceivable, while, so far as depended on the mere nature of mind, it would have been inconceivable and incredible. If Malebranche had not believed in an omnipotent Being, he would have held all action of mind on body to be a demonstrated impossibility.(131)

A doctrine more precisely the reverse of the Volitional theory of causation can not well be imagined. The Volitional theory is, that we know by intuition or by direct experience the action of our own mental volitions on matter; that we may hence infer all other action upon matter to be that of volition, and might thus know, without any other evidence, that matter is under the government of a Divine Mind. Leibnitz and the Cartesians, on the contrary, maintain that our volitions do not and can not act upon matter, and that it is only the existence of an all-governing Being, and that Being omnipotent, which can account for the sequence between our volitions and our bodily actions. When we consider that each of these two theories, which, as theories of causation, stand at the opposite extremes of possible divergence from one another, invokes not only as its evidence, but as its sole evidence, the absolute inconceivability of any theory but itself, we are enabled to measure the worth of this kind of evidence: and when we find the Volitional theory entirely built

upon the assertion that by our mental constitution we are compelled to recognize our volitions as efficient causes, and then find other thinkers maintaining that we know that they are not and can not be such causes, and can not conceive them to be so, I think we have a right to say that this supposed law of our mental constitution does not exist.

Dr. Tulloch (pp. 45-47) thinks it a sufficient answer to this, that Leibnitz and the Cartesians were Theists, and believed the will of God to be an efficient cause. Doubtless they did, and the Cartesians even believed (though Leibnitz did not) that it is the only such cause. Dr. Tulloch mistakes the nature of the question. I was not writing on Theism, as Dr. Tulloch is, but against a particular theory of causation, which, if it be unfounded, can give no effective support to Theism or to any thing else. I found it asserted that volition is the only efficient cause, on the ground that no other efficient cause is conceivable. To this assertion I oppose the instances of Leibnitz and of the Cartesians, who affirmed with equal positiveness that volition as an efficient cause is itself not conceivable, and that omnipotence, which renders all things conceivable, can alone take away the impossibility. This I thought, and think, a conclusive answer to the argument on which this theory of causation avowedly depends. But I certainly did not imagine that Theism was bound up with that theory; nor expected to be charged with denying Leibnitz and the Cartesians to be Theists because I denied that they held the theory.