besides fact and argument. These alleged phenomena are open, like all others, to the test of counter-experiment. Let them be subjected to it in the most rigid manner, and set aside in the case of failure. But to meet them merely with scoffs and jests, or at the most, certain wholly gratuitous assumptions as to a possibly various cause, is not philosophical, and therefore deserves no consideration.

Having thus presented vestiges of laws for the origination and modification of organic being, I must protest against proof of the existence of such laws being held indispensable to the development theory. The earth, we see, has been peopled for ages before man began to observe nature or chronicle his observations. The organic world attained what appears to us completeness, in remote ages. It is a thing done, as individual reproduction is done at the birth of the new creature. We are not, therefore, to expect conspicuous examples of either a new origin of life or a modification of species at the present day. Though, therefore, not one unequivocal instance of such origin and such modification could be presented, it would say nothing positive against the hypothesis that species originated, and made a
series of advances in general organization, by the efficacy of law, in times long antecedent to our historical period. We should still have to say that the evidence of such phenomena was to be looked for elsewhere,—namely, in the history of the progress of organic being as chronicled for us by geology, and in the history which physiology affords us of the progress of the individual embryo. Seeing, then, that plants and animals came into existence gradually, in the course of a vast period of time, and in a succession conforming generally to their grades in organization, and the stages through which the embryo of one of the highest has to pass before it attains maturity, we might say that we had seen all that could well be expected in the case, and enough to establish a strong probability for the development theory. Nevertheless, it may be admitted that any evidence of the continued existence of the creative and modifying laws, is still desirable, for the sake of corroboration. And such is the light in which I regard the facts which we possess regarding variations of type, and the production of some of the lower plants and animals by means independent of generation. As in the progress of an individual being, even after birth, we see the laws which pre-
side over reproduction operating still in a faint degree in the defective nutrition which stunts, and the favouring conditions which advance and glorify, the state of infancy and youth, so might we expect that the laws which originally spread the vegetable and animal kingdoms over the earth, would still, perhaps, be traceable as faintly at work, especially in those lower families where life and the modifiable quality are most abundantly imparted. The evidence for the existence of such laws is patent to the exact observation which will give it philosophical certainty, and to such observation I trust it will, in time, be subjected. Meanwhile, I claim its being received as a provisional aid to the theory of development.

Thus closes my review of the objections which have been made to the evidences for an organic creation by law. Such a mode of that creation was, I said at the first, rendered likely by the manifestation of a presidency of law both in the physical arrangements of the universe and in the constitution of our own minds. It seemed to me that, with evidences of law in these things, we had a strong probability established that law had been the mode of the divine working in the whole
system revealed to our senses and reason, throughout all ages of its existence. And I believed that we were called upon, not to grasp at every objection to this idea which could be conjured out of the darkness of our imperfect knowledge, as if to save us from a disrelished conclusion, but rather to look with candid minds into nature, and endeavour to discover in what we do know the traces of such an origin of organization as might harmonize with the conceptions forced upon us from other quarters; trusting that there never could be any disadvantage from embracing that view which the balance of reason might show to be the nearest to truth. The question is, to which view does the balance now incline? Whether is it most likely that the Deity produced Being and its many-staged theatre in the manner of order or law, or by any different mode of a more arbitrary character; whether, consequently, are we to regard him as ruling the affairs of the world in the manner of an invariable order or otherwise? I say likely—because we are not to expect on any such questions the absolute demonstration which attends a mathematical problem or an unchallengeable writing. We must be content if we only can see a preponderance of reasons for regarding the universe
and its Author in one or other of these lights. To be prepared for a decision upon this question, it is proper that the reader should be presented with a sketch of the theory opposed to that of universal order.

When we set about describing this system, we are struck by finding it vague and unsteady, varying with every degree of intelligence in its votaries and every addition made to science. The uneducated man regards the whole system of the world as resulting from, and depending upon, the immediate working and guidance of an almighty being who acts in each case as may seem to him most meet, exactly as human creatures do. Persons of intelligence, again, usually admit a system of general laws, but for the most part entertain it under great reservations, or in connexion with views totally inconsistent with it. We find Dr. Clark, for instance, admitting a course of nature as the "will of God producing certain effects in a regular and uniform manner," but, this will, "being arbitrary, [an assumption, as far as natural means of knowledge are concerned,] is, he says, as easy to be altered at any time as to be preserved."

Others cut off particular provinces of nature as exceptions from the plan of constant order.
Whatever part is dubious or obscure, to mankind generally or to themselves in particular, there they rear the torn standard of the arbitrary system of divine rule. Human volitions form such a region to many who know not that Quetelet has reduced these to mathematical formulæ, and that one of our own most popular divines has written a Bridge-water Treatise, to show the predominance of natural law over mind, as a proof of the existence and wisdom of God. Some who give up this domain to law, find footing in other departments of nature upon which science has not as yet poured any clear light. We shall presently see by what weak arguments such exceptions are maintained. Meanwhile, it must be noted as important, that all is uncertainty on this side of the question—a strong presumption, were there no other, against it.

One of the most remarkable reservations made of late years from the system of invariable order is that presented in Dr. Whewell's *History of the Inductive Sciences*. Admitting that nature, as revealed to our senses, is a system of causation, this writer halts when he comes to consider the origin of language and of arts, the origin of species and formation of globes. These he calls palætiological sciences, because, in his opinion, we
have to seek for an ancient and different class of causes, as affecting them, from any which are now seen operating. "In no palætiological science," says he, "has man been able to arrive at a beginning which is homogeneous with the known course of events. We can, in such sciences, often go very far back, determine many of the remote circumstances of the past series of events, ascend to a point which seems to be near their origin, and limit the hypothesis respecting the origin itself; but philosophers have never demonstrated, and, so far as we can judge, probably never will be able to demonstrate, what was the primitive state of things from which the progressive course of the world took its first departure. In all these paths of research, when we travel far backwards, the aspect of the earlier portions becomes very different from that of the advanced part on which we now stand; but in all cases the path is lost in obscurity as it is traced backwards to its starting point: it becomes not only invisible, but unimaginable; it is not only an interruption, but an abyss which interposes itself between us and any intelligible beginning of things."*

* Philosophy of the Inductive Sciences, apud Indications of the Creator.
Here, we have the view of exceptions which is entertained by one of the chief writers of the day, and the superior of one of our greatest academical institutions. The professional position of Dr. Whewell may be held to imply that we should receive from him a view at once leaning to the philosophical, and accommodated as far as possible to the prepossessions expected in a large class of persons. It is remarkable, but not surprising, how weak is the barrier which he has raised to stop our course towards a theory of universal arrangement by ordinary natural law.

The necessity alleged by Dr. Whewell for a different set of causes in the early times of our globe, and with regard to the formation of that globe, is, at the very first, liable to strong suspicion, as reminding us much of that well known propensity of nations to fill up the first chapters of their history with mythic heroes and giants. The subjects of investigation are remote from common research; they are not, and never could have been, chronicled in the manner of modern facts; we are in the regions of the comparatively unknown—hence, something more magnificent or impressive than ordinary must be supposed. Such is the reasoning, or rather no-reasoning.
The point at which extraordinary causes have to be supposed is evidently quite arbitrary, resting exactly on the limits of the knowledge existing at any time, and always flying further and further back, in proportion as our knowledge increases. Had Dr. Whewell been writing fifty years ago, he would of course have included among his palæiological sciences, the formation of strata, and the intrusions of the granitic and trappean among the aqueous rocks, which ingenuity has since explained by existing causes;—for there is not a single argument for his considering the formation of globes and origin of species as palæiological, which would not have applied with equal force to these phenomena before the days of Pallas and Hutton. Against a theory of mere assumption—a reasoning from ignorance to ignorance—such considerations form serious objections. But let us come to closer argument. Let us inquire how the idea of a different set of causes for the more important of these phenomena, agrees with such exact knowledge as we have attained respecting them.

"According to the nebular hypothesis," says Dr. Whewell, "the formation of this our system of sun, planets, and satellites, was a process of the same kind as those which are still going on in the
heavens. . . . But . . the uniformitarian doctrine on this subject rests on most unstable foundations. We have as yet only very vague and imperfect reasonings to show that by such condensation a material system such as ours could result; and the introduction of organized beings into such a material system is utterly out of the reach of our philosophy. Here . . therefore, we are led to regard the present order of the world as pointing towards an origin altogether of a different kind from anything which our material science can grasp." Because the nebular hypothesis rests on unstable foundations, and "nothing has been pointed out in the existing order of things which has any resemblance or analogy, of any valid kind, to that creative energy which must be exerted in the production of new species,"—therefore, according to Dr. Whewell, we are "driven to assume events not included in the course of nature," as having formerly taken place. Such is his reasoning. Now let us call to mind a few of the laws ascertained to have been concerned in the cosmical arrangements, leaving for the meantime all that is doubtful in the nebular hypothesis entirely out of view. The proportion of the equatorial to the polar diameter of the earth is exactly
what a fluid mass rotating at such a rate of speed would assume any day we might try the experiment. The relative distances of the planets have been determined by the relation of two laws of matter, so thoroughly patent in their working to modern observation, that a mathematician could ascertain this their result and announce it from his closet, although he never had heard of a planetary system in which it was exemplified. There is, surely, here anything but a likelihood that different causes from those now existing and acting, were the immediate means of producing the cosmical arrangements. May we not rather say that, whatever may have been the details of the formation of globes, we possess ample proof that it was a phenomenon envolved by virtue of exactly the same system of order which we see still operating upon earth? As to the origin of organic beings, our knowledge of geology comes to precisely a similar effect. Admitting that we see not now any such fact as the production of new species, we at least know that, while such facts were occurring upon earth, there were associated phenomena in progress, of a character perfectly ordinary. For example, when the earth received its first fishes, sandstone and limestone were forming in the
manner exemplified a few years ago in the ingenious experiments of Sir James Hall: basaltic columns rose for the future wonder of man, according to the principle which Dr. Gregory Watt showed in operation before the eyes of our fathers; and hollows in the igneous rocks were filled with crystals, precisely as they could now be by virtue of electric action, as shown within the last few years by Crosse and Becquerel. The seas obeyed the impulse of gentle breezes, and rippled their sandy bottoms as seas of the present day are doing; the trees grew as now by favour of sun and wind, thriving in good seasons and pining in bad; this, while the animals above fishes were yet to be created. The movements of the sea, the meteorological agencies, the disposition which we see in the generality of plants to thrive when heat and moisture were most abundant, were kept up in silent serenity, as matters of simply natural order, throughout the whole of the ages which saw reptiles enter in their various forms upon the sea and land. It was about the time of the first mammals, that the forest of the Dirt Bed was sinking in natural ruin amidst the sea sludge, as forests of the Plantagenets have been doing for several centuries upon the coast of England. In
DR. WHEWELL'S VIEWS CONDEMNED.

short, all the common operations of the physical world were going on in their usual simplicity, obeying that order which we still see governing them, while the supposed extraordinary causes were in requisition for the development of the animal and vegetable kingdoms. There surely hence arises a strong presumption against any such causes. It becomes much more likely that the latter phenomena were evolved in the manner of law also, and that we only dream of extraordinary causes here, as men once dreamt of a special action of deity in every change of wind and the results of each season, merely because they did not know the laws by which the events in question were evolved.

The writer of the critique in the *Edinburgh Review* is another representative of opinion on this subject whose ideas are worthy of notice. These ideas are not very clear, but I shall endeavour to gather them from the various parts of his paper where they are expressed. He says of certain animals (p. 60)—"They were not called into being by any law of nature, but by a power above nature." If he means by a law of nature something independent of the Deity, I entirely concur with him. Most unquestionably, the animals resulted from a power, which is above nature, in the sense of its being the
Author of nature. He adds—"They were created by the hand of God, and adapted to the conditions of the period." If he here means a special exertion of the powers of the Deity, having a regard to special conditions, we part company, for my object is to show that animals were indebted for their gradations of advance to a law generally impressed by the Deity upon matter, and that their external peculiarities are owing immediately to the agency of those very conditions to which they are supposed to have been adapted. I contend that there was no more need for a special exertion to produce (for instance) mammalia, than there is for one to carry a human foetus on from the sixth to the seventh, or from the eighth to the ninth month. I had remarked in no irreverent spirit, but the contrary, that the supposition of frequent special exertion anthropomorphises the Deity; I find a similar idea expressed by one who will not be suspected of irreverence on such a subject, the pious and amiable Doddridge—"When we assert," says he, "a perpetual divine agency, we readily acknowledge that matters are so contrived as not to need a divine interposition in a different manner from that in which it had been constantly exerted. And it is
most evident that an unremitting energy, displayed in such circumstances, *greatly exalts our idea of God, instead of depressing it;* and therefore, by the way, is so much the more likely to be true.” The Edinburgh reviewer denies that there is any lowering of the divine character in supposing a system of special exertion. “The law of creation,” he says, “is the law of the Divine will, and nothing else besides. . . The fiat of the Almighty was sufficient at all times, and for all the phenomena of the universe, material and moral.”

“It may be true,” he continues, “that in the conception of the Divine mind there is no difference between the creation of dead matter and its unbending laws, and the creation of organic structures subservient to all the functions of individual life. But such views are, and must be, above our comprehension. . . Each organic structure is a miracle as incomprehensible as the creation of a planetary system; and each structure is a microcosm related to all other worlds within the ken of sense; yet governed by laws and revolving cycles within itself, and implied in the very conditions of its existence. What know we of the God of nature (we speak only of natural means), except through the faculties he has given
us, rightly employed on the materials around us? In this we rise to a conception of material inorganic laws, in beautiful harmony and adjustment; and they suggest to us the conception of infinite power and wisdom. In like manner we rise to a conception of organic laws—of means (often almost purely mechanical, as they seem to us, and their organic functions well comprehended) adapted to an end,—and that end only the well-being of a creature endowed with sensation and volition. Thus we rise to a conception both of Divine power and Divine goodness; and we are constrained to believe, not merely that all material law is subordinate to His will, but that he has also (in the way he allows us to see His works) so exhibited the attributes of His will, as to show himself to the mind of man as a personal and superintending God, concentrating his will on every atom of the universe.” The reviewer then censures the language used in my book with respect to the idea of special creative efforts. “Does not our author,” says he, “see that he binds the Divinity (on his dismal material scheme) in chains of fatalism as firmly as the Homeric gods were bound in the imagination of the blind old poet? . . . The material system may end in downright atheism;
or, if not, it stops short in the undeviating sequence of second causes. . . Our view, on the contrary, sees, from one end of the scale to the other, the manifestation of a great principle of creation external to matter—of final cause, proved by organic structures created in successive times, and adapted to changing conditions of the earth. It therefore gives us a personal and superintending God who careth for his creatures.”

If such be the best view of the opposite theory which a clever scholar and man of science of the present day can give, that theory must certainly be regarded as in a very unpromising condition. He is, we see, for fiats or efforts adapted to special conditions. These may be, in the divine conception, identical with natural laws or the system of order; but we cannot comprehend it. It is not given to our faculties to understand a matter so profound. Immediately after, he informs us that we have only these faculties to look to for information on this very subject; and they tell us—what?—that the world is a system of law! law, however, subordinate to the divine will. Surely, if our faculties cannot comprehend the point above stated, they must be equally unable to pronounce decisively upon points so abstruse as law being
subordinate to will, and the attributes of that will showing us the Deity as a personal and super-intending God. Were controversialists entitled thus to assume that the human faculties can pronounce upon one subject in their own way, but are struck powerless on approaching another, tending to an opposite conclusion, there would, of course, be an end of all argument. But even that exercise of the faculties which the reviewer admits of for his own purpose, by no means goes to the conclusion at which he arrives. He refers but to a small portion of the divine works, when he speaks of "organic structures created in successive times and adapted to the changing conditions of the earth." He cannot be permitted to assume that he has proved these to have been produced by special fiats or any other mode of special exertion, "in conformity with changed conditions:" on the contrary, his proposition is disproved, for we hear in many instances of conditions suitable for new beings, countless ages before the suitable beings make their appearance, showing that such was not the principle to which we are solely to look for the genesis of animals. But, even though he were more successful on this point, he would still be required to show his theory of
fiats, in harmony with a system, the most important facts of which appear, on the contrary, to have taken their present forms and arrangements under the immediate agency of the "Unremitting Energy." As to results which may flow from any particular view which reason may show as the best supported, I must firmly protest against any assumed title in an opponent to pronounce what these are. The first object is to ascertain truth. No truth can be derogatory to the presumed fountain of all truth. The derogation must lie in the erroneous construction which a weak human creature puts upon the truth. And practically it is the true infidel state of mind which prompts apprehension regarding any fact of nature, or any conclusion of sound argument.

The ingenious Agassiz is equally disposed with Dr. Whewell and the Edinburgh Reviewer to except some part of nature as a domain for special intervention; but he wishes the limits of that domain to be rigidly examined, and repudiates the idea that such inquiries are beyond our province. "If," says he, "it is an obligation on science to proclaim the intervention of a divine power in the development of the whole of nature, and if it is to that power alone that we must ascribe
all things, it is not the less incumbent on science to ascertain what is the influence which physical forces, left to themselves, exercise in all natural phenomena, and what is the part of direct action which we must attribute to the supreme being, in the revolutions to which nature has been subjected. . . . It is now time for naturalists to occupy themselves likewise, in their domain, in inquiring within what limits we can recognise the traces of a divine interposition, and within what limits the phenomena take place in consequence of a state of things immutably established from the beginning of the creation. Let it not be said that it is not given to man to sound these depths: the knowledge he has acquired of so many hidden mysteries in past ages, promises more extended revelations. It is an error to which the mind, from a natural inclination to indolence, allows itself too easily to incline, to believe impossible what it would take some trouble to investigate. We generally would impose limits to our faculties, rather than increase their range by their exercise; and the history of the sciences is present to tell us, that there are few of the great truths now recognised, which have not been treated as chi-