

on the contrary, that these organisms may have appeared in the beginning over a wide area, is to grant, at the same time, that the physical influences under which they existed at first were not so specific as to justify the assumption that these could be the cause of their appearance. In whatever connection, then, the first appearance of organized beings upon earth is viewed, whether it is assumed that they originated within the most limited areas, or over the widest range of their present natural geographical distribution, animals and plants being everywhere diversified to the most extraordinary extent, it is plain that the physical influences under which they subsist cannot logically be considered as the cause of that diversity. In this, as in every other respect, when considering the relations of animals and plants to the conditions under which they live, or to one another, we are inevitably led to look beyond the material facts of the case for an explanation of their existence. Those who have taken another view of this subject, have mistaken the action and reaction which exist everywhere between organized beings, and the physical influences under which they live¹ for a causal or genetic connection, and carried their mistake so far as to assert that these manifold influences could really extend to the production of these beings, not considering how inadequate such a cause would be, and that even the action of physical agents upon organized beings presupposes the very existence of those beings.² The simple fact that there has been a period in the history

relations, special contrivances must therefore have been provided. Now, what would be appropriate for the one, would not suit the other, so that excluding one another in this way, they cannot have originated upon the same point; while within a wider area, physical agents are too uniform in their mode of action to have laid the foundation for so many such specific differences as existed between the first inhabitants of our globe.

¹ See, below, Sect. 16.

² A critical examination of this point may dispel much of the confusion which prevails in the discussions relating to the influence of physical causes upon organized beings. That there exist definite relations between animals as well as plants and the mediums in which they live, no one at all familiar with the phenomena of the organic world can doubt; that these mediums and all physical agents at work in nature, have a certain influence upon organized beings is equally plain. But before any such action can take place and be felt, organized beings must exist. The problem before us involves, therefore,

two questions, the influence of physical agents upon animals and plants already in existence, and the origin of these beings. Granting the influence of these agents upon organized beings to the fullest extent to which it may be traced, (see Sect. 16,) there remains still the question of their origin upon which neither argument nor observation has yet thrown any light. But according to some, they originated spontaneously by the immediate agency of physical forces, and have become successively more and more diversified by changes produced gradually upon them, by these same forces. Others believe that there exist laws in nature which were established by the Deity in the beginning, to the action of which the origin of organized beings may be ascribed; while according to others, they owe their existence to the immediate intervention of an intelligent Creator. It is the object of the following paragraphs to show that there are neither agents nor laws in nature known to physicists under the influence and by the action of which these beings could have originated; that, on the contrary, the very nature of these be-