

both animal and vegetable, are known to occur. We must study these strata in strict reference to their chronological order, as deduced from their superposition, and other relations. From these sources we may learn which of the species, now our contemporaries, have survived the greatest revolutions of the earth's surface; which of them have co-existed with the greatest number of animals and plants now extinct, and which have made their appearance only when the animate world had nearly attained its present condition.

From such data we may be enabled to infer, whether species have been called into existence in succession, or all at one period; whether singly, or by groups simultaneously; whether the antiquity of man be as high as that of any of the inferior beings which now share the planet with him, or whether the human species is one of the most recent of the whole.

To some of these questions we can even now return a satisfactory answer; and with regard to the rest, we have some data to guide conjecture, and to enable us to speculate with advantage: but in order to be fully qualified to enter upon such discussions the reader must study the ample body of materials amassed by the industry of modern géologists.

CHAPTER XLV.

EFFECTS PRODUCED BY THE POWERS OF VITALITY ON THE STATE OF THE EARTH'S SURFACE.

Modifications in physical geography caused by organic beings—Why the vegetable soil does not augment in thickness—The theory, that vegetation is an antagonist power counterbalancing the degradation caused by running water untenable—Conservative influence of vegetation—Rain diminished by felling of forests—Distribution of American forests dependent on direction of predominant winds—Influence of man in modifying the physical geography of the globe.

THE second branch of our inquiry, respecting changes of the organic world, relates to the processes by which the remains of animals and plants become fossil, or, to speak still more generally, to all the effects produced by the powers of vitality on the surface and shell of the earth.

Before entering on the principal division of this subject, the imbedding and preservation of animal and vegetable remains, I shall offer a few remarks on the superficial modifications caused directly by the agency of organic beings, as when the growth of certain plants covers the slope of a mountain with peat, or converts a swamp into dry land; or when vegetation prevents the soil, in certain localities, from being washed away by running water.

In considering alterations of this kind, brought about in the physical geography of particular tracts, we are too apt to think exclusively of that part of the earth's surface which has emerged from beneath