

the function and occupy the position of leaves, are differently circumstanced with respect to light, &c., and apparently in consequence differ in structure. But, as Mr. Herbert Spencer admits, it is most difficult in all such cases to distinguish between the effects of the definite action of physical conditions and the accumulation through natural selection of inherited variations which are serviceable to the organism, and which have arisen independently of the definite action of these conditions.

Although we are not here concerned with the definite action of the conditions of life on organisms in a state of nature, I may state that much evidence has been gained during the last few years on this subject. In the United States, for instance, it has been clearly proved, more especially by Mr. J. A. Allen, that, with birds, many species differ in tint, size of body and of beak, and in length of tail, in proceeding from the North to the South; and it appears that these differences must be attributed to the direct action of temperature.⁴⁶ With respect to plants I will give a somewhat analogous case: Mr. Meehan,⁴⁷ has compared twenty-nine kinds of American trees with their nearest European allies, all grown in close proximity and under as nearly as possible the same conditions. In the American species he finds, with the rarest exceptions, that the leaves fall earlier in the season, and assume before their fall a brighter tint; that they are less deeply toothed or serrated; that the buds are smaller; that the trees are more diffuse in growth and have fewer branchlets; and, lastly, that the seeds are smaller—all in comparison with the corresponding European species. Now considering that these corresponding trees belong to several distinct orders, and that they are adapted to widely different stations, it can hardly be supposed that their differences are of any special service to them in the New and Old worlds; and if so such differences cannot have been gained through natural selection, and must be attributed to the long continued action of a different climate.

⁴⁶ Professor Weismann comes to the same conclusion with respect to certain European butterflies in his valuable essay, 'Ueber den Saison-Dimorphismus,' 1875. I might also refer to the recent works of several

other authors on the present subject; for instance, to Kerner's 'Gute und schlechte Arten,' 1866.

⁴⁷ 'Proc. Acad. Nat. Soc. of Philadelphia,' Jan. 28th, 1862.