

exemplification of the manner in which different species of animals may originate, one from the other, and increase the number of types existing at first? And yet, with all this apparent freedom of transformation, what do the facts finally show? That all these transformations are the successive terms of a cycle, as definitely closed within precise limits, as in the case of animals, the progeny of which resembles for ever the immediate parent,\* in all successive generations. For here, as everywhere in the organic kingdoms, these variations are only the successive expressions of a well regulated cycle, ever returning to its own type.

## SECTION XXI.

### SUCCESSION OF ANIMALS AND PLANTS IN GEOLOGICAL TIMES.

Geologists hardly seem to appreciate fully, the whole extent of the intricate relations exhibited by the animals and plants whose remains are found in the different successive geological formations. I do not mean to say, that the investigations we possess respecting the zoölogical and botanical characters of these remains are not remarkable for the accuracy and for the ingenuity with which they have been traced. On the contrary, having myself thus far devoted the better part of my life to the investigation of fossil remains, I have learned early, from the difficulties inherent in the subject, better to appreciate the wonderful skill, the high intellectual powers, the vast erudition displayed in the investigations of Cuvier and his successors upon the faunæ and floræ of past ages.<sup>1</sup> But I cannot refrain

<sup>1</sup> CUVIER, (G.) Recherches sur les Ossemens fossiles de Quadrupèdes, etc., Paris, 1812, 4 vols. 4to.; nouv. édit. Paris, 1821-23, 5 vols. 4to.; 4e édit. 10 vols. 8vo. and 2 vols. pl. 4to. — SOWERBY, (JAMES,) The Mineral Conchology of Great Britain, London, 1812-19, 6 vols. 8vo. fig. — SCHLOTTHEIM, (E. F. v.) Die Petrefactenkunde, etc., Gotha, 1820, 8vo. fig. — LAMARCK, (J. B. DE.) Mémoires sur les fossiles des environs de Paris, Paris, 1823, 4to. fig. — GOLDFUSS, (G. A.) Petrefacta Germaniæ, Düsseldorf, 1826-33, fol. fig. — STERNBERG, (KASPAR, M. GR. v.) Versuch einer geognostisch-botanischen Darstellung der Flora der Vorwelt, Leipzig und Prag, 1820-38, fol. fig. — BRONGNIART, (AD.) Prodrome d'une Histoire des Végétaux fossiles, Paris, 1818,

2 vols. 8vo. — Histoire des Végétaux fossiles, Paris, 1828-43, 2 vols. 4to. fig. — LINDLEY, (J.) and HUTTON, (W.) The Fossil Flora of Great Britain, London, 1831-37, 3 vols. 8vo. — GÖRPPERT, (H. R.) Systema Filicum fossilium, Vratisl. et Bonnæ, 1836, 4to. fig. — Die Gattungen der fossilen Pflanzen, verglichen mit denen der Jetztwelt, etc., Bonn, 1841-48, 4to. fig. — Monographie der fossilen Coniferen. Düsseldorf, 1850, 4to. fig. — More special works are quoted hereafter, but only such works shall be mentioned, which have led on, in the progress of Geology and Palæontology, or contain full reports of the present state of our science, and also such as have special reference to America. References to the description of species may be found in BRONN,