

illustrate this proposition, through the whole animal kingdom, as such an attempt would involve the assertion that I know all these relations, or that where there exists a discrepancy between the classification and the succession of animals, the classification must be incorrect, or the relationship of the fossils incorrectly appreciated. I shall therefore limit myself here to a general comparison, which may, however, be sufficient to show, that the improvements which have been introduced in our systems, upon purely zoölogical grounds, have nevertheless tended to render more apparent the coincidence between the relative standing among living animals and the order of succession of their representatives in past ages. I have lately attempted to show, that the order of Halcyonoids, among Polyps, is superior to that of Actinoids;<sup>1</sup> that, in this class, compound communities constitute a higher degree of development, when contrasted with the characters and mode of existence of single Polyps, as exhibited by the Actinia; that top-budding is superior to lateral budding; and that the type of Madreporæ, with their top-animal, or at least with a definite and limited number of tentacles, is superior to all other Actinoids. If this be so, the prevalence of Actinoids in older geological formations, to the exclusion of Halcyonoids, the prevalence of *Rugosa* and *Tabulata* in the oldest deposits,<sup>2</sup> the later prevalence of Astræoids, and the very late introduction of Madreporæ, would already exhibit a correspondence between the rank of the living Polyps and the representatives of that class in past ages, though we may hardly expect a very close coincidence in this respect between animals the structure of which is so simple.

The gradation among the orders of Echinoderms is perfectly plain. Lowest stand the Crinoids, next the Asterioids, next the Echinoids, and highest the Holothurroids. Ever since this class has been circumscribed within its natural limits, this succession has been considered as expressing their natural relative standing, and modern investigations respecting their anatomy and embryology, however extensive, have not led to any important change in their classification, as far as the estimation of their rank is concerned. This is also precisely the order in which the representatives of this class have successively been introduced upon earth in past geological ages. Among the oldest formations we find pedunculated Crinoids<sup>3</sup> only, and this order remains prominent for a long series of successive periods; next come free Crinoids and Asterioids; next Echinoids,<sup>4</sup> the successive appearance of which since the triassic

<sup>1</sup> For classification of Polypi, see DANA, q. n., p. 31, note 2; also MILNE-EDWARDS and HAIME, q. n., and AGASSIZ, (L.) Classification of Polyps, Proc. Am. Acad. Sc. and Arts, 1856, p. 187.

<sup>2</sup> See MILNE-EDWARDS and HAIME, q. n., p. 31.

<sup>3</sup> MILLER, Crinoids, q. n. — D'ORBIGNY, q. n. — J. HALL, q. n. — AUSTIN, q. n., p. 96.

<sup>4</sup> See the works q. n., p. 96; also: MÜLLER, (J.) and TROSCHEL, (F. H.) System der Asteriden, Braunschweig, 1842, 4to. fig. — MÜLLER, (J.) Ueber den Bau der Echinodermen, Berlin, 1854, 4to. — TIEDEMAN, (FR.) Anatomie der Röhren-Holothurie, des Seeigels, etc., Landshut, 1817, fol. fig. — VALENTIN, (G.) Anat. du genre Echinus, Neuchâtel, 1842, 4to.