X.—ON THE RELATIONS OF THE NEOCRINOIDS TO THE PALÆOCRINOIDS.

The term "Neocrinoidea," which was first introduced by the writer in 1881,[1] embraces all the "Crinoidea Articulata" of Miller and Müller, together with *Marsupites* and *Holopus*, both of which were placed elsewhere by the German zoologist; while the Palæozoic Crinoids generally were referred to by him as the "Crinoidea Tessellata,"[2] this group including the Semiarticulata and Inarticulata of Miller. His definitions of these two great groups, however, were meagre in the extreme. The Articulata comprised the genera *Pentacrinus*, *Apiocrinus*, *Encrinus*, and *Comatula* in the wide sense, *i.e.*, types in which the radii are free down to the base of the calyx; while his only distinct reference to the Tessellata is that they are Crinoids "deren Kelch ganz aus Tafeln zusammengesetzt ist."[3] From his numerous references to individual genera, however, it is possible to obtain a tolerably clear notion of the ideas which led Müller to establish these two principal divisions of Crinoids; and various palæontologists have in consequence attempted, with more or less success, to formulate characters which should distinguish them from one another.

The most satisfactory of the earlier attempts in this direction was that which appeared in Bronn's Thierreich (vol. ii. p. 228). Besides the supposed sutural union of the calyx-plates and the presence of a subtegminal mouth in the Tessellata, reference is also made to the asymmetry of the calyx in this group, the more frequent presence of a dicyclic base, and the greater rarity of stemless forms than in the Articulata.

On the other hand, Lütken[4] and others have pointed out the weakness of these definitions.

By far the best of the numerous diagnoses which have been drawn up since the time of Müller are those which we owe to Zittel.[5] But the freedom of the rays in the Articulata, on which Müller laid stress, is omitted by him, while an important error runs through his as through all the earlier definitions. The calyx plates of the Tessellata are "unbewëglich durch einfache Nähte verbunden;" while those of the Articulata are "meist sehr dick, durch gelenkartig ausgehöhlte und gewölbte oder ebene Nahtflächen verbunden." Now the lowest articulation to be found in the calyx of an articulate Crinoid is that which unites the first and second radials (Pl. LXII.). The former are suturally united both to one another and to the basals; while, when underbasals are present (*Marsupites*, *Extracrinus*), the union between them and the basals is of the same kind. In both groups the interradials (when present) are suturally united to the radials and to one another; so that the name-giving difference between the Articulata and the Tessellata is

[1] *Ann. and. Mag. Nat. Hist.*, 1881, ser. 5, vol. vii. p. 296.
[2] Pentacrinus, *loc. cit.*, p. 30.
[3] *Ibid.*, p. 29.
[4] *Op. cit.*, pp. 219–222.
[5] Palæontologie, pp. 335, 342, 345.