

E. SOME ABNORMAL CONDITIONS OF THE RAYS OF COMATULÆ.

In the two large genera *Antedon* and *Actinometra*, just as in *Apiocrinus*, *Pentacrinus*, and *Encrinus*, there are normally five rays which divide upon the third joint above the basals, *i.e.*, the third radial is the axillary (Pls. VIII., LXVII.); and this is the general rule among the Neocrinoids. The exceptions are *Metacrinus* and *Plicatocrinus*, the former with four or six radials (primitively five or eight, as some of them are syzygial joints), and the latter with only two as in one or two fossil Comatulæ. It sometimes happens, however, that an additional radial is inserted into the normally three-jointed series, as for example in the *Pentacrinus mülleri* mentioned in Part I.,¹ and I have met with a nearly similar case in *Antedon alternata* (Pl. XXXII. fig. 5); while Wagner² has noticed the same monstrosity in *Encrinus gracilis*. But the two outer radials of *Antedon alternata* remain separate and are not united by syzygy, as in the *Pentacrinus mülleri* just mentioned. On the other hand, in one example of *Antedon remota* (Pl. XXIX. fig. 6) and in the only specimen of *Antedon incerta* (Pl. XVIII. fig. 4) and in one of *Actinometra parvicirra* (Pl. LXI. fig. 1) the second radial is missing in one ray and the axillary rests directly against the first radial as in *Plicatocrinus* and in many Palæocrinoids.

Another and more common variation is in the number of the rays themselves. Excepting, of course, in *Promachocrinus* there are normally five rays in all Comatulidæ; but forms with four and six rays are occasionally met with. I have a tetraradiate specimen of *Antedon rosacea*, and one of a Japanese *Antedon* in Dr. Döderlein's collection, and also one of *Actinometra paucicirra* from Cape York. In all these three individuals the anterior ray (A) is missing, so that the mouth, instead of being radial in position, is placed interradially between the rays E and B.

On the other hand the "Blake" collection contains a six-rayed form of *Actinometra pulchella*. The disc is unfortunately concealed, so that the symmetry of the ambulacra cannot be made out. But I am rather inclined to think from the appearance of the centro-dorsal that it has the usual pentamerous symmetry, one of the radials being rather larger than its fellows and also axillary, so that it bears two small rays, as sometimes happens in *Allagecrinus*.³ Another variation characteristic of this genus occurs in *Actinometra multibrachiata* (Pl. LVI. fig. 3), one of the radials being considerably smaller than the other four.

The only other six-rayed *Comatula* that I know is a small and dry *Antedon* in the

¹ Zool. Chall. Exp., part xxxii. p. 311, pl. xv. fig. 2.

² Die Encriniten des unteren Wellenkalkes von Jena, *Jenaische Zeitschr.*, 1886, Bd. xx. (N.F. xiii.), p. 20, Taf. ii. fig. 13.

³ See Carpenter and Etheridge, Contributions to the Study of the British Palæozoic Crinoids,—No. I. On *Allagecrinus*, the Representative of a New Family from the Carboniferous Limestone Series of Scotland, *Ann. and Mag. Nat. Hist.*, 1881, ser. 5, vol. vii. pp. 288, 292.