

radials are united by syzygy, as are the first two joints beyond the distichal and all subsequent axillaries. Except in these and a few other cases, however, there is a very great uniformity throughout the arm-divisions of the Comatulæ.

In five of the eight recent species of *Pentacrinus* the two outer radials form a syzygy, and in correspondence with this the lowest distichals and brachials are similarly united in pairs (Pl. XII. figs. 18, 21; Pl. XV. figs. 1, 2; Pl. XVI. fig. 1; Pl. XVIII. figs. 1-3, 8, 11; Pl. XIX. figs. 1, 6, 7; Pl. XXI. figs. 1*d*, 2*d*, 5*a*; Pl. XXV.; Pl. XXVI. figs. 4, 5, 8). On the other hand, the ten-armed *Pentacrinus naresianus* has a bifascial articulation between the two outer radials, and also between the two lowest brachials, just as in *Antedon rosacea* (Pl. XXX. figs. 1, 11, 12, 16, 17). But in *Pentacrinus decorus* and *Pentacrinus blakei* the rays divide twice or thrice; and though the two first joints beyond the lowest axillaries resemble the outer radials in being articulated by ligaments, yet there is a muscular joint between the two lower brachials of the ultimate arms, the second of which is usually a syzygy (Pl. XXXI. figs. 1, 2; Pl. XXXII. figs. 16-18; Pl. XXXIV. figs. 3, 6; Pls. XXXV.-XXXVII.).

The syzygial union of two arm-joints is of a somewhat peculiar character. For the hypozygal entirely loses its individuality as a separate segment of the arm, and bears no pinnule as the epizygal and the remaining brachials do (Pl. XII. fig. 9; Pl. XV. fig. 3; Pl. XXX. figs. 1, 19, 20, 23; Pl. XXX*a*. figs. 10*a*, 10*b*, 12*a*, 12*b*; Pl. XXXII. fig. 4; Pl. L. figs. 6-16). Thus, for example, in very nearly all Comatulæ the original third and fourth joints of the growing arm differ from those which ultimately appear beyond them. For "whilst the majority of these gradually come to possess the true articulations, and to be separated by the intervention of muscles and ligaments, a certain small proportion become more intimately united on a simpler plan, which admits of no motion between them."¹ The double or syzygial joints thus formed resemble the ordinary brachials in bearing but one pinnule, and they are therefore best considered as single joints. In *Antedon rosacea*, for example, the third and fourth, the ninth and tenth, and the fourteenth and fifteenth joints of the growing arm are respectively united in pairs by syzygy; but the arm is best described as having syzygies in the third, eighth, and twelfth joints. So again in the numerous Comatulæ, such as *Actinometra parvicirra*, which have axillaries on some or all of the primary arms. Counted from the third radial, the distichal axillary is primitively the fourth joint. The first, as is almost invariably the case, bears no pinnule, while the second has a pinnule, but the third not, for it is united to the following (axillary) joint by a syzygy. The first ray-division would therefore be described as consisting of three distichal joints, the second bearing a pinnule, and the third (axillary) a syzygy.

The same arrangement occurs in the genus *Metacrinus*, which is distinguished from *Pentacrinus* and from all other Neocrinoids by having, not three radials only, but

¹ *Phil. Trans.*, 1866, p. 721.