

three radials ever has a pinnule on the second one; and when this becomes the hypozygal of a syzygy, it does not therefore lose its individuality, as is the case with the hypozygals of the ordinary brachial syzygies. Almost the same may be said respecting the first two brachials. Most Comatulæ, like *Pentacrinus naresianus* (Pl. XXXa. figs. 1, 10a, 10b, 12a, 12b), have a syzygy in the third brachial with a bifascial articulation between the two preceding joints, of which only the second bears a pinnule. Hence, when these two are united by syzygy, as in *Actinometra solaris*, *Actinometra typica*, &c., the lowest or hypozygal loses no individuality as an arm-joint. They are, therefore, better described as the first and second brachials, and not as a first brachial which "is a syzygy." This method has the advantage of retaining the third brachial as a syzygial joint as a condition which is common to by far the larger number of Comatulæ. For it is only in a very few species like *Actinometra fimbriata* and *Actinometra multiradiata* that there is a syzygy in the second brachial and a pinnule on the first, as is often the case in *Metacrinus*. This is an entirely different type, and arises from the coalescence of the primitive second and third joints of the growing arm.

Syzygial unions of two primitively separate arm-joints occur with great regularity throughout the arms of the Comatulæ. In the two principal genera *Antedon* and *Actinometra*, there are large groups of species typified by *Antedon eschrichti* and *Actinometra parvicirra* respectively, in which syzygies occur at tolerably regular intervals of three joints. It is rare, however, to find a perfectly regular arm, especially in the latter species, in which the "syzygial interval" may vary from 0 to 10 joints.¹ In other species the interval may be as much as twenty joints or more; while it is occasionally two, as in *Antedon rosacea*, and in rare cases one joint only, as in *Rhizocrinus*. But it is generally possible to find a considerable amount of regularity in the number of joints which form the syzygial interval in any given species, and this is often of some value for systematic purposes.

Among the Pentacrinidæ, however, this is only the case to a very slight extent. The syzygial interval is perhaps most regular in *Pentacrinus naresianus* (Pl. XXVIII.); but it is long as in many tropical Comatulæ, and in other Pentacrinidæ the brachial syzygies are usually "few and far between."

In *Rhizocrinus* and *Hyocrinus*, on the other hand, the syzygial union of the primitive brachials is carried on to a very great extent. In the former genus syzygial and muscular unions alternate with one another continuously from the calyx to the arm-ends (Pl. IX.; Pl. X. fig. 20; Pl. LIII. fig. 7). In *Hyocrinus* (Pl. VI. figs. 1, 2), as was well described by Sir Wyville Thomson,² the five arms "consist of long cylindrical joints deeply grooved within, and intersected by syzygial junctions. The first three joints in each arm consist each of two parts separated by a syzygy; the third joint bears at its distal end an articulating facet from which a pinnule springs. The fourth arm-joint is intersected by

¹ *Actinometra*, loc. cit., p. 49.

² *Journ. Linn. Soc. Lond. (Zool.)*, vol. xiii. p. 52.