

by different palæontologists, *e.g.*, on pl. 53 of Buckland's Geology and Mineralogy, figs. 9-13; on Tab. 101 of Quenstedt's Encriniden, especially figs. 24, 27, 33, and 37; and also on pl. 12 of the Messrs. Austin's Monograph, figs. *d, f, k, n, o, r*. None of these authors, however, seem to have noticed the distinction of this type of joint from that of the ordinary Pentacrinidæ, either recent or fossil; and attention was first drawn to it by de Loriol, as will be pointed out subsequently.

In the ordinary Pentacrinidæ, as in the multiradiate Comatulæ, there is no special regularity in the mode of division of the secondary and tertiary arms. The twenty secondary arms borne upon the distichal axillaries may either remain simple, or fork again, once or oftener. But in most cases the forking is very irregular. Secondary (palmar) axillaries may appear upon any of the four secondary arms; and the two tertiary arms borne by them are of equal size, and have equal power of forking again, though as a rule they do not all do so. A good instance of this is shown in Miller's figure<sup>1</sup> of *Pentacrinus asterius* (*caput-Medusæ*), which is represented more diagrammatically in Quenstedt's Tab. 97, fig. 3. A similar arrangement has been described by Lütken in *Pentacrinus mülleri*,<sup>2</sup> while it also occurs in *Pentacrinus maclearanus*, *Pentacrinus wyville-thomsoni*, and *Pentacrinus alternicirrus* (Pl. XIV.; Pl. XV. fig. 1; Pl. XIX. fig. 2; Pl. XXV.; Pl. XXVI. fig. 4). In all these cases the secondary (and tertiary) axillaries are limited to the outer arms of each successive pair, so that the arrangement of the arms on the ray is 2, 1; 1, 2; or 2, 1, 1; 1, 1, 2.<sup>3</sup> But the two (or four) inner arms are equivalent to the outer ones in all respects, neither of them dividing again.

While the arm-division in *Extracrinus* proceeds to a much greater extent than in *Pentacrinus*, it is confined as a rule to the sides of the ray, only the outer arm of each successive pair bearing axillaries, just as in the secondary and tertiary arms of *Pentacrinus asterius*, *Pentacrinus mülleri*, &c. The four tertiary arms which spring from each pair of palmar axillaries are rarely of equal size, and never absolutely equivalent. The two inner ones are usually rather the smaller, and except in some forms of *Extracrinus subangularis* do not divide again. Each of the larger outer arms, however, divides again after a few joints, but the division is unequal. The smaller inner face of the axillary, *i.e.*, that turned towards the other axillary, bears a slender armlet; while the main arm-trunk is continued directly onwards without change of direction. It gradually diminishes in size, and gives off at short intervals a series of slender armlets from its inner side, but it never really forks. But for the pinnules borne by it and its subordinate armlets, one would be almost inclined to say that the distichal axillary bears two secondary arms which have long slender pinnules placed at intervals upon their adjacent inner faces, but none whatever upon their outer sides. These organs are real

<sup>1</sup> *Op. cit.*, p. 48, pl. i.

<sup>2</sup> Om Vestindiens Pentacriner, *loc. cit.*, pp. 203, 204.

<sup>3</sup> The Caribbean *Antedon spinifera* often shows exactly the reverse condition to this. Palmar axillaries are frequently only developed on the inner pair of the four secondary arms, so that the grouping on each ray is 1, 2; 2, 1.