reduced to a supposed difference in the mode of union of the first radials with the joints which they bear.

In all the Mesozoic and later Crinoids this is an articulation effected by a pair of muscles and three ligaments, as described above (Pl. VIIa. fig. 15; Pl. VIIb. figs. 1, 5; Pl. VIIIa. fig. 7; Pl. X. figs. 1–4; Pl. XII. figs. 9, 12, 15, 20, 23; Pl. XX. figs. 7, 8; Pl. XXI. figs. 5*c*, 6*d*; Pl. LXII.). It presents itself even in forms which have such decided Palæozoic affinities as *Hyocrinus*, *Marsupites*, and *Thaumatocrinus*, but it appears, according to de Loriol,[1] to be absent in *Guettardicrinus*, in which type the reduced articular facet found in *Apiocrinus* seems to have disappeared altogether, not only from the distal faces of the first radials, but also from those of the axillaries.

In this respect, therefore, as also in the presence of numerous interradials, and in the close lateral union of the lower parts of the rays, *Guettardicrinus* is a true Tessellate, as has been already pointed out by Lütken.[2]

On the other hand, the first radials of many of the so-called Tessellates have just as well-marked articular facets as those of the Pentacrinidæ, and the joints belonging to the other orders of radials are united to one another in just the same way as the distichals and palmars of Pentacrinidæ and Comatulæ. *Marsupites*, *Allagecrinus*, and *Platycrinus* are notable examples of the presence of a muscular joint between the first and second radials; and I feel confident that it would be found to recur in numerous other forms with perforated first radials, such as *Cyathocrinus*, *Poteriocrinus*, and *Myrtillocrinus*, if properly looked for.

Thus then, so far as regards the presence or absence of a true articulation between the first and second radials, no hard and fast line can be drawn between the older and the younger Crinoids. Many of the former certainly had a muscular joint in this position; while it was absent in *Guettardicrinus*, though not from an arrest of development, as in the older Crinoids.

The want of a distinct articular facet on the first radials of many Tessellata is only another indication of their being in the condition of permanent larval forms, as is so clearly shown by many of their other characters.[3] The fossæ for muscles and ligaments, the central canal, and the transverse articular ridge of the radials and arm-joints of all the post-Palæozoic Crinoids (except *Guettardicrinus*) only make their appearance at a comparatively late developmental stage. The axial cords of the young joints, whether of rays, arms, or pinnules, lie at first upon their upper surfaces, eventually being received more deeply into the substance of the plates. They lie for some time in open canals, which are only closed up and received into the substance of the skeleton at a later period. Consequently the transverse section, which at first resembles a horse-shoe, finally comes to be a ring, with muscles and ligaments attached round it. Now in many

[1] Paléont. Franç., *op. cit.*, pp. 216, 218.
[2] *Op. cit.*, p. 221.
[3] See Wachsmuth, *Amer. Journ. Sci. and Arts*, vol. xiv. p. 190.