

ligamentous bundles, muscles being confined exclusively to the rays and their subdivisions.

This ligamentous articulation of the successive cirrus-joints and of the stem-joints of the Bourgueticrinidæ is of a very simple nature. There is an articular surface around the opening of the central canal with a more or less marked fossa on either side of it (Pl. VIIa. figs. 7-11). The fossæ lodge the elastic inter-articular ligaments, which are of precisely the same nature as the tendinous cords in the stem of *Pentacrinus*; but they differ from these cords in being confined to the intervals between the elongated joints without traversing their substance (Pl. VIIa. fig. 1, *ls*).

The two ligaments may be of unequal size, as in the middle and outer portions of the cirri, whereby the prehensile power of these organs is much increased; or they may be of equal bulk, as in the lower portions of the cirri and between the stem-joints generally. In the former, however, the long axes of the terminal faces of any joint lie in the same plane; but in the stem-joints of the Bourgueticrinidæ this is by no means the case, for the long axes of the terminal faces cross one another at various angles (Pl. VIIa. figs. 2, 3; Pl. IX. fig. 3). The outline of the interarticular ligaments of the middle and lower parts of the stem, as seen in optical or in longitudinal section, has a diamond shape with somewhat extended lateral angles. This is, of course, due to the fact that the fibres are longest in the centre of the stem, immediately around the vascular axis, and shortest towards the periphery where the fossæ are shallowest (Pl. VII. figs. 12, 13; Pl. VIIa. figs. 7-11; Pl. X. figs. 11-14).

But there are no fibres at all in the middle half of each joint, which is composed of the usual limestone network. Towards the upper part, however, the fibres (Pl. VIIa. fig. 1) become relatively shorter in the centre but longer and longer towards the periphery, and their ends approach more and more nearly to the middle planes of the two joints which they unite. By the time the joints become cylindrical and then discoidal immediately below the cup, the fibres are continuous through their whole length (Pl. VIIb.), as is the case in the upper stem-joints of *Pentacrinus* (Pl. LVIII. fig. 3, *ls*).

The articular surface which surrounds the opening of the central canal varies considerably in its character. In many cirrus-joints it is merely an expansion of the thickened rim of the opening, but does not extend across the joint face. Quenstedt figures a stem-joint of this kind from the Mæstricht chalk.¹ It is nominally referred to *Bourgueticrinus ellipticus*, but I have seen no recent ones like it. In other cirrus-joints and in the stem-joints of the Bourgueticrinidæ the articular surface takes the form of a more or less well-marked ridge, which lies either across or in the direction of the long axis of the oval joint-face, and is pierced in the middle by the opening of the central

¹ Encriniden, Tab. 104, fig. 70.