

the re-entering angles of the former being deeper than those of an ordinary internodal joint. (Compare Pl. XXXIX. figs. 8, 9; Pl. LIII. figs. 2, 4).

The occurrence of syzygies in the stem of the Pentacrinidæ has long been familiar to palæontologists. This is due to the fact that the stem breaks most easily at these points, so that stem fragments are not uncommon in the fossil state with syzygial faces at one or both ends. This has been noticed both by Quenstedt¹ and by de Loriol²; but these fragments have sometimes been figured in an inverted position, the syzygy being represented as at the upper surface of the nodal joint, whereas it is naturally at the under surface.

Within each nodal joint the vascular axis of the stem expands into a miniature edition of the chambered organ in the calyx (Pl. XXIV. figs. 3, 4, *ch.n.*); and from each chamber is given off one cirrus-vessel (fig. 4, *cv*). This is sheathed in a very delicate extension of the fibrillar envelope of the vascular axis (*ca*), and passes outwards into the central canal of the cirrus.

The number of internodal joints varies very considerably in the different species of Pentacrinidæ. There may be only one or two as in *Pentacrinus maclearanus* (Pl. XVI.); or the number may reach forty-five, as in the lowest parts of the stem of *Pentacrinus wyville-thomsoni* (Pl. XIX. fig. 1), or any lesser figure (Pls. XI., XIV., XXVIII., XXXIV.–XXXVI., XXXVIII., XL., XLII., XLIV., XLV., XLVIII.–LIII.) These internodal joints are sometimes smooth externally (Pl. XI.; Pl. XIII. fig. 8; Pl. XIX. figs. 1–5; Pl. XXVII. fig. 1; Pl. XXVIII. fig. 2; Pl. XXXa. fig. 6; Pl. XXXI. fig. 3; Pl. XXXV. fig. 2; Pl. XLI. figs. 5, 15; Pl. XLII.–XLIV.; Pl. XLVII. fig. 6); or they may be more or less ornamented with ridges and tubercles (Pl. XIII. fig. 7; Pl. XXXV. fig. 1; Pl. XXXVI.; Pl. XXXVIII.; Pl. XXXIX. figs. 3, 8–11; Pl. XL.; Pl. XLI. fig. 1; Pl. XLV. figs. 1, 6; Pl. XLVII. figs. 1, 2; Pl. LI. fig. 8; Pl. LII. fig. 2; Pl. LIII. figs. 2, 4–6). The young joints formed at the top of the stem are stellate or nearly pentagonal (Pl. XIII. fig. 9; Pl. XXII. figs. 1–12; Pl. XXIII.; Pl. XXVI. fig. 18; Pl. XXXIV. fig. 9; Pl. XXXVII. figs. 13–16), so that the upper part of the stem is marked by five more or less prominent interradiial ridges (Pl. XI.; Pl. XIII. fig. 1; Pl. XV. figs. 1, 2; Pl. XVIII. figs. 1, 2; Pl. XIX. figs. 1, 6, 7; Pl. XXXI.; Pls. XXXV.–XXXVII.; Pl. XXXIX. fig. 1; Pl. XLIII.). In some species (of *Metacrinus* especially) this condition is retained throughout the whole length of the stem (Pl. XXXVIII.; Pl. XXXIX. figs. 3–11; Pl. XL.; Pl. XLIX. figs. 1–3); but in others the joints gradually become more rounded, or at any rate pentagonal, as new ones are formed successively above them (Pl. XI.; Pl. XIII. fig. 11; Pl. XIX. figs. 1, 4, 5; Pl. XXII. figs. 13, 14, 23–26; Pl. XXVIII. fig. 2; Pl. XXX. figs. 25–30; Pl. XXXVI.; Pl. XLI. figs. 3, 7; Pl. XLVII. figs. 4, 8). A continual production of new joints goes on at the top of

¹ Encriniden, pp. 196, 230, Tab. 98, figs. 2, 3, 107.

² Monographie des Crinoïdes fossiles de la Suisse, *Mém. Soc. Pal. Suisse*, 1877–79, pp. 122, 144.