On the Structure of the Thallus of Delesseria sanguinea. *Lamour.*

By

M. C. Potter, M.A., F.L.S.

With Plates XVII and XVIII.

The Delesserias, a genus of red seaweeds, six species of which inhabit the shores of the British Isles, have the thallus differentiated into a well-marked foliar expansion and a cylindrical portion; these we may respectively term the leaf and the stalk. Descriptions of this thallus are given in all books on seaweeds, for instance, in Harvey's (Phycologia Britannica), or Hauck's (Die Meeresalgen), but as far as I am aware no detailed account has been given of these structures. Agardh* and Wille† briefly describe their histology, but pay no special attention to them. The leaf is generally a fairly broad expansion (Pl. XVIII, fig. 1), with a definite midrib which gives off laterally a number of veins, these again giving off other veins and so on; the veins taper and become gradually finer till they end in being unicellular (fig. 2). This arrangement of veins exactly resembles the distribution of the fibro-vascular bundles in the leaf of an ordinary Dicotyledon and we shall see that they perform nearly the same functions in the two cases. By cutting transverse sections of the leaf we find that it is a plate of cells one cell thick (fig. 3, A, *a*) with here and there masses of cells, the veins. The cells of the leaf seen in surface view are polygonal with their protoplasm continuous‡ from cell to cell (fig. 4). While the leaf is small and is still growing the veïns are developed by the cells of the leaf dividing into three (fig. 3, B); the cells on each side may divide similarly and thus the vein become broader (fig. 3, C); the cells also above and below (fig. 3, A, *b*) the central ones may cut off segments and thus the vein becomes thicker. In this way we can trace the development of a vein from its unicellular ending to its largest part where it joins the midrib or another large vein. The midrib is developed in exactly the same way. The central cells first formed (fig. 3, C) elongate considerably as the young leaf grows; the cells formed by the divisions of the outer ones do not become so long as the central cell; thus the cells in the centre of each vein are longer than those external to them. The cells of

* *Florideernes Morphologi*, Kongl. Svenska Vetenskaps Akademiens Handlingar, 1879.

† *Bidrag til Algernes Physiologiske Anatomi*, Kgl. Svenska Vetensk. Akad., 1885.

‡ *On the Continuity of the Protoplasm in the Florideæ*, see Gardiner, in Proc. Camb. Phil. Soc., vol. v, p. 104, and Hick, in Journal of Botany, vol. xxii.

the vein, with the exception of the most external layer, are much longer than broad and have their protoplasm continuous with each other and with those cells which touch them (fig. 5).

As regards the stalk we find that the outer layer is made up of small squarish cells, while scattered irregularly in the centre are very large cells between which smaller cells are packed (fig. 6). Fig. 7 shows that the large cells are conducting cells, and that their protoplasm is continuous at their ends and also with the neighbouring cells at the sides.

We now come to consider the physiological importance of these structures, and at the outset we can clearly distinguish between an assimilating tissue, viz. the parts of the leaf where it is only one cell thick and the outermost cells covering the veins, and a conducting tissue, namely, the veins in the leaves and large cells in the stalk. The cell wall is thick, gelatinous, and pitted, and by means of these pits the protoplasm is continuous from cell to cell. The assimilated substances can easily be passed through a few cells to the veins; here they find an easy passage to various parts of the plant, some being stored up in the stalk which serves for a reservoir of reserve material as well as for an organ of attachment. Comparing the Delesseria leaf with that of a Dicotyledon, in both cases we have conducting tissue, but in the Delesseria there is only one conducting tissue required to take the assimilated substances to parts of the plant where they are wanted, and since the plant lives entirely submerged there is no need of a tissue to conduct water to the leaf; and we see too that in Delesseria, coupled with morphological differentiation into stalk and leaf, there is also physiological differentiation into assimilating and conducting tissue.

The above remarks apply especially to *D. sanguinea,* and judging from Harvey's pictures we conclude that in the main all the species are alike in possessing assimilating and conducting tissue.

DESCRIPTION OF PLATES XVII AND XVIII.

Illustrating Mr. M. C. Potter's paper "On the Structure of the Thallus of *Delesseria sanguinea.*"

FIG. 1.—Part of thallus of *Delesseria sanguinea.*

FIG. 2.—Portion of leaf magnified. *a.* The midrib. *b.* Lateral veins given off from it. *c.* Fine veins.

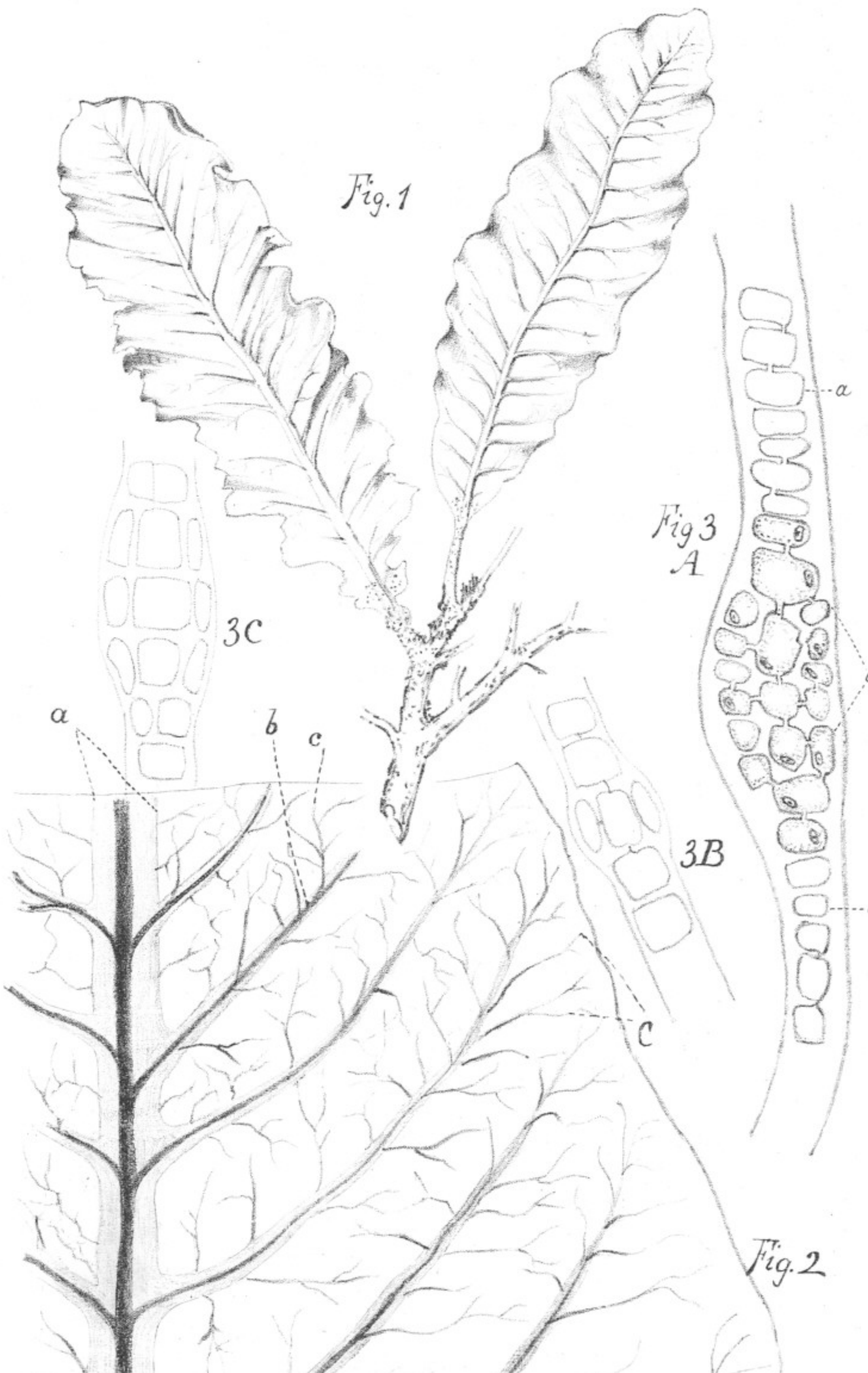
FIG. 3.—Transverse section of leaf. A. Section showing the unicellular part (*a*) and a small vein (*b*). B and C. Section showing the development of a vein.

FIG. 4.—Portion of a leaf seen in surface view.

FIG. 5.—Cells from a fine vein.

FIG. 6.—Transverse section of portion of stalk, the shaded portions (*a*) indicating the pits where the cells are continuous at their ends.

FIG. 6.—Longitudinal section of stalk, showing a large conducting cell.



M.C. Potter del. G.C.B. reprod.

Fig. 4

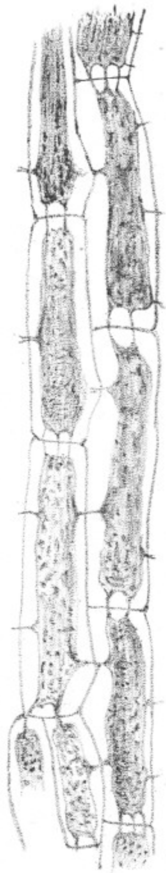


Fig. 5

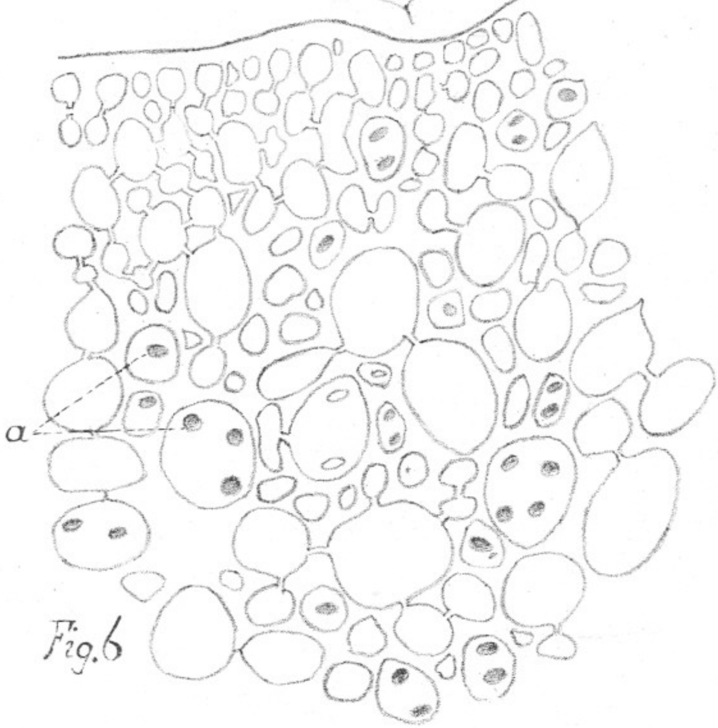
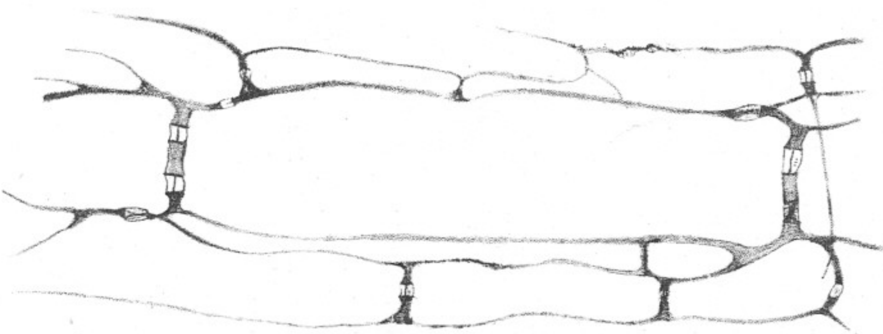


Fig. 6



M. C. Potter del. G. C. B. reprod.

Fig. 7.