THE 'EPIDERMOIDAL' LAYER OF CALAMITE ROOTS.—

The bounding layer of young calamite roots consists of cells with thick outer membranes. These are in no way specially remarkable, being cells which have 'the structure of a thick-walled epidermis, and appear to correspond in all respects with the epidermoidal layer described by Olivier in many recent roots'¹. As is seen from the published figures² they are much the same size as the cells of the

FIG. 30.

cortex (diameter about .08 mm.), and do not stand out from them in any very remarkable way, except in the thickness of the external wall.

In foreign specimens of older roots a periderm of nine to twelve layers has been described by M. Renault³, but the outermost layer does not appear to have differed from the ones below it. No such definite periderm has been described for English roots. In the above

¹ Williamson and Scott, Further Observations, II, Phil. Trans., 1895, p. 694.

² loc. cit., Pl. XV, Phot. 5, Pl. XVII, Figs. 7 and 8.

³ Genre *Astromylon*, Ann. des Sci. Géol., 1885, vol. xvii, Fig. 2, Pl. VII.

quoted memoir¹ the authors draw attention to a section in which the outer layer appeared two cells in thickness, and which 'suggested that we have here a peridermic formation' even although the cells lacked the clear definition of a well-developed periderm.

The object of this note is to place on record what appears to be an undoubted peridermic formation in roots from the lower coal-measures of England, which also show a highly specialized 'epidermoidal layer.' The slides from which the present descriptions and sketches have been taken are S. 4014 and 4015, from the series S. 4013-7, continued in S. 3556-8, in the general collection of the geological department of the British Museum (Nat. Hist.).

The root appears to have had a diameter of about 15 mm., but it is impossible to be quite accurate as the pith is not well preserved, and the stele is somewhat compressed and split by stigmarian rootlets. The preservation of the inner and middle cortex is poor, but there is sufficient evidence of continuity between these layers and the outer cortex, which is crushed against the well-preserved 'epidermoidal layer,' continuous round the root, see Fig. 30.

The individual epidermoidal cells are very large, ranging from .175 to .2 mm. in diameter, and considerably exceeding any other tissue in the root. The outer membrane of each cell is thick, and from it fibrous fragments project into the cell-cavity, Fig. 31; it is not possible to ascertain the minute structure of these fibres, and I am not aware of any similar appearance in recent plants that would throw light on their nature.

X 100.

FIG. 31.

The epidermoidal cells appear to originate as the enlarged outer layer of the periderm, see Fig. 32 A and B, and it seems probable that they took the outermost position with some irregularity, as in most cases the linear arrangement of the periderm cells has been disturbed,

¹ Will. and Scott, loc. cit., Pl. XVII, Fig. 11, and p. 694.

and cells such as *a* in Fig. 32, A are common, where a periderm cell below the outer layer is beginning to take on the epidermoidal characters; this explains the lack of linear continuity between the periderm as such and the outer layer, as the enlarging cell pushes the others to one side. In Fig. 32, B the linear arrangement is not disturbed, and we also get the remains of a layer outside the present functional one.

FIG. 32.

It appears, therefore, that, at least in the English specimens, when periderm formation takes place, the primary epidermoidal layer of the young root is replaced by the specialized outer layer of periderm which is irregularly reinforced from the cells beneath.

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