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II. Histological Notes

W. R. M'Nab M.D. ^a

^a Edinburgh

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The presence of medullary rays, the uniform size of the cells, as seen on transverse section, and the presence of punctations, although they are peculiar, seem all to point to a close relation to the Coniferae. As I cannot refer the lignite to the carboniferous genera, *Dadoxylon* or *Dictyoxylon*, it seems possible that it will have to be referred to a new genus; if so, I would venture to suggest the name of *Palaeopitys Millerii*, for the Old Red Sandstone lignite now described. The relation of the markings found in the lignite to those of *Salisburia* is of peculiar interest. The *Salisburia* is known to have leaves very closely resembling those of certain ferns. May it not turn out that some of the so-called fern-like leaves from the older formations should be referred to plants resembling the *Salisburia* of the present day?

Murchison* states that plants from the Old Red Sandstone of Caithness, examined by Professor Quekett, exhibited a true coniferous structure, allied to *Araucaria*. The lignites from Caithness, examined by Quekett, are therefore quite distinct from the lignite of Cromarty, discovered by Mr Miller.

II. *Histological Notes.* By W. R. M'Nab, M.D. Edinburgh.

1. *On the Structure of the Adventitious Roots of the Portugal Laurel.*

In the month of October of last year, many of the branches of the Portugal Laurels, in the grounds of the Crichton Royal Institution, Dumfries, became covered with patches of adventitious roots. These adventitious roots were submitted to a careful microscopic examination, and were found to present the usual histological characters of true roots. They arise in patches, more or less large, from the branches, but not in any regular order, their position on the branch not giving any clue to their relative age. The bark was always ruptured and pushed aside by the rootlets, showing that they have a deep-seated and not a superficial origin. Sections made in various directions showed that the roots are in direct relation to the cambium layer; and, in certain

* *Siluria*, third ed., pp. 290, 291.

sections, the medullary rays could be traced for some distance into the adventitious root. All the cells of the medullary rays in the neighbourhood of the rootlet were filled up with small rounded starch granules, which gave the characteristic blue reaction with iodo-chloride of zinc solution. The apex of the root was covered with the mass of loose cells common to ordinary roots, and forming a slightly developed pileorhiza. When sections were placed in carmine solution, the active cells at the growing point became, as usual, brightly coloured. One section was left, by mistake, for a long time in the carmine solution; this, when taken out and carefully washed, showed a coloured matrix, in which the apparently loose cells were immersed. These cells, although apparently loose, can be always removed with the section from slide to slide. It is thus probable that the cells, instead of being loose as described, are more or less immersed in a gelatinous matrix, probably due to the degeneration of the primary cell-wall. I have not been able to get the same appearance again, as the rootlets were all destroyed before the above observation was made. The appearance was certainly not due to some of the colouring matter remaining between the cells, as every attempt was made to remove it without success. The only difference between these adventitious and true roots is in their position and irregular mode of growth. In their growing by addition to the growing point, and in histological characters, they are undistinguishable from true roots. Root hairs were also produced in abundance by the epidermis.

2. *On Intercellular Substance and Cuticle.*

At the meeting of the Botanical Society held last January, I communicated a paper on the staining of certain vegetable tissues. In it I took occasion to remark that the cuticle covering the external parts of plants could be readily stained with carmine, the so-called intercellular substance remaining colourless. During the year these experiments have been frequently repeated, and always with the same result, namely, that while the cuticle was quickly and deeply stained with carmine, the intercellular substance remained colourless. Careful observation of the growth of cells in the young roots of the white mustard, *Phalaris canariensis*, and

the garden pea and bean, have led to the conclusion that the so-called intercellular substance is in reality the original or primary cell-wall—that as growth goes on, this primary cell-wall becomes thickened by the addition of numerous more or less marked layers on the inside. In the stems of many plants it requires some care to be able to demonstrate that the cell-wall and thickening layers are separate. In the layer of cells of the epidermis, on which the cuticle rests, the outer surface is in general greatly thickened, while the inner part of the cells are only thickened at the angles at which the other cells join. This thickening at the angles is often so great that the cell appears almost filled up, or the thickening appears as a continuous layer. In the epidermal and subepidermal cells of the ivy the thickening is so great, that without careful examination the thickening might be considered continuous. On the more or less thickened external surface the cuticle rests, and may be considered as thickening occurring outside the cell-wall. We have many examples of this thickening outside a cell-wall, the covering being analogous to a cuticular layer; as in the extine and intine of the pollen grain,—the intine representing the primary cell-wall, the extine the cuticular layer. The intine is the more important part, because the extine may be very thin or wanting, as in the pollen of *Zostera*. The outer covering of many spores, the exosporium, is also another example of a cuticular layer on a single cell. The so-called intercellular substance, as seen in sea-weeds, &c., seems to be a degenerated and gelatinous condition of the cell-wall, and of an entirely different character from that of the cuticle. From all the observations I have made, I think we must reject the statements of Wiegand, Schacht, and others, regarding the identity of intercellular substance and cuticle as untenable.

III. *Notice of Hieracium stoloniflorum, Waldst. and Kit.; H. glomeratum, Fr.; and H. præaltum, Vill., as occurring in the Neighbourhood of Edinburgh.* By Professor BALFOUR.

Of late years the following species of *Hieracium* have been gathered near Edinburgh:—