PAP. & PROC. ROY. SOC. TASMANIA, 1940 (23RD MAY, 1941.)

Observations on the Stem Anatomy of the Genus Richea(1)

By

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(Read 11th November, 1940)

PLATE VI

The Richeas are essentially Tasmanian plants: widespread and abundant in mountain habitats, certain species are important members of the Austral-Montane formation of mountain plateaux. The genus *Richea*, R. Br., in which Rodway (1903) includes the genera *Cystanthe* and *Pilitis* of Hooker (1860), comprises eight species: of these, seven are endemic in Tasmania, while one, *R. Gunnii*, common in Tasmania, is found also in the Australian Alps. The species listed by Rodway are:—*R. sprengelioides*, F.v.M., *R. procera*, F.v.M., *R. acerosa*, F.v.M., *R. Milligani*, F.v.M., *R. Gunnii*, Hook., *R. scoparia*, Hook., *R. dracophylla*, R. Br., *R. pandanifolia*, Hook.

The following description is based on the examination of fresh material of all the above species except of *R. Milligani*, for which herbarium material was used. Specimens of the plants collected have been placed in the herbaria of the Royal Botanic Gardens, Kew, and of the University of Tasmania.

The plants are erect evergreen shrubs, ranging in height from 1 ft., in specimens of *R. sprengelioides*, to more than 30 ft., in specimens of *R. pandanifolia*. The leaves, which show a corresponding range in size, from $\frac{1}{2}$ inch to several feet in length, are xeromorphic and densely crowded on the stems. The phyllotaxis is $\frac{2}{5}$ or $\frac{5}{13}$. The arrangement of the leaves in *R. sprengelioides* is illustrated in Plate VI., fig. 1. A certain degree of variation in the size and habit of the leaves, which may be erect or recurved, is noticeable in the species *R. sprengelioides* and *R. scoparia*. The leaves of all the species are, however, characterized by wide decurrent sheathing bases, which, when shed, leave conspicuous annular scars. This feature readily distinguishes the Richeas from the closely allied *Sprengelia incarnata*, Sm.

In all the species of *Richea*, the stems in transverse section show the typical dicotyledonous structure. Growth is slow and secondary thickening may occur at a distance of less than 1 cm. behind the apex. The xylem vessels are small, and regularly arranged: the walls are strongly lignified having bordered pits or scalariform thickening. The vascular tissue is traversed by uniseriate rays.

The structure of the pith and of the primary cortex is of interest. In these regions special excretory receptacles containing large solitary crystals of calcium oxalate, are a prominent feature. The receptacles, consisting of groups of two to sixteen relatively large cells which are crystal sacs, are interspersed between the smaller, thicker-walled cells of the pith and cortex. The crystal sacs have thin cellulose walls, some of which, in the older parts of the stem, may partially

(1) Published under the auspices of the Tasmanian Biological Survey.

break down (Plate VI., figs. 2 & 3). While the structure of the receptacles is similar in the pith and in the primary cortex, in the pith the surrounding cells have strongly lignified walls perforated by simple pits, in the cortex the thickening of the corresponding cells is cellulose. These thickened cells of the ground tissue are irregular in shape. The individual cells when isolated by maceration for a few days in a mixture of 10 per cent chromic and nitric acids, are seen to have projections which may interlock with similar outgrowths from adjoining cells (Plate VI, fig. 4). The differentiation of the cells of the pith takes place at an early stage, cells developing into crystal sacs may readily be distinguished in sections taken a few mm. behind the apex of the shoot.

Excretory receptacles, which are a characteristic feature of the stems of every species of *Richea*, are not found in *Sprengelia incarnata*, and they provide an interesting anatomical distinction between these plants. Such receptacles are not described by Solereder (1908) in his account of the anatomical features of the Epacrideae, although a reticulate arrangement of large and small cells in the pith of *Richea* is noted.

Cork formation in the stems of the Richeas, as in other members of the family, begins in a deep-seated layer. In every species of *Richea* this is in the phloem immediately within the pericyclic fibres. Solereder states that in the Epacrideae no distinct cork cambium is present and ' it almost appears as though the cells of the cork originated from the outer cells of the soft bast '. In the material now examined, although a meristematic layer may be distinguished, this is somewhat irregular, and the cells cut off by it are not characterized by a radial arrangement. After four to eight rows of cork cells are formed, the activity of more deeply seated meristematic layers results in the formation of successive cork cylinders (Plate VI, fig. 5).

I am glad to have this opportunity of expressing my thanks to Dr. H. D. Gordon, who suggested the examination of this Tasmanian genus, and to the Committee of the Biological Survey of Tasmania who defrayed the cost of collecting the material. The problem arose during the course of investigations carried out whilst in receipt of a Commonwealth Research Grant.

References

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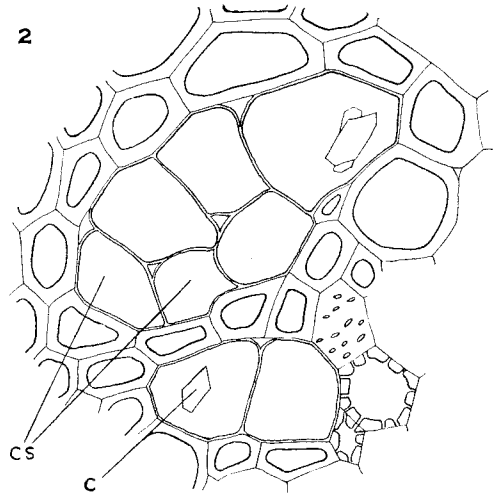
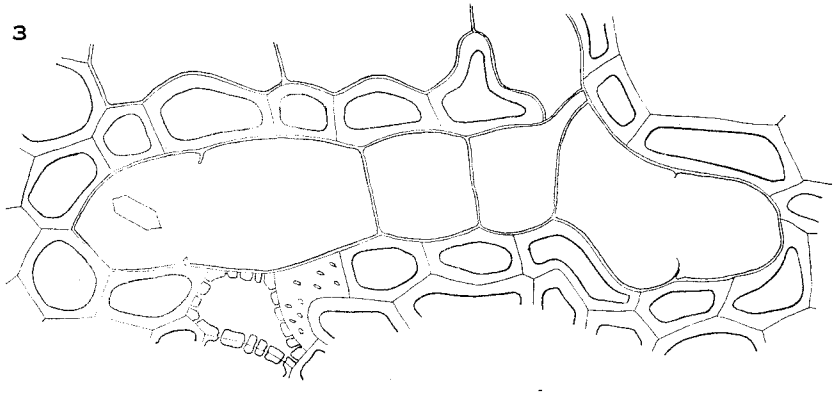
Rodway, L., 1903.—*The Tasmanian Flora*, Hobart.
Solereder, H., 1908.—*Systematic Botany of the Dicotyledons*, Oxford.

PLATE VI

Figure 1.—Leafy stem of *Richea sprengelioides*. Nat. size.
Figure 2.—T.S. of stem of *R. dracophylla*, showing crystal sacs in the pith.
CS crystal sac.
C crystal of calcium oxalate.
Figure 3.—L.S. of stem of *R. dracophylla*, showing crystal sac in pith.
Figure 4.—*R. dracophylla*. Cells of ground tissue of pith, isolated by maceration.
Figs. 1-4 made with camera lucida, X 162.
The pitting of the cells of the ground tissue is shown in two cells only in each diagram.
Figure 5.—*R. procera*. T.S. of stem showing formation of cork.
Drawn with camera lucida, X 312.
co cortex
p pericyle
c_1 first zone of cork
c_2 second zone of cork
m meristematic layer
ph phloem


1


2
CS
C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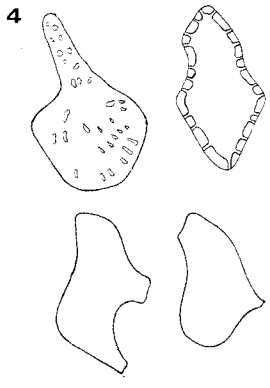
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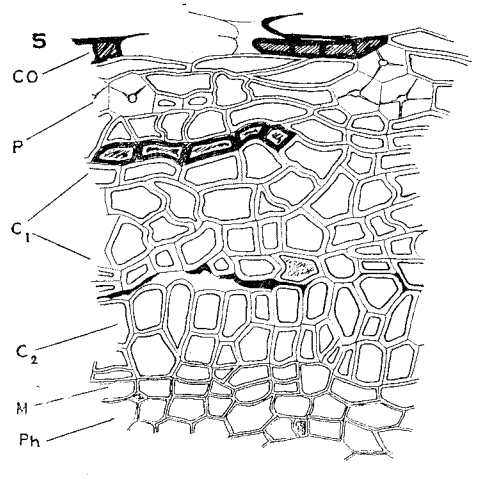
5
CO
P
C1
C2
M
Ph