question must remain at present undecided, although the mature structure certainly gives a strong impression of centripetal development. Potonié¹ has established a comparison between the secondary vascular tissues of the *Calamariaceae* and the *Sphenophyllaceae* by mentally doing away with the central mass of primary xylem that exists in the latter. By inverting this procedure, and considering it possible that the ancestors of the Equisetums may have possessed a xylem that extended to the centre of the stem, one is led to derive their structure, as it exists at present, from the modification of a stele with a solid central mass of centripetal xylem such as that of *Sphenophyllum*, or of certain Lepidodendreae. To illustrate the nature of the modifications that such a stele would have to undergo, a series of parallel developments may be pointed out within the latter group (*Lepidodendron Rhodumnense*, *selaginoides*, *Harcourtii*, *Sigillaria spinulosa*, and *Menardi*), in which parenchyma appears in the xylem, and gradually increases in quantity until only an attenuated peripheral ring of xylem remains, which then becomes more or less broken up into separate strands.

It is suggested that the lateral xylem-strands in the vascular bundles of the existing Equisetums may perhaps be taken to represent the last remnants of a primitive central mass, and that this would be entirely in agreement with their apparently centripetal development, and in particular with their cauline course.

D. T. GWYNNE-VAUGHAN.

GLASGOW.

SOME OBSERVATIONS UPON THE VASCULAR ANATOMY OF THE CYATHEACEAE².—In a number of Dicksonias with creeping or prostrate stems it is shown that the vascular system is solenostelic, the leaf-traces departing as a single strand curved into the form of a horseshoe, with its concavity facing towards the median line of the rhizome—*Dicksonia adiantoides*, *cicutaria*, *davallioides*, *apiifolia*, and *punctiloba*.

In *D. apiifolia* it is found that along the free margin of the leaf-gap there is a considerable increase in the amount of xylem in the

¹ Pflanzenpalaeontologie, p. 205.

² Abstract of paper read before the Botanical Section of the British Association, Glasgow, September, 1901.

solenostele, causing it to project somewhat towards the centre of the stem.

A similar marginal enlargement also occurs in *D. adiantoides*; and here it is continued past the leaf-gap, forming a ridge on the internal surface of the solenostele, running from one leaf-gap margin to another. In the internode this projecting portion of the xylem becomes separated off from the rest and surrounded by a phloem of its own; however, it remains always included within the same endodermis.

In *Dicksonia rubiginosa* the typical vascular ring is interrupted by gaps other than those due to the leaf-traces, and it may therefore be termed polystelic. In addition there are two or three small accessory steles lying within the vascular ring. Throughout the internode the course of these internal steles is quite free from the vascular ring, but at each node one of them approaches the free margin of the leaf-gap, and completely fuses with it, separating off again after the leaf-gap has become filled up.

Pteris elata, var. *Karsteniana*, has a typically solenostelic vascular ring, and also possesses internal accessory steles, which behave in a manner quite similar to those of *Dicksonia rubiginosa*; but they are relatively larger, and frequently they all fuse up together so as to form a second, inner, completely closed vascular ring.

It is suggested that the several internal steles and vascular rings that occur in the *Saccolomas* and in *Matonia pectinata* are also of the same origin and nature as those described above.

The relation of the internal accessory steles in certain *Cyatheas* to those of the above-mentioned Ferns is also discussed.

D. T. GWYNNE-VAUGHAN.

GLASGOW.

ON THE ANATOMY OF DANAEA AND OTHER MARATTIACEAE¹.—Various species of the Marattiaceae were studied for the comparative anatomy of the adult structure, and *Danaea simplicifolia*, Rudge, for the development of the vascular system.

I. Development of the vascular system of *Danaea simplicifolia*.

The primary vascular axis is a simple concentric stele. The xylem

¹ Abstract of paper read before the Botanical Section of the British Association, Glasgow, September, 1901.

Gwynne-Vaughan, D. T. 1901. "Some observations upon the vascular anatomy of the Cyatheaceae." *Annals of botany* 15, 776–777.

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