

have served the purpose of a rhizoma*. The best example that I have seen of the rhizoma of a Calamite is that figured in Plate IX. (fig. 21), from a specimen presented by me to the Geological Society many years ago.

With regard to *Calamodendron* the difficulties are greater, and have been well stated by Prof. Williamson in a recent paper in the 'Memoirs of the Literary and Philosophical Society of Manchester'†, in which he describes under the generic name *Calamopitrus* a peculiar stem, which, while he identifies it in its general characters with *Calamites*, he justly regards as being in internal structure distinct from the *Calamodendra* described by Cotta and Binney.

The characters of *Calamodendron* as distinguished from ordinary *Calamites* may be summed up as follows:—

(a) The part usually preserved is the internal axis, corresponding to a *Sternbergia*. It presents ribs similar to those of *Calamites*, but more angular, and almost always having traces of woody fibres capable of showing the structure on some part of their surface. I have not seen on these casts any distinct traces of scars or areoles. These casts of the pith of *Calamodendron* constitute the greater part, if not the whole of the specimens referred to *C. approximatus*.

(b) More complete specimens are invested with woody matter, arranged in wedges, and consisting of elongated cells and porous, disjunct, or pseudo-sealariform tissue. My specimens do not show distinctly the arrangement of these; but this has been well described by other observers. Williamson describes medullary rays in the woody bundles in addition to the large cellular tracts intervening between them.

(c) The actual external surface of *Calamodendron* is not certainly known; but I have been disposed to regard as of this kind those ribbed stems, found in the coal-formation, which have swollen nodes as if caused by the emission of whorls of small branches. I have specimens of these in my collection, which I have hesitated to name or describe until they could be better understood. Prof. Williamson's description of *Calamopitrus* now inclines me to suppose that they belong to that genus or to allied forms.

With regard to the affinities of the *Calamodendra*, the structure of the stem raises them above the *Calamites* and modern *Equiseta*, and justifies the conjecture of Brongniart that they may have been gymnosperms. Williamson, Carruthers, and Binney, however, attribute to them a cryptogamous fructification. In this case they may, as the former suggests, be a connecting link between Acrogens and Gymnosperms. Should subsequent investigations confirm this view, it will throw an interesting light on the possible affinities of *Sigillaria*. *Calamites*, on the one hand, and *Lepidodendron* on the other, are distinctly cryptogamous and are related to, or included in, the modern families of Equisetaceæ and Lycopodiaceæ. But *Calamodendron* seems to form a connecting link between *Calamites* and the ribbed *Sigillariæ*; and in like manner *Lepidophloios* seems to connect the

* See my description in Quart. Journ. Geol. Soc. vol. x.
† Vol. iv. 3rd Series.