

*Kalymna grandis*. Aug.

by D. P. Richardson

Collected by Mr.  
Charles E. Beecher  
of the Yale University  
Museum

Specimens of a fossil plant from the  
(Devonian) of Ireland, <sup>Kentucky</sup> ~~from Prof. J. M. Clarke of Albany, N. Y.~~, and  
placed in my hands by Sir W. Dawson  
<sup>to whom specimens were sent in the first instance of Prof. J. M. Clarke of Albany</sup>  
the entrance a portion of a stem and three  
transverse sections cut from it by Mr.  
Becher of West Haven. To these there were  
subsequently added other transverse and  
longitudinal sections. The derivation of the  
specimen from the formation referred to, is  
vouched for by <sup>Charles E.</sup> Mr. Beecher who collected it.

The principal specimen, apparently  
a fragment of a stem, has an elliptical  
transverse section measuring 2.3 x 3.8 cm.  
No cortical structure is represented, although  
it is evident that certain parts corresponding  
to a cortex were at one time present.

The surface shows numerous closely aggregated  
bundles traversing the stem longitudinally.  
With a hand lens of very moderate power,  
each of these bundles presents a distinctly  
fibrous structure. In the transverse

Section, these bundles are found & the so arranged as to constitute a narrow marginal zone. They are separated by parenchyma tissue which forms radiating bands usually much less in width than the bundles lying on either side.

Internal & this is a somewhat broad zone of parenchyma tissue, followed by an inner vascular zone. In this latter the bundles are somewhat widely separated by parenchyma tissue. They are all small, usually measuring 1.5 mm. in diameter. In transverse section they are round, elliptical, triangular or even crescent shaped, this latter being, in our specimen, somewhat uncommon and apparently resulting from the partial fusion of two bundles. It is also to be observed that all the bundles do not lie strictly within a zone of uniform width, as occasionally a bundle will be found isolated and situated more towards the center of the stem. This is apparently a normal relation, as no evidence of displacement appears. Central & this inner vascular zone, is a large

It is composed of large and thick walled cells, in all respects the same as the more extensive Parenchyma tissue.

The entire Parenchyma structure of the stem is remarkably well preserved. A very marked peculiarity of the specimen is to be found in its extreme lightness and the porous nature of the greater part of the structure. This latter feature is so conspicuous as to render the coarse, cellular tissue readily distinguishable without the aid of a glass. As determined by Sir W. Dawson, the infiltrated material is wholly Calcite, and it is probable that the deposition was limited, being developed first in the cell walls and later extending to some of the cell cavities which, in small tracts, are completely filled up.

The various sections examined show the entire structure to be in a fine state of preservation. From them we gather the following facts:

The Parenchyma tissue is very coarse and thick walled. It abounds in inter-cellular spaces which are, for the most

fact, small. The primary cell wall is usually well defined, but no structural markings have been observed.

The bundles of the marginal zone are radially elongated, usually two or three times longer than broad and narrower at the inner extremity. Occasionally they are double as shown in fig. 1, from which it will also be seen that the cell walls are very thick and there is an apparent absence of vessels. The outer face of this figure also shows a portion of the bundle removed. This is a common feature, although in some cases, the same space is occupied by cells which appear isolated - separated by somewhat wide, structureless areas, a result evidently due to decay of the primary cell membranes and a wider separation of the liberated parts. We may therefore refer the disappearance of the cortical structure and the outer portions of the marginal bundles, to the action of decay, rather than to the operation of mechanical action on the stem. Fixed longitudinally these bundles also show a complete absence of vessels, while

The Cells are found to be very long with tapering extremities similar in many respects, to the Cells of bast tissue. No markings have been detected.

The bundles of the inner vascular zone exhibit considerable variety of form, and most of them show interior tracts devoid of structure, as if a more delicate tissue like Cambium, had been removed. Other and complete bundles, on the other hand, show no such open tracts, nor do they, as appears in figure 2, show more than one kind of tissue, so that we are left somewhat in doubt as to their precise composition. The cross section shows an apparent absence of vessels, and with one exception the same may be said of the longitudinal sections. In one case a single cell shows five transverse bars, possibly the remains of a spiral, annular or decolouriform structure. In other respects this cell is the same as the other members of the bundle. Each bundle is surrounded by a layer of sclerenchymatous tissue, composed of rather thick walled cells of very unequal

Dimensions and form

The Specimen is apparently identical with Unger's Kalymene grandis which he considers to be related to the Equisetaceae a view correctly based upon the general structure, though the presence of an outer zone of vascular structure must be regarded as exceptional, and, so far as I am aware, it has no parallel in existing types. Uncertain as to the exact structure of characteristics of the vascular bundles renders a more decided opinion as to the affinity of this plant, undesirable at the present time.

Additional interest is given to this specimen from the fact that it is the first of its kind from the formation and locality from which it was obtained.

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<sup>1</sup> Richter & Unger

Devonian of Thuringia p. 71

Explanation of Figures  
Halimium grandis Ung.

Fig. 1. Transverse section of a double vascular bundle from the outer portion of the stem.  
W = Wood Cells; Pr = Parenchyma.  
The large cells forming a line near across the figure, show the parenchyma separating the two bundles.  $\times 870$

Fig. 2. Transverse section of vascular bundle from the inner vascular zone.  
W = Wood Cells; Sc = Sclerenchyma Cells surrounding the wood tissue.  
 $\times 80$

Fig. 3. Transverse section of the parenchyma tissue showing thick walls, inter-cellular spaces and primary cell walls.  
 $\times 80$

Dear Mr

Charles Francis

Jan 19/91

*[Faint, mirrored handwriting from the reverse side of the page, including phrases like "the inner structure", "the outer structure", and "the same structure" repeated multiple times.]*