Primitive-Like Metaphloem Sieve Elements in the Aerial Stem of *Equisetum hyemale* 1

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Summary

Internodal metaphloem sieve elements located near the nodes of aerial stems of *Equisetum hyemale* contain very oblique end walls. During maturation, the connections, or plasmodesmata, in these walls undergo little or no structural modification. By contrast, the end-wall connections uniting the protoplasts of mature sieve elements elsewhere in the aerial stem of *E. hyemale* are pores.

1. Introduction

In his extensive study of the phloem in lower vascular plants Lamoureux (1961) reported that two to three mm on either side of the node of the aerial stem or rhizome of *Equisetum hyemale*, the metaphloem sieve elements possessed very oblique end walls. In cross sections of this part of the stem almost all of the metaphloem sieve elements apparently occurred in pairs, the elements of each pair separated from one another by the very oblique and thin cell walls. Longitudinal sections revealed such end walls to contain many large sieve areas, borne in a scalariform or reticulate pattern. Due to the presence of callose, Lamoureux was unable to discern details of these sieve areas, and could find no signs of pores.

Similar sieve elements have been reported in other species of *Equisetum*. As early as 1907, Queva reported the presence of such sieve elements in the aerial stems of *E. maximum*. He explained the oblique walls as resulting from late cell divisions during sieve-element formation. Following this report, similar sieve elements were observed in *E. palustris* (Ludwigs 1911, Vidal 1912), and *E. telmateia* (Bohorquez 1970), as well as *E. hyemale* (Lamoureux 1961, Bohorquez 1970). Such sieve elements apparently are typical of vascular bundles in *Equisetum*.

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During a recent electron microscope study of sieve elements in the aerial stem of *E. hyemale* (Dute 1976), sieve elements similar to those mentioned above were encountered. At this time we are reporting on the ultrastructure of these sieve elements.

2. Materials and Methods
The materials and methods used in this ultrastructural study were exactly the same as those described previously (Dute 1976, Dute and Evert 1977).

3. Observations
Fig. 1 shows a cross section of an internodal bundle containing a number of the pertinent metaphloem sieve elements. Note the thin walls between pairs of sieve elements (arrows). A longitudinal view of the same stem region...