Sieve element plastids in bamboo

N. Parameswaran[1]

Institut für Holzbiologie und Holzschutz der Bundesforschungsanstalt für Forst- und Holzwirtschaft, Leuschnerstrasse 91, D-2050 Hamburg 80 (Federal Republic of Germany), 7 March 1978

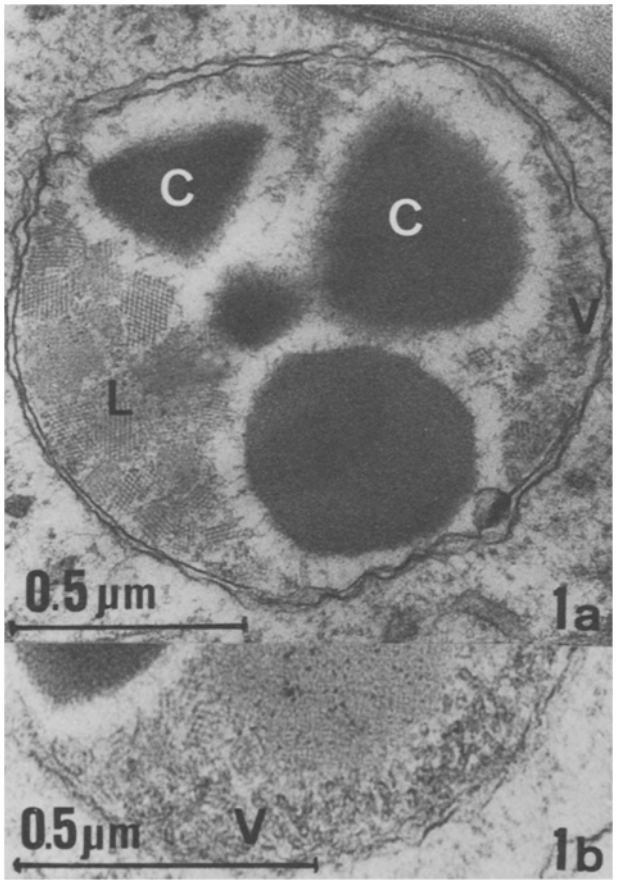
Summary. The fine structure of the sieve element plastids of *Bambusa vulgaris* and *Schizostachyum lumampao* revealed the typical monocotyledonous type (P-type) with the cuneate proteinaceous bodies and lattice-like crystalloids; in addition, characteristically formed vesicles and tubulae could be observed. The diagnostic value of these plastids is also discussed.

The taxonomic value of the fine structural aspects of sieve element plastids in angiosperms has been the subject of intensive studies in recent years[2]. Behnke[3] has classified the sieve element plastids into S- and P-types according to their contents: the S-type plastids store only starch and are frequently met with in dicotyledons; the P-type plastids accumulate proteinaceous inclusions and occasionally also starch grains. In the monocotyledons the P-type plastid is said to be predominant, as has been established for many taxa[2]. The graminaceous members studied however, seem to contain only proteinaceous inclusions in their sieve element plastids and no starch grains[4-6].

The present observations on the sieve element plastids of *Bambusa vulgaris* Schrad ex Wendl. and *Schizostachyum lumampao* (Blco.) Merr. obtained in connection with other fine structural investigations[7,8] extends the data to yet another group of plants in the Monocotyledonae.

In the early stages of sieve-element differentiation, the plastids appear more or less round with a dense stroma. During further development, they undergo changes in shape and contents. The characteristic inclusions at the active stage of the sieve element are the osmiophilic electron-dense cuneate and slightly round bodies, reported already in many monocot taxa (figure a). These inclusions appear to have a core-like region and a halo surrounding the bodies. It was not possible to resolve these into substructural units, as has been reported for some taxa[9-11]. Their number is variable even within 1 sieve element. Besides these proteinaceous bodies, the plastids possess regularly formed lattice-like crystalloids with parallel tubular units in the peripheral zones; they are present even in the proplastid stage and appear to be ontogenetically unrelated to the cuneate-shaped structures. Similar crystalloids have been observed in *Flagellaria*[9], *Hordeum*[12], *Oryza*[13], *Saccharum*[2] and *Secale*[14]. In addition, the plastids contain vesicular and tubular structures at the periphery adjacent to the double membrane (figure b). Strasburger[15] mentions the occurrence of a small number of starch grains in the sieve elements of *Bambusa vulgaris*; during the present study, the plastids were devoid of starch at all stages. The companion cell plastids of *Bambusa vulgaris* do not contain either the cuneate proteinaceous bodies or starch. Starch grains were developed solely in the plastids of the parenchymatous cells of the ground tissue.

Behnke[2] has erected subtypes and forms for the P-type plastids in sieve elements; his P IIb plastid is characterized by the presence of several cuneate proteinaceous crystalloids combined with additional tiny crystalloids of the lattice nature and lack of starch grains. This type is especially characteristic of the Poaceae (Gramineae). Thus the Bambusaceae belonging to the Poaceae of the Order Poales (sensu Takhtajan[16]) provide yet another example for the restricted occurrence of definite types of sieve element plastids in certain taxa, and thus for their diagnostic value in taxonomy.



a Sieve element plastid in *Bambusa vulgaris* with cuneate proteinaceous bodies (C) and crystalloids (L); vesicles (V) at the periphery. *b* Enlarged view of the peripheral tubular and vesicular structures in the sieve element plastid of *Bambusa vulgaris*.

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