

SEPTATE SIEVE TUBE ELEMENTS

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DURING the course of investigation on seasonal activity of the vascular cambium of *Dalbergia sissoo* Roxb, *Morinda tinctoria* Roxb and *Terminalia crenulata* Roth, the authors came across certain sieve tube elements which differed from the normal elements in structure. The present account deals with them.

The secondary phloem contained sieve tube elements, companion cells, axial and ray parenchyma and fibres. The sieve tube elements were elongated cells with sieve plates restricted to the end walls. During the period of very active cambial activity only normal sieve tube elements were formed. But when the

cambium approached dormancy or least activity, several 'septate' sieve tube elements were formed in addition to normal elements. These elements were like normal sieve tube elements with sieve plates on either end but, in addition, had a variable number of transverse septa (a maximum of six in *Dalbergia*), which partitioned the elements into compartments (figure 1 A–C). There is cytoplasmic continuity between the compartments of such elements. The septa were formed after the initiation of sieve plate differentiation and were very thin and primary in nature. The possibility of mistaking the cross walls of cells lying just below such sieve tube elements as the septa was ruled out by examining these elements at different foci. Carefully isolated elements in macerated preparations showed definite septa (figure 1C), thus confirming the above observation.

The presence of such 'septate' sieve tube elements has not been so far recorded in any angiosperm¹,

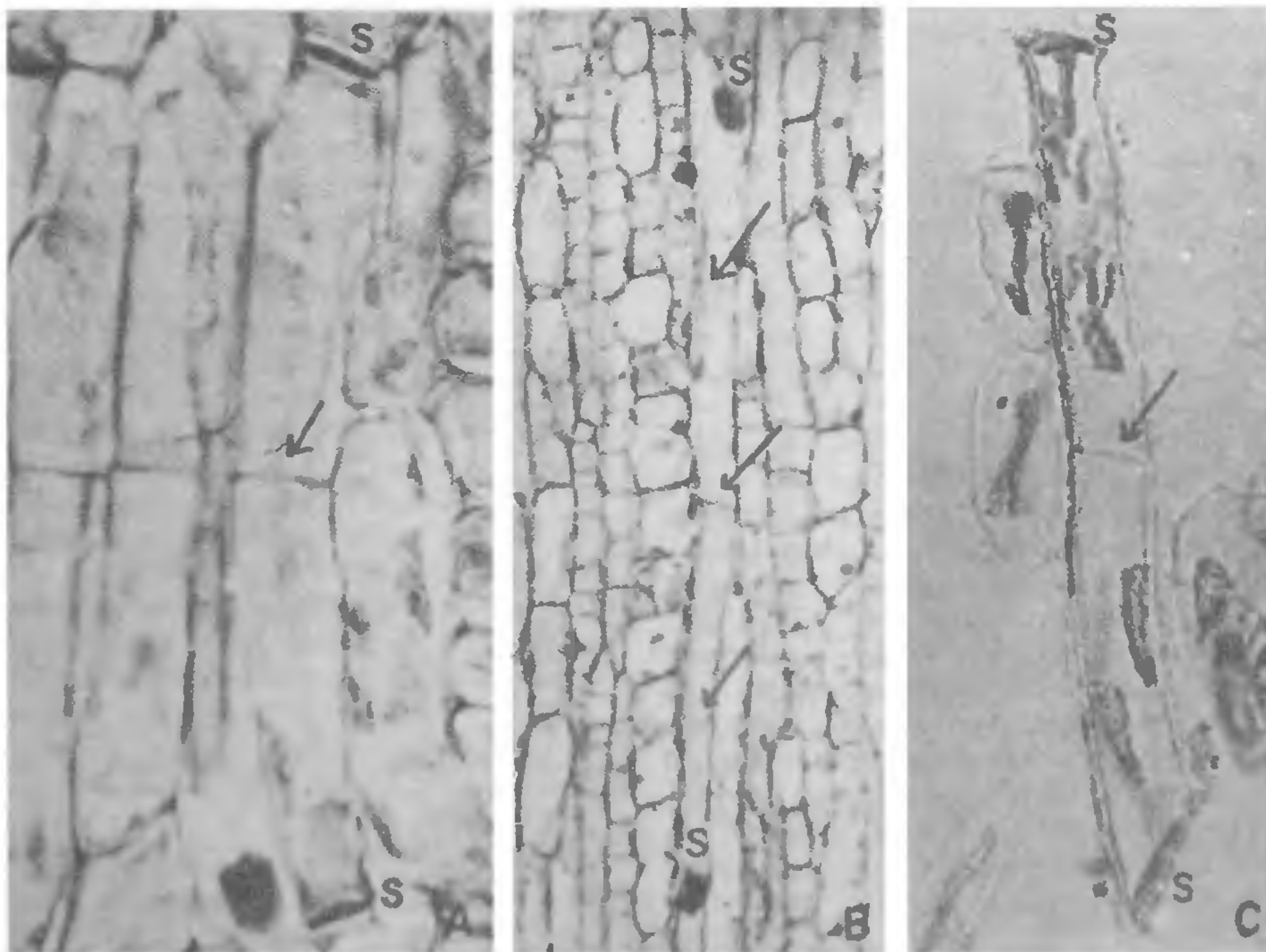


Figure 1A and B. Portions of secondary phloem of *Dalbergia sissoo* and *Terminalia crenulata* respectively in TLS. A, $\times 625$; B, $\times 445$. C. A single sieve tube element of *Morinda tinctoria* from a macerated preparation and stained with Aniline Blue, $\times 1000$. S = Sieve plate. The arrows indicate the position of septa

although septate fibres are very common in the secondary xylem and phloem of many plants such as the species of *Vitis*². The functional significance of the septa in 'septate' sieve tube elements is unknown.

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1. Esau, K., *The Phloem: Encyclopedia of Plant Anatomy*, Gebruder Borntraeger, Berlin, 1969.
2. Fahn, A., *Plant Anatomy*, 3rd edn., Pergamon Press, Oxford, 1982, 354.

A COMPARATIVE STUDY OF AMMONIA EXCRETION BY *MASTIGOCLADUS LAMINOSUS* COHN AND *GLOEOCAPSA* SP

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In cyanobacteria, glutamine synthetase (GS) is the major enzyme involved in the primary assimilation of ammonia¹ and its activity gets inhibited by the action of the glutamate-analogues L-methionine-DL-sulphoximine^{2,3} (MSX) and 5-hydroxylysine⁴. Thus, when ammonia assimilation into organic nitrogen is prevented, a major portion of the newly fixed ammonia gets released⁵.

The effect(s) of MSX on the cyanobacteria *Mastigocladus laminosus* Cohn and *Gloeocapsa* were investigated. GS from both the cyanobacteria is almost completely inhibited in presence of MSX even at 10 μ M. This results in ammonia excretion for 6 days by the former and 13 days by the latter (figure 1a, b). While in the unicellular *Gloeocapsa*, MSX causes an irreversible inhibition of GS, in the filamentous *M. laminosus* inhibition of GS is relieved after 6 days owing perhaps to the dilution of the inhibitory effect during cell multiplication or transport of glutamine from the heterocysts. This inhibition of GS in response to MSX treatment is promising and offers possibilities for use of the cyanobacteria as mini-fertilizer plants in the field.

Nitrogenase activity decreases marginally on treatment with MSX (table 1). However, on transfer from light to dark, its activity is lowered by 90% and 50% in *M. laminosus* and in *Gloeocapsa* respectively. In

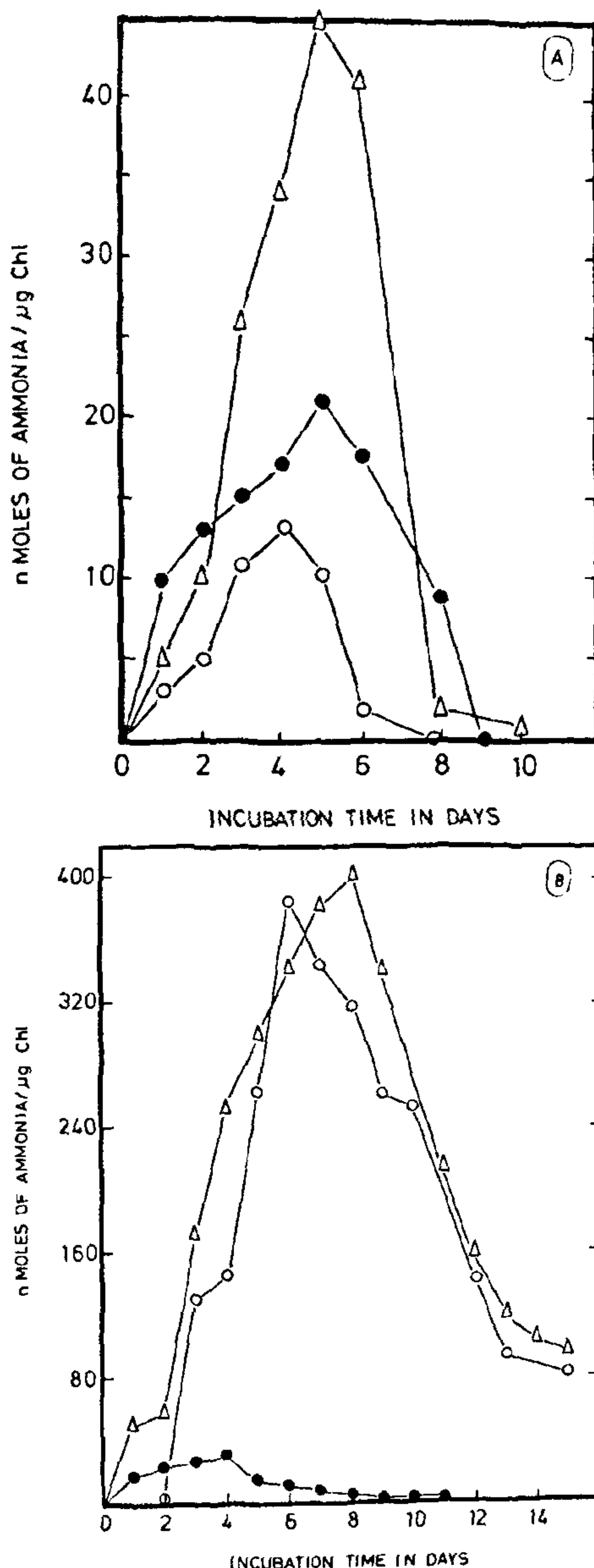


Figure 1. Excretion of ammonia by *M. laminosus* (A) and *Gloeocapsa* (B) in the presence of 10 μ M MSX. ○ N-free, light. ● N-free, dark. △ NO₃⁻-grown, light.