B.Sc. II Semester

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Unit II

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Pathways of Translocation

Phloem is the tissue that translocate the product of photosynthesis

- Particularly sugars
- From mature leaves to areas of growth and storage, including roots
- Phloem also transmits signals between sources and sink in the form of regulatory molecules.
- Sugar is translocated in phloem sieve elements
- Mature sieve elements are living cells specialized for translocation
- Large pores in cell walls are the prominent features of sieve elements
- Companion cells aid the highly specialized sieve elements.

Figures

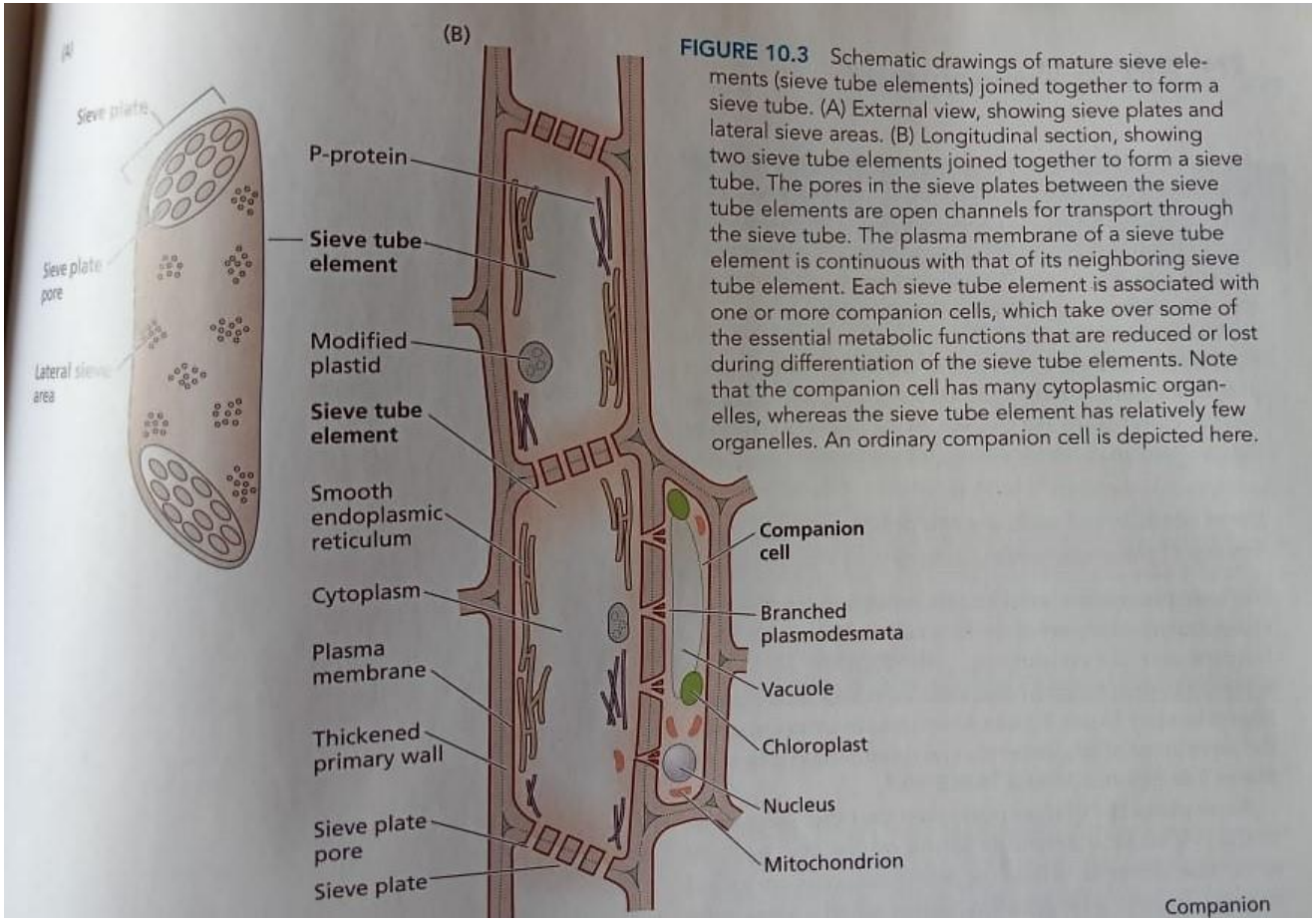

FIGURE 10.3 Schematic drawings of mature sieve elements (sieve tube elements) joined together to form a sieve tube. (A) External view, showing sieve plates and lateral sieve areas. (B) Longitudinal section, showing two sieve tube elements joined together to form a sieve tube. The pores in the sieve plates between the sieve tube elements are open channels for transport through the sieve tube. The plasma membrane of a sieve tube element is continuous with that of its neighboring sieve tube element. Each sieve tube element is associated with one or more companion cells, which take over some of the essential metabolic functions that are reduced or lost during differentiation of the sieve tube elements. Note that the companion cell has many cytoplasmic organelles, whereas the sieve tube element has relatively few organelles. An ordinary companion cell is depicted here.

Source: Plant Physiology by L. Taiz and E. Zeiger

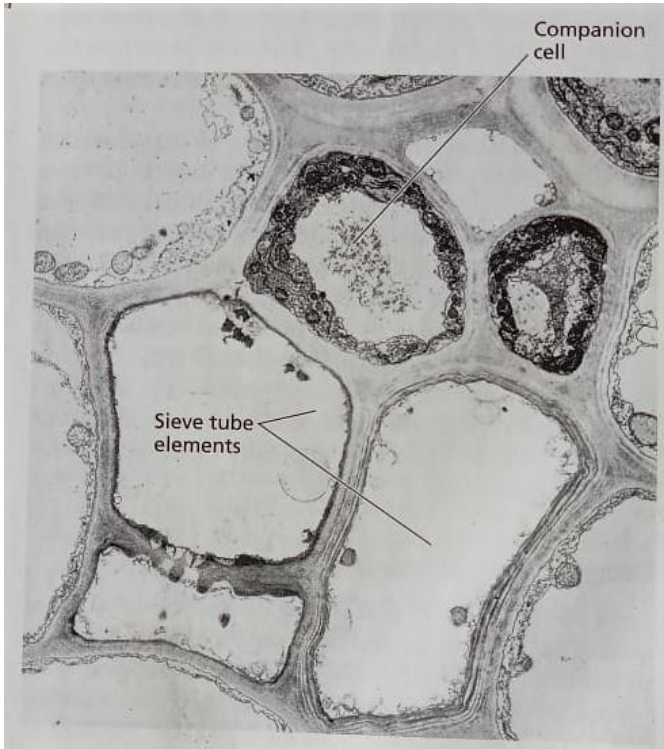

FIGURE 10.4 Electron micrograph of a transverse section of ordinary companion cells and mature sieve tube elements. (3600×) The cellular components are distributed along the walls of the sieve tube elements, where they offer less resistance to mass flow. (From Warmbrodt 1985.)

Source: Plant Physiology by
L. Taiz and E. Zeiger

Sieve Tube Elements

1. Some sieve areas are differentiated into sieve plates;
individual sieve tube elements are joined toeather into a sieve tube.

2. Sieve plate pores are open channels

3. P-protein is present in all dicots and many monocots.

4. Companion cells are sources of ATP and perhaps other compounds. In some species, they serve as transfer cells or intermediary cells.

Materials Translocated in Phloem

- **Sugars**
- **Amino acids**
- **Organic acids**
- **Protein**
- **Hormones**
- **Some inorganic ions**
- **RNAs**
- **Secondary compounds**

Patterns of Translocation

Source to Sink

Phloem sap is translocated from areas of supply, called **Source**, to area of metabolism or storage called **Sink**

Mechanism

- **Passive transport mechnism**
- **Explained by The Pressure-Flow Model :** An osmotically generated pressure gradient drives translocation

Thankyou