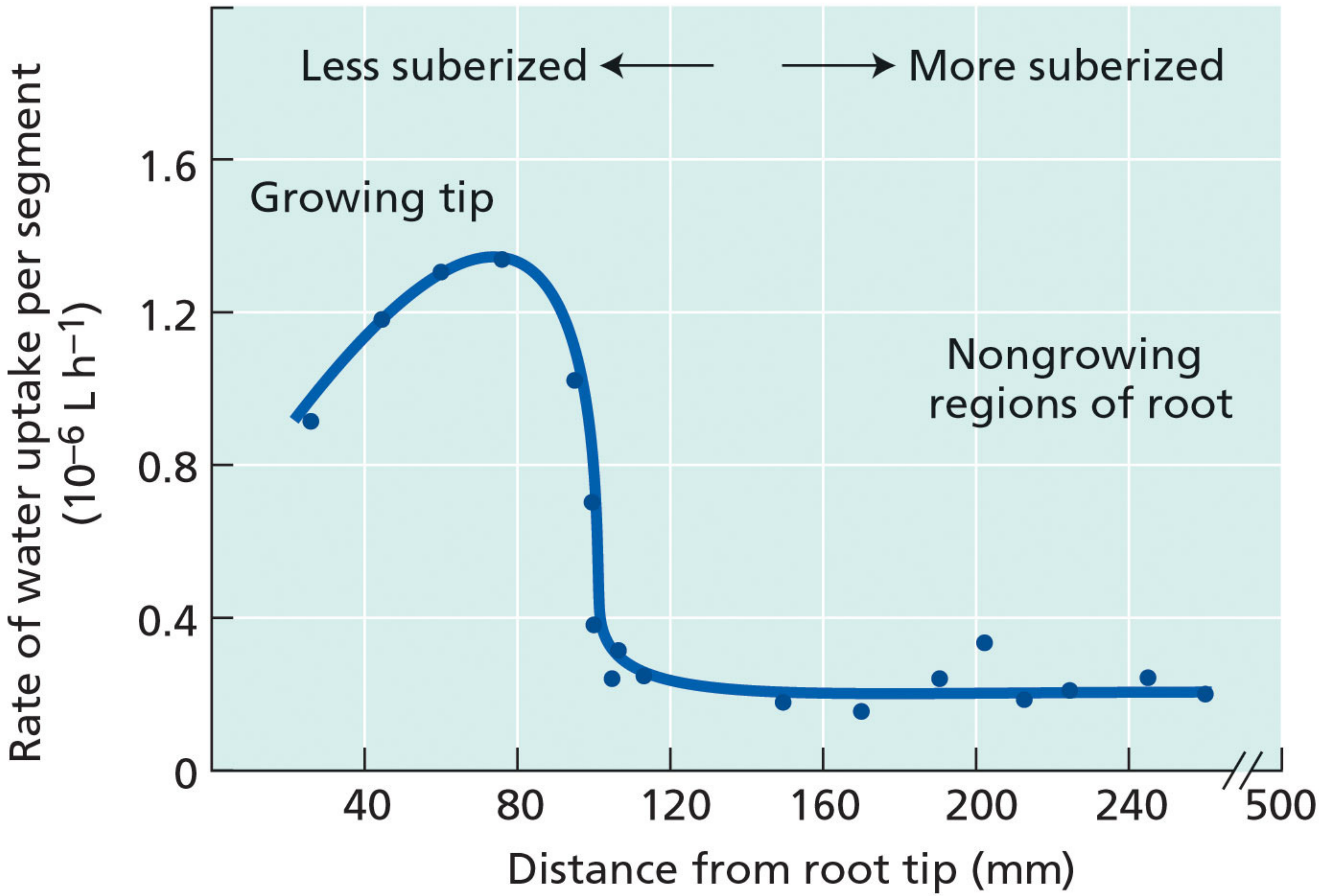
AGRY 515 2012

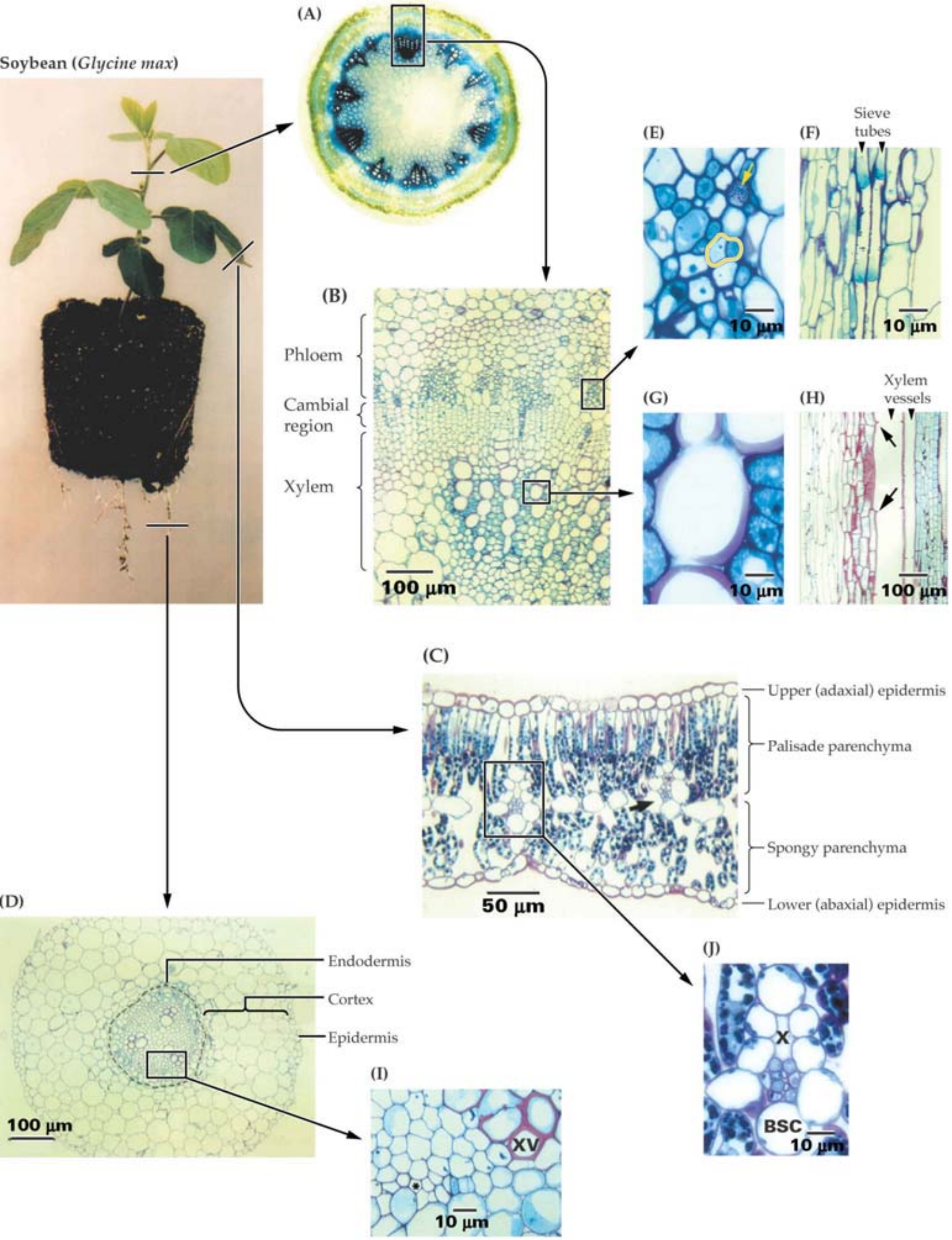
- Xylem Transport
- Phloem Transport
- Nutrient Mobility within the Plant
- Retranslocation

Fig. 1. The bigger the plant the longer the distance things travel…



PLANT PHYSIOLOGY, Third Edition, Figure 4.4 © 2002 Sinauer Associates, Inc.

Fig. 2. Vascular Systems



Photomicrographs showing the organization of the vascular system of higher plants, including:

phloem
xylem
cambium
cortex
Casparian strip.

Fig. 3. (Fig. 3.11 in text)

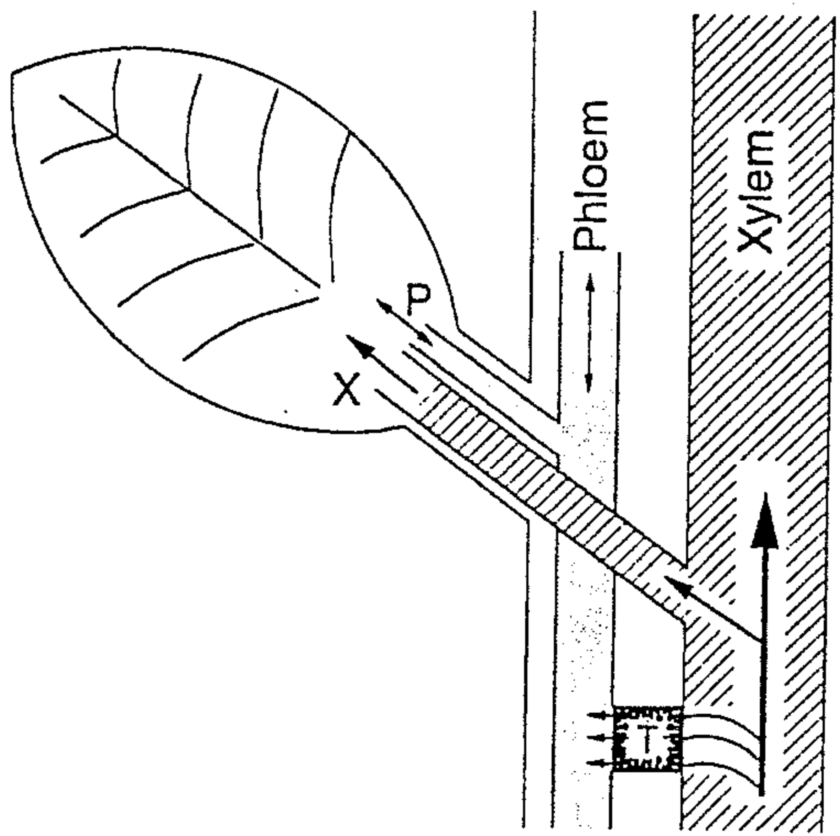


Fig. 3.11 Long-distance transport in xylem (X) and phloem (P) in a stem with a connected leaf, and xylem-to-phloem transfer mediated by a transfer cell (T).

Fig. 4. (Fig. 3.9 in text)

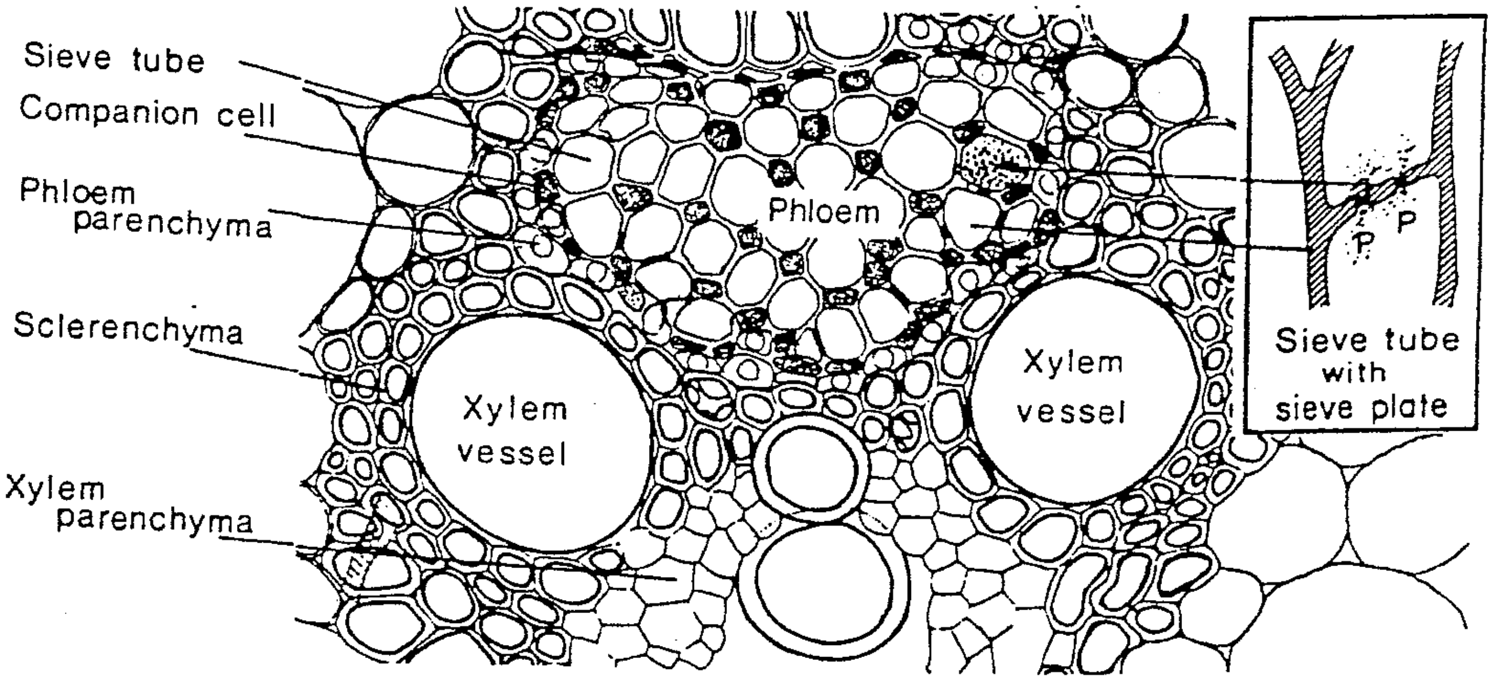
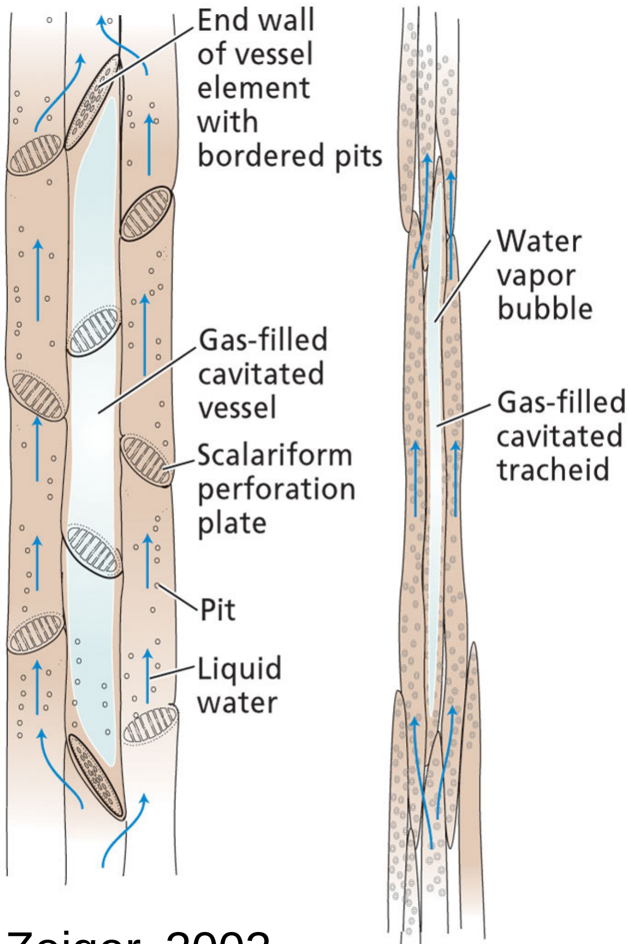
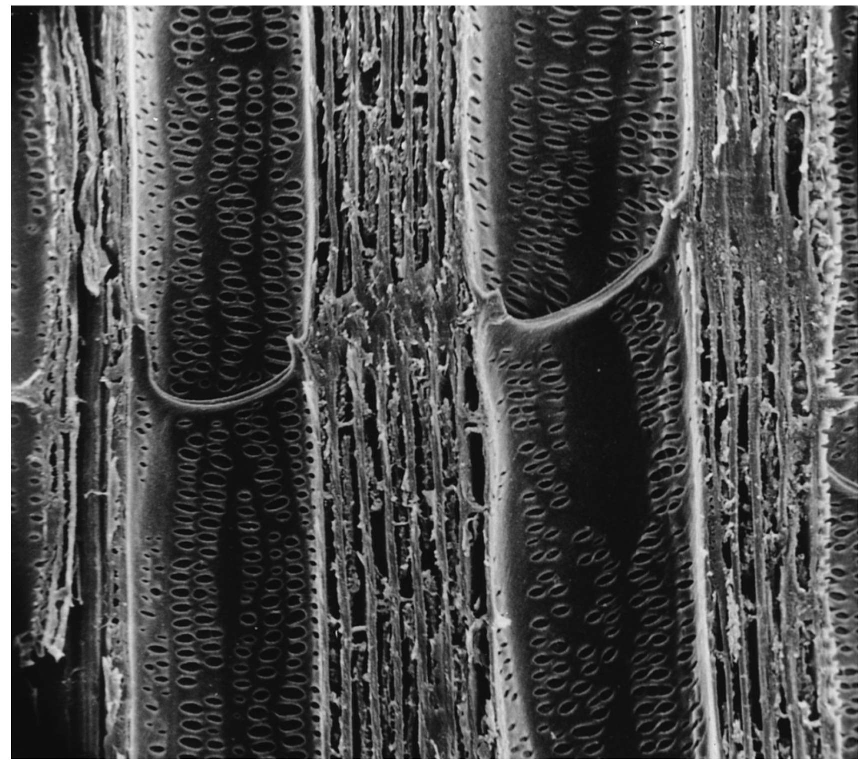


Fig. 3.9 Cross-sectional area of a vascular bundle from the stem of maize. Inset: sieve tube with sieve plate pores and 'P-protein'. (From Eschrich, 1976.)

Fig. 5. Xylem anatomy in longitudinal section





Taiz and Zeiger, 2002

Fig. 6. (Fig. 3.4 in text)

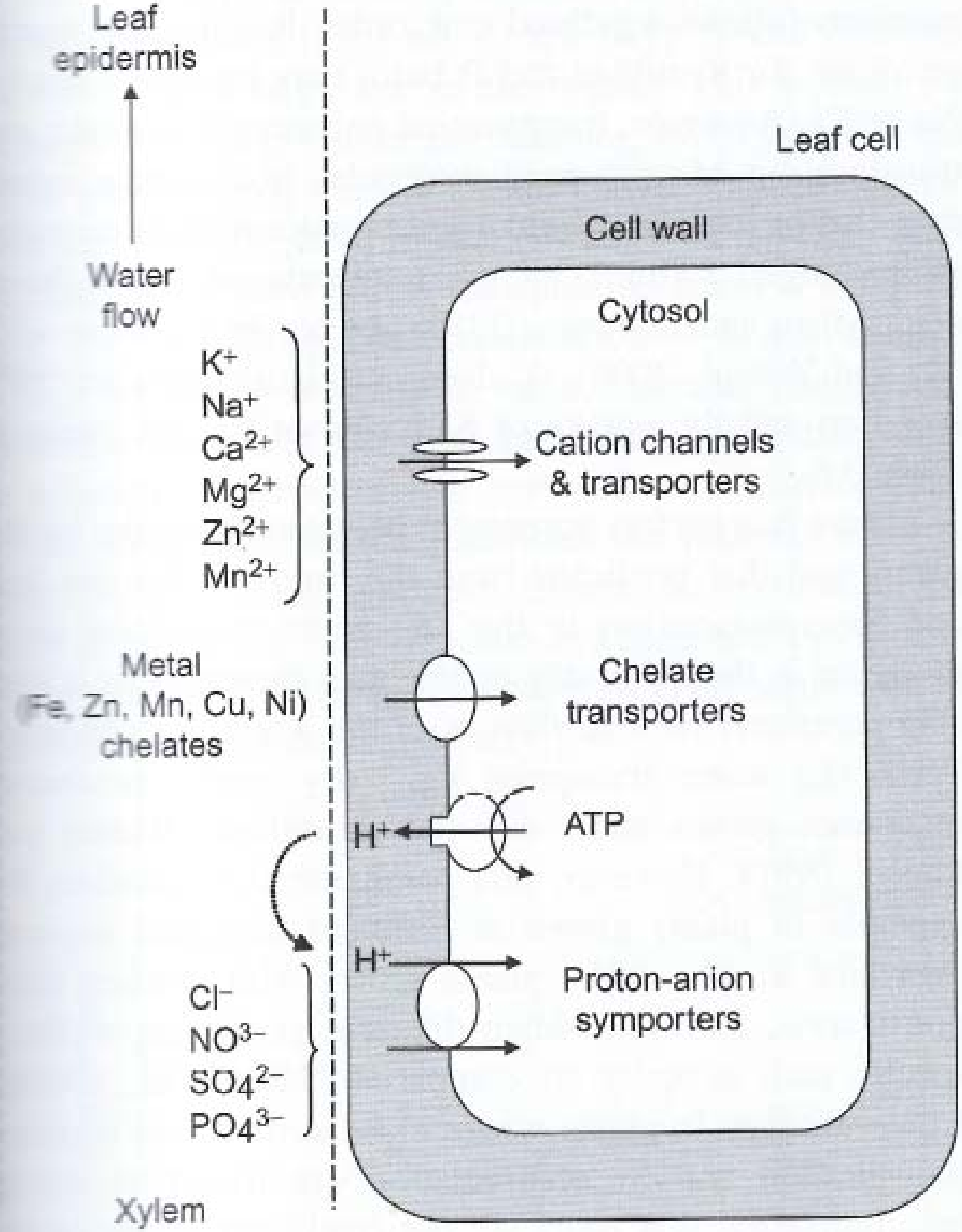


FIGURE 3.4 Model for the retrieval of major solutes from the xylem sap ('xylem unloading') in leaf cells.

Fig. 7. Pressure flow model of translocation in the phloem

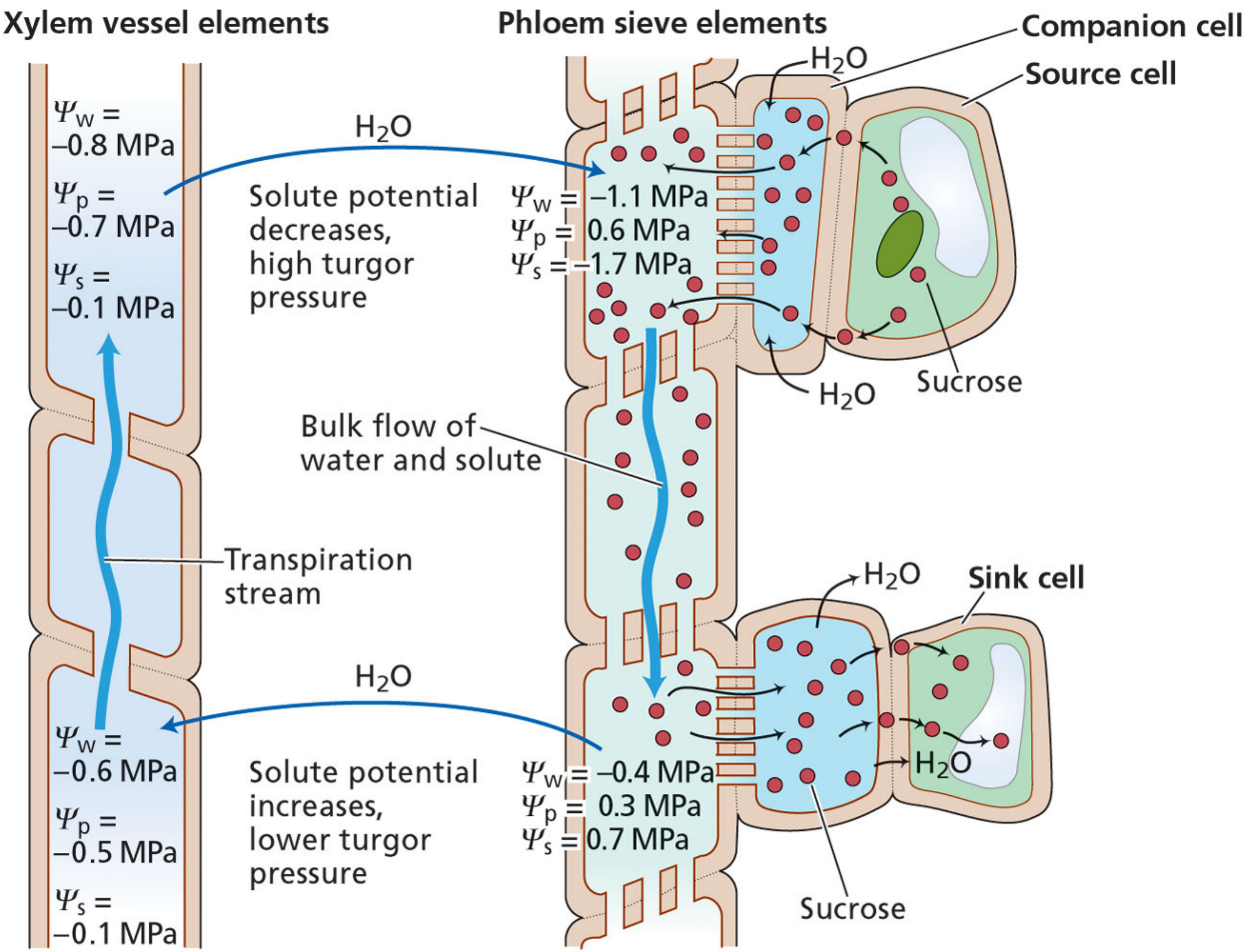
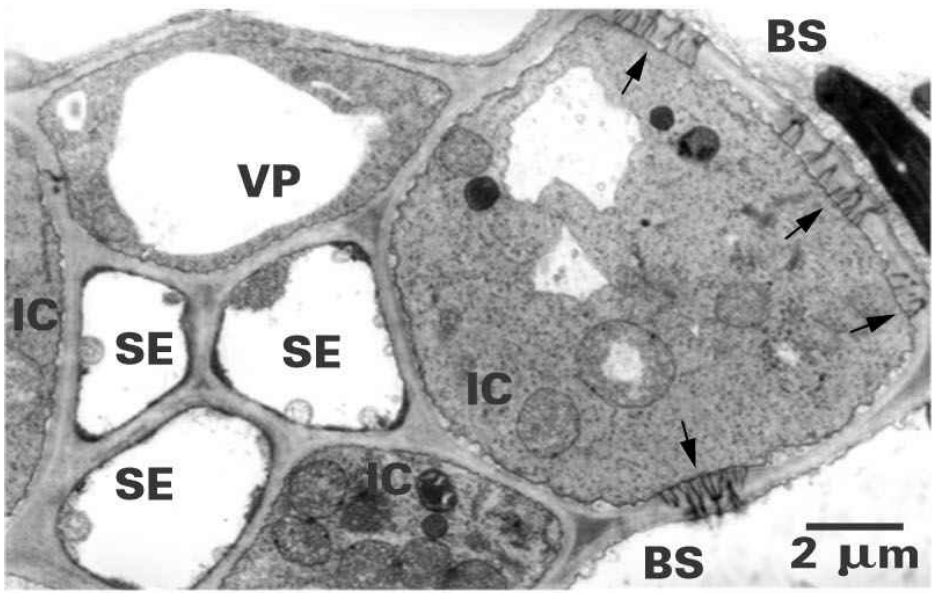
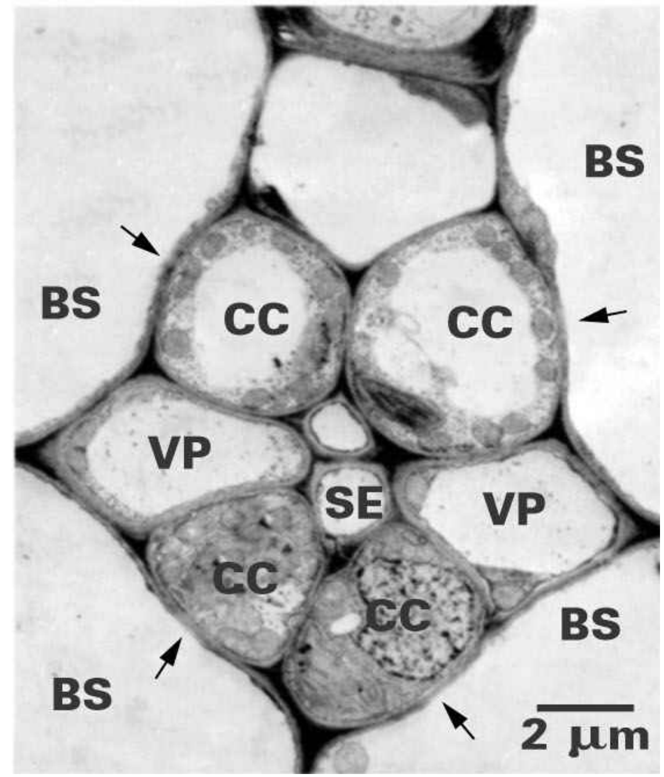


Fig. 8. Phloem anatomy in cross-section showing the sieve elements (se), companion cells (cc), bundle sheath (bs), and vascular parenchyma (vp)

Type 1 (open)



Type 2 (closed)



ASPB,
Biochemistry and Molecular Biology of Plants,
2000

Fig. 9. Schematic diagram of mature sieve element

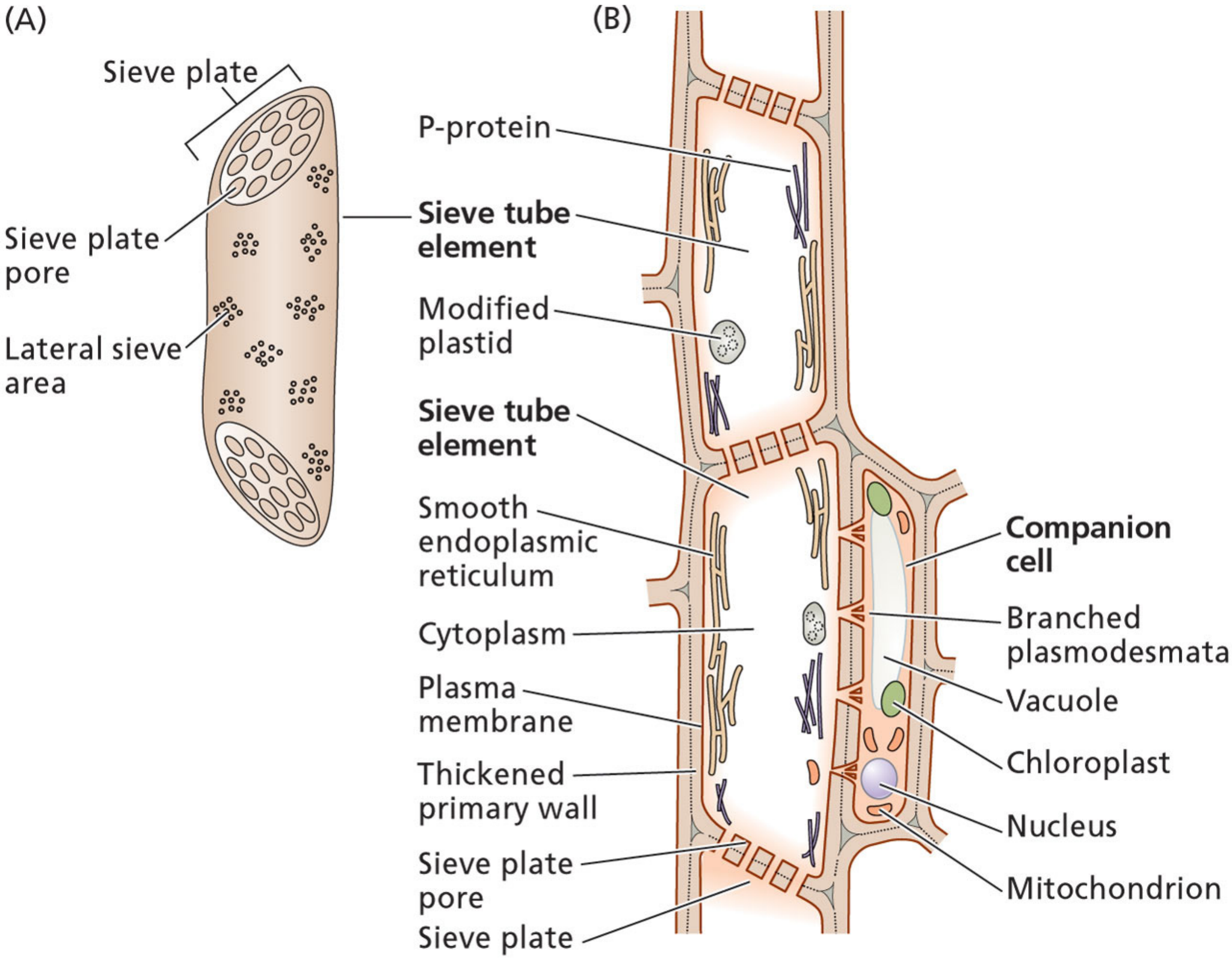
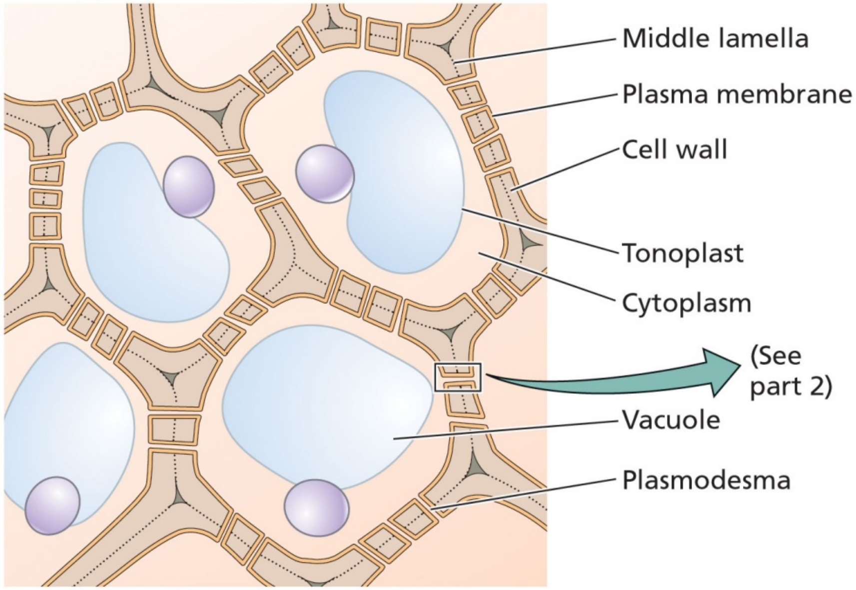


Fig. 10. Location and structure of plasmodesmata in plant cell walls



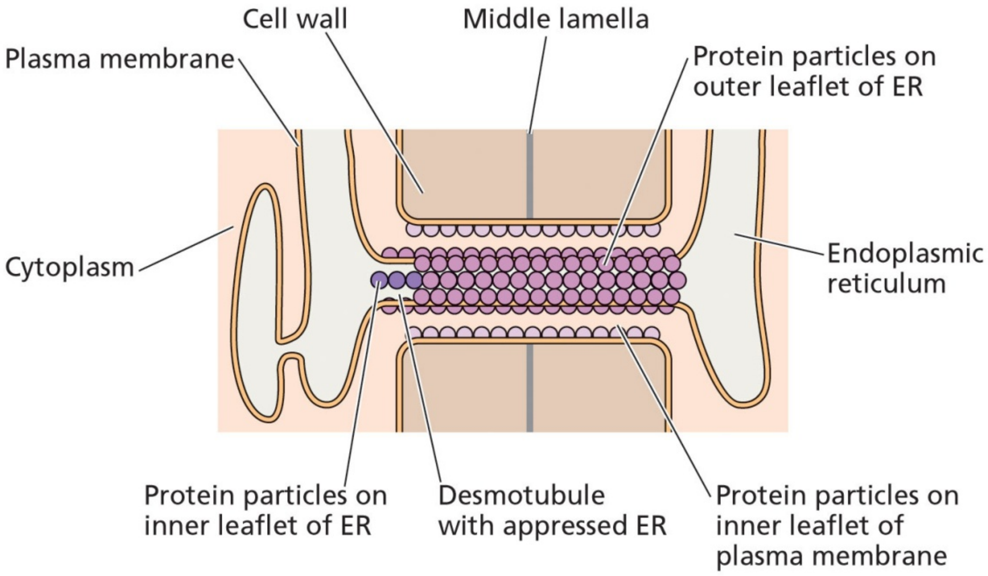
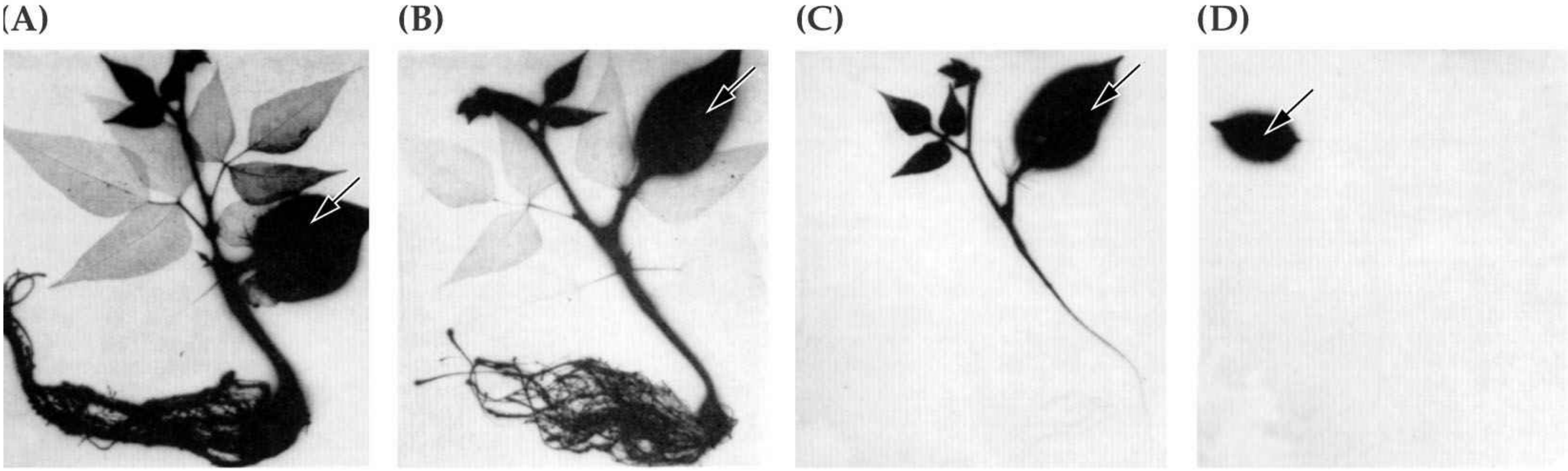


Table 1. (Table 3.8 in text). Comparison of the Levels of Organic and Inorganic Solutes in the Phloem and Xylem Exudates of *Nicotiana glauca*a.

Substance	Phloem exudates (stem incision) pH 7.8-8.0 ($\mu g\ ml^{-1}$)b	Xylem exudates (tracheal) pH 5.6-5.9 ($\mu g\ ml^{-1}$)b	Concentration ratio phloem/xylem
Dry matter	**170-196c**	**1.1-1.2c**	**155-163**
Sucrose	**155-168c**	**ND**	**—**
Reducing sugars	**Absent**	**NA**	**—**
Amino compounds	**10 808.0**	**283.0**	**38.2**
Nitrate	**ND**	**NA**	**—**
Ammonium	**45.3**	**9.7**	**4.7**
Potassium	**3673.0**	**204.3**	**18.0**
Phosphorus	**434.6**	**68.1**	**6.4**
Chloride	**486.4**	**63.8**	**7.6**
Sulfur	**138.9**	**43.3**	**3.2**
Calcium	**83.3**	**189.2**	**0.44**
Magnesium	**104.3**	**33.8**	**3.1**
Sodium	**116.3**	**46.2**	**2.5**
Iron	**9.4**	**0.60**	**15.7**
Zinc	**15.9**	**1.47**	**10.8**
Manganese	**0.87**	**0.23**	**3.8**
Copper	**1.20**	**0.11**	**10.9**

Fig. 11. Phloem uptake and recycling of ^{32}P applied as $K_2H^{32}PO_4$ to successively younger leaves over 24 hours

Arrow denotes leaflet that was labeled



ASPB,
Biochemistry and Molecular Biology of Plants,
2000

Table 2. (Table 3.9 in text). Characteristic differences in mobility of mineral nutrients in the phloem.

High Mobility	Intermediate Mobility	Low Mobility
Potassium	Iron	Calcium
Magnesium	Zinc	Manganese
Phosphorus	Copper	
Sulfur	Boron	
Nitrogen (amino-N)	Molybdenum	
Chlorine		
(Sodium)		

Fig. 12. (Fig. 3.13 in text). Schematic representation of mineral nutrient distribution in cereal plants during ontogeny.

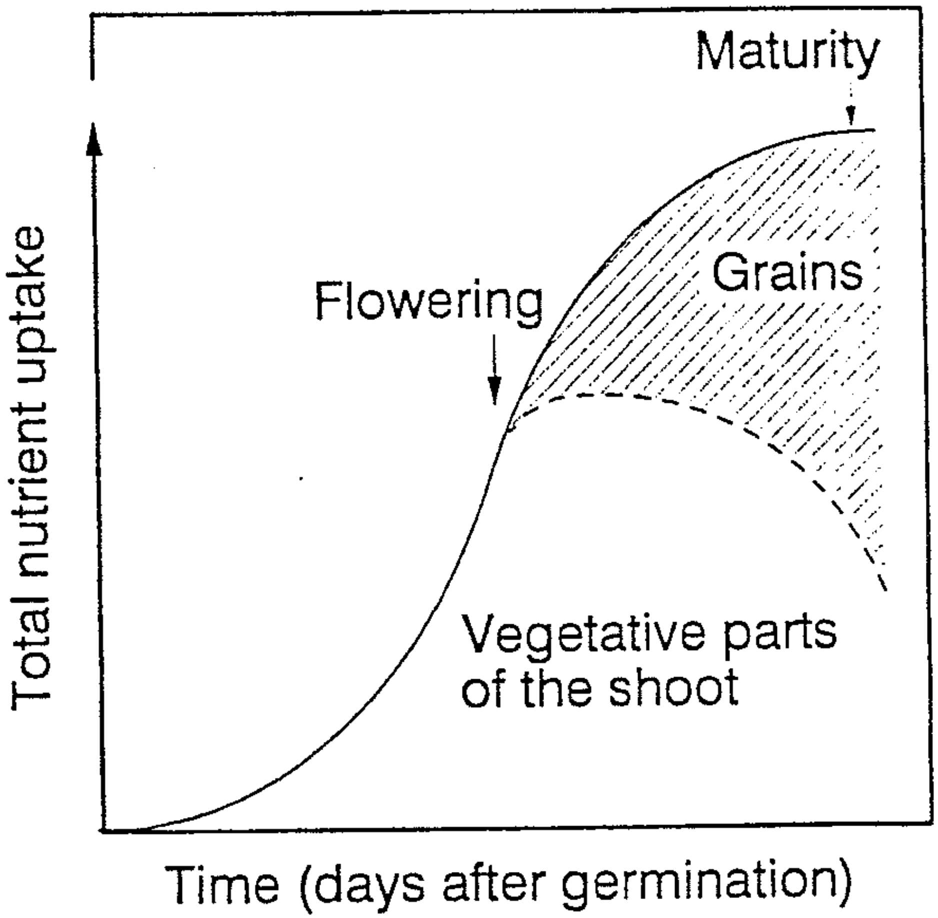


Fig. (Fig. 3.14 in text). Nitrogen partitioning in field-grown bean during reproductive growth…