

What are plant hormones and how do they function ?



What are tracheophytes ?

- ★ Higher land plants with vascularization (true roots, stems and leaves) are called tracheophytes. They include the ferns, gymnosperms (conifers) and angiosperms (flowering plants).



What are activities that tracheophytes must regulate ?

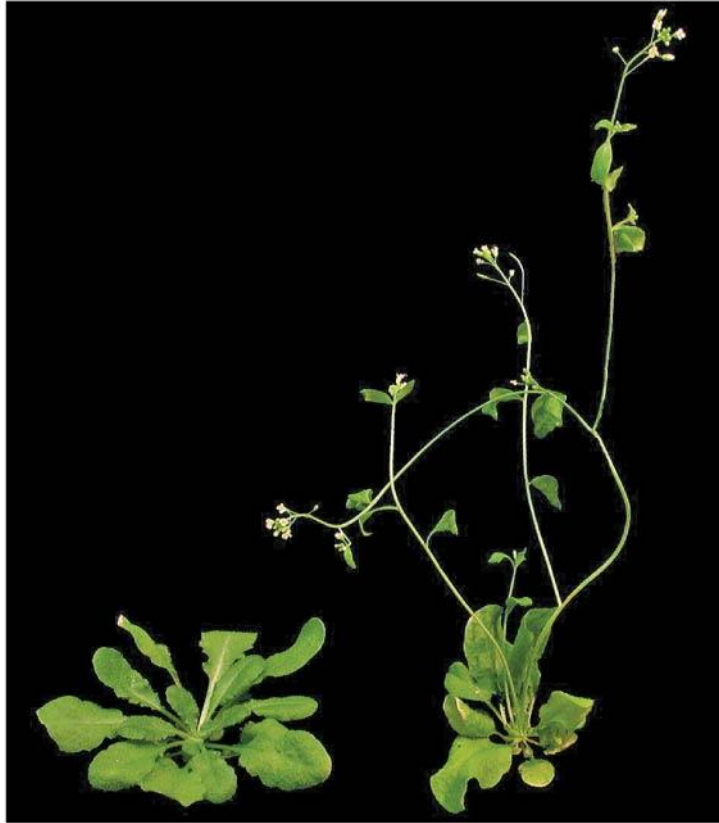
- ★ Stems must respond to light. This is called phototropism. (IAA) (auxin)
- ★ Roots must anchor the plant by growing into a substrate such as soil. This is called geotropism. (IAA) (auxin)
- ★ Angiosperms must 'know' when to flower. This is called photoperiodism. (phytochrome)



What are activities that tracheophytes must regulate ?

- ★ Angiosperms must fruit. (ethylene and GA) (gibberlic acid)
- ★ Seeds must germinate (GA)
- ★ Seed embryos must form roots, stems and leaves. These are specialized organs. (cytokinins)





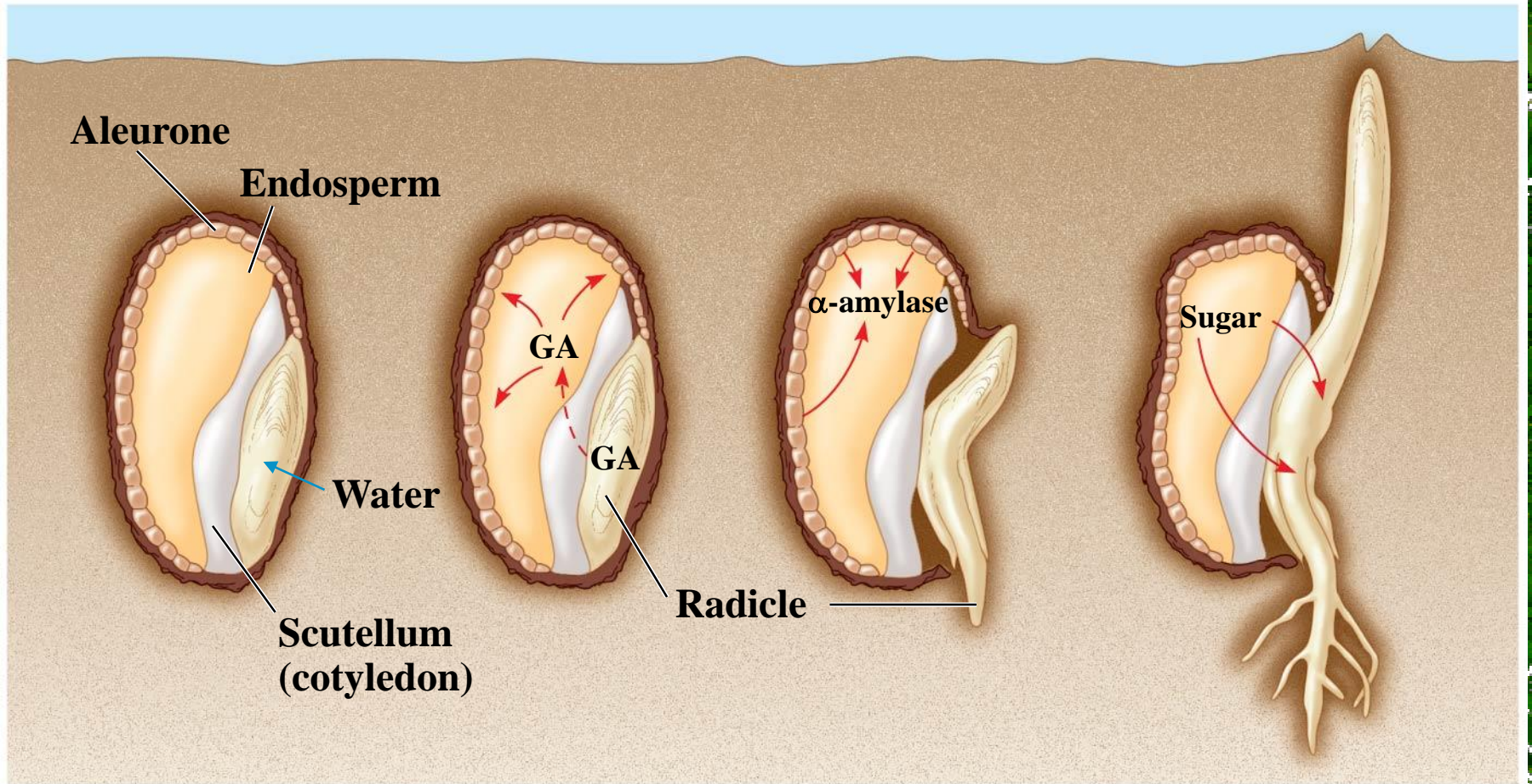
(a) Rosette form (left) and gibberellin-induced bolting (right)



(b) Grapes from control vine (left) and gibberellin-treated vine (right)



Figure 31.7



What are activities that tracheophytes must regulate ?

- ★ Deciduous trees must lose leaves in autumn (ethylene)
- ★ Deciduous trees must remain dormant during the winter (ABA) (abscisic acid)
- ★ Deciduous trees must come out of dormancy in spring (GA)



What are plant hormones ?

- ★ Plant hormones are chemicals produced in one area of the plant that function somewhere else.
- ★ Plant rely on the chemical regulation of hormones to regulate metabolism.
- ★ Plant hormones are small and permeable to cell walls.
- ★ They effect cell division, cell growth (elongation) and cell differentiation (becoming roots, stems or leaves)
- ★ Their effect is dependent on the type of hormone, its concentration, its target cell, and the presence of other hormones.



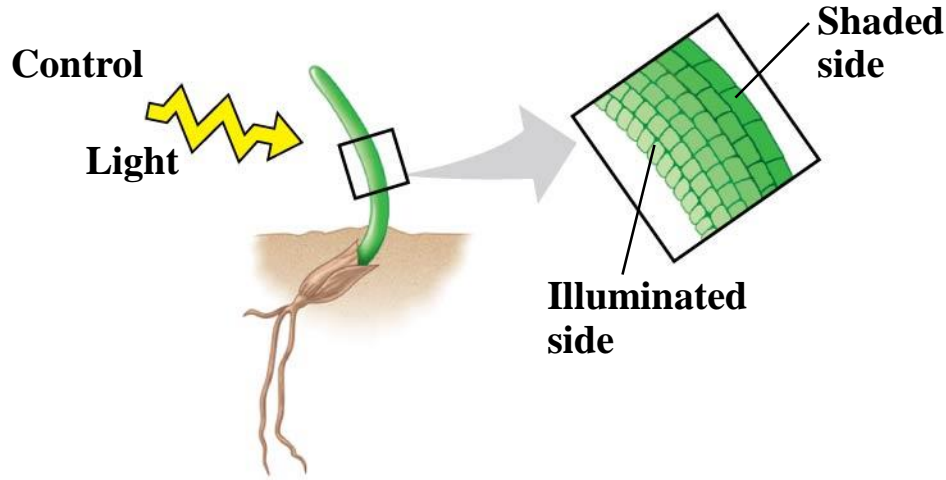
What are tropisms ?

- * Tropism = growth pattern in response to an environmental stimulus
- * Phototropism – response to light
 - 1) auxin moves from apical meristem to zone of elongation (target) by active transport
 - 2) If light illuminates the entire stem, the result is uniform, straight growth.
 - 3) Uneven light causes auxin to move to the shady side. At that location it causes cells to elongate faster and the plant bends towards the light.

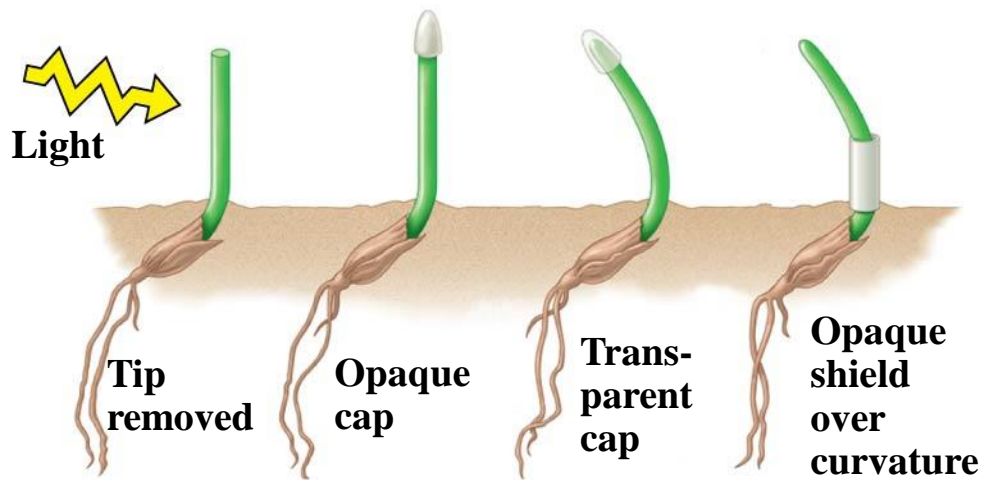


Figure 31.2

Results



Darwin and Darwin



Boysen-Jensen

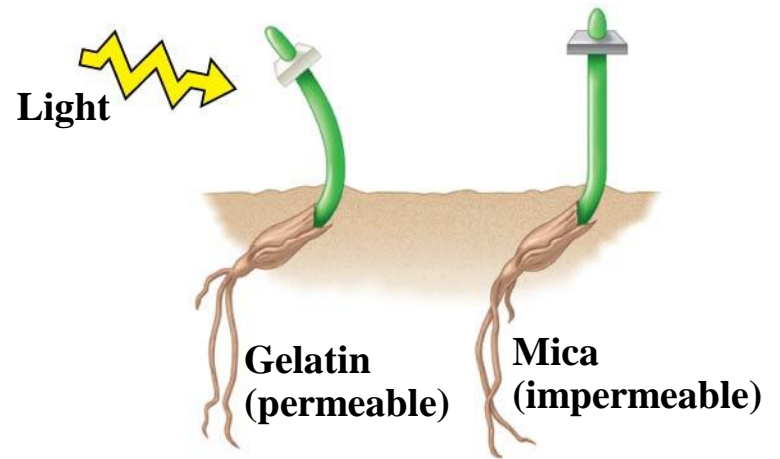


Figure 31.2a

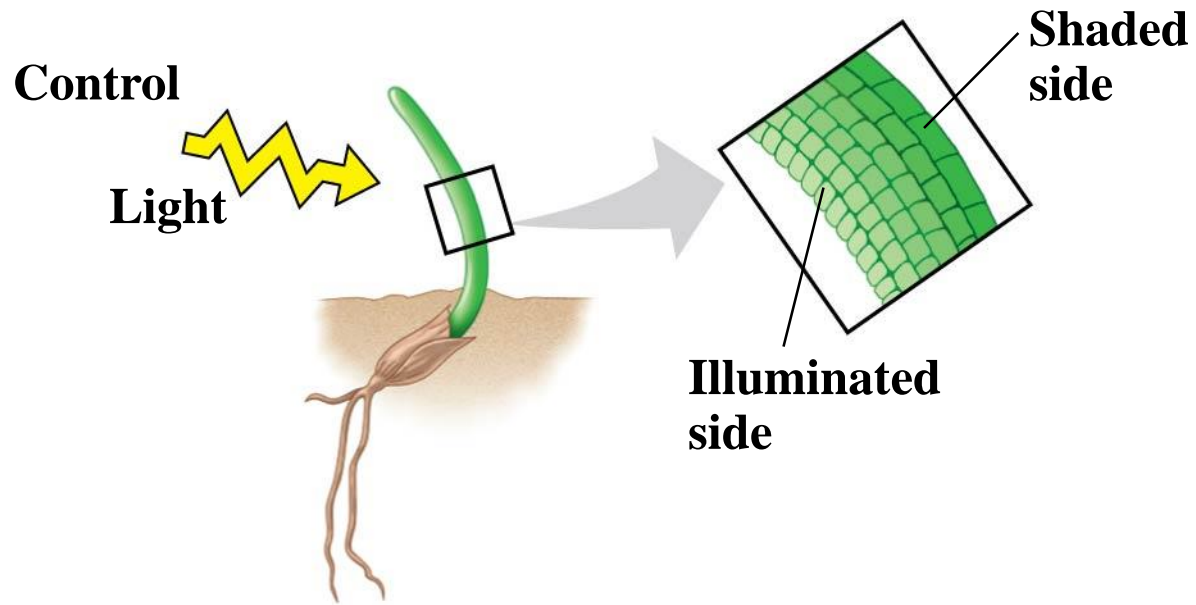


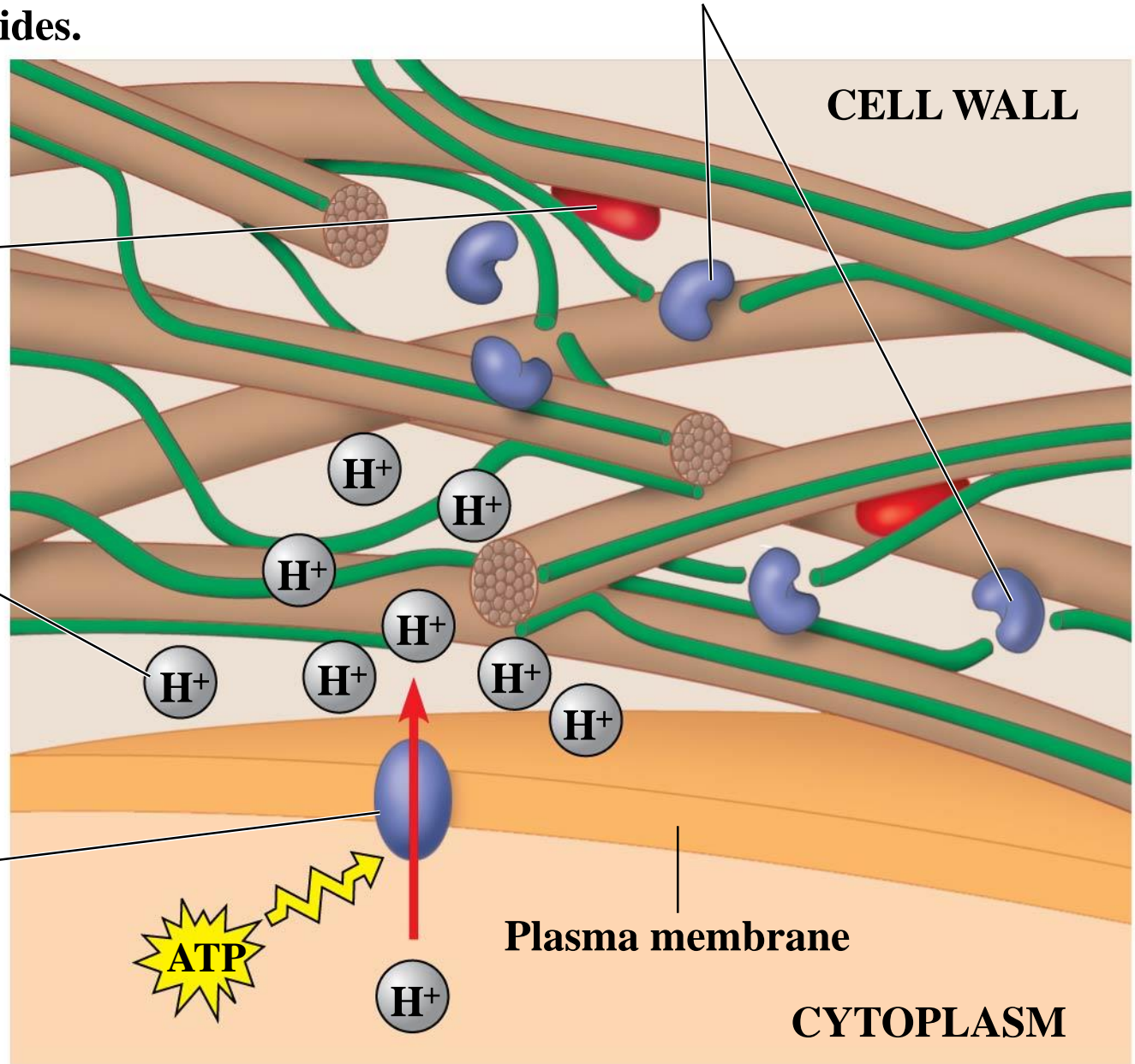
Figure 31.5a

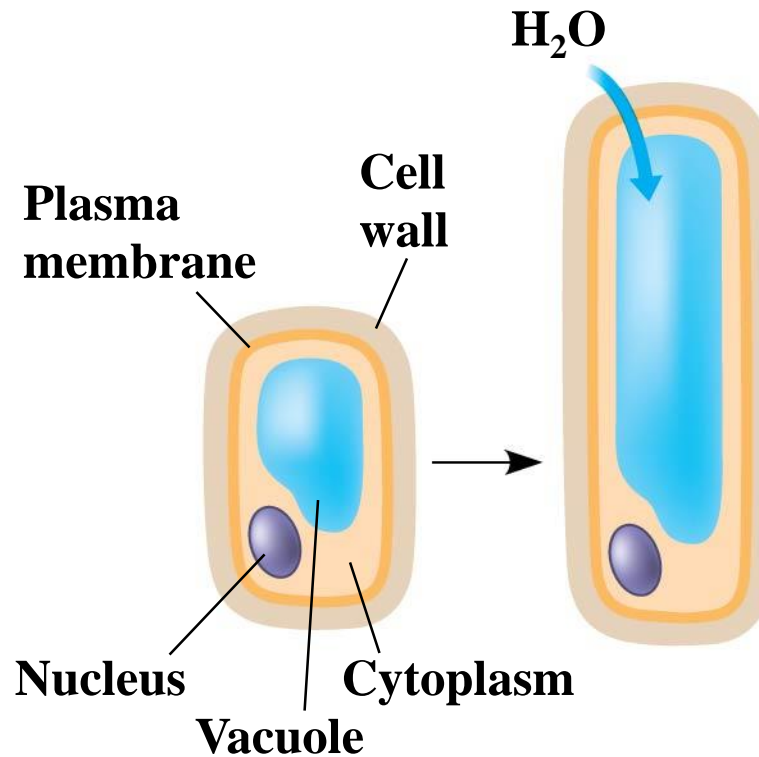
4 Cell wall-loosening enzymes cleave cross-linking polysaccharides.

3 Low pH activates expansins.

2 Acidity increases.

1 Proton pump activity increases.





- 5 Sliding cellulose microfibrils allow cell to elongate.



What are tropisms ?

- ★ Geotropism (response to gravity) – roots grow down (with gravity) because auxin is inhibited in roots. Stems grow upward.
- ★ Thigmotropism – response to touch climbing vines wrap around pole and venus fly traps close in on prey

