FACULTY
OF SCIENCE
Masaryk University

Reproduction and Senescence

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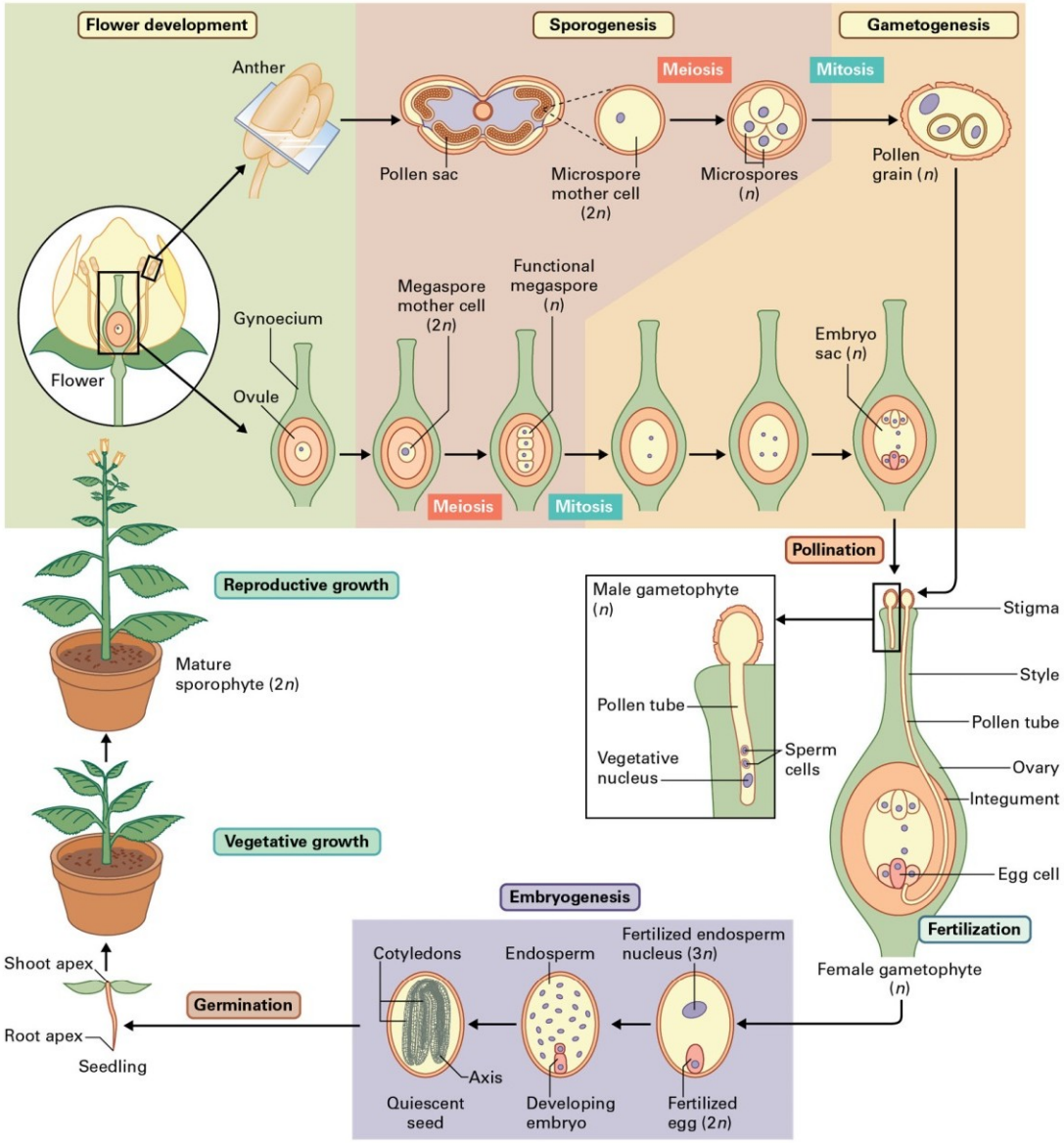
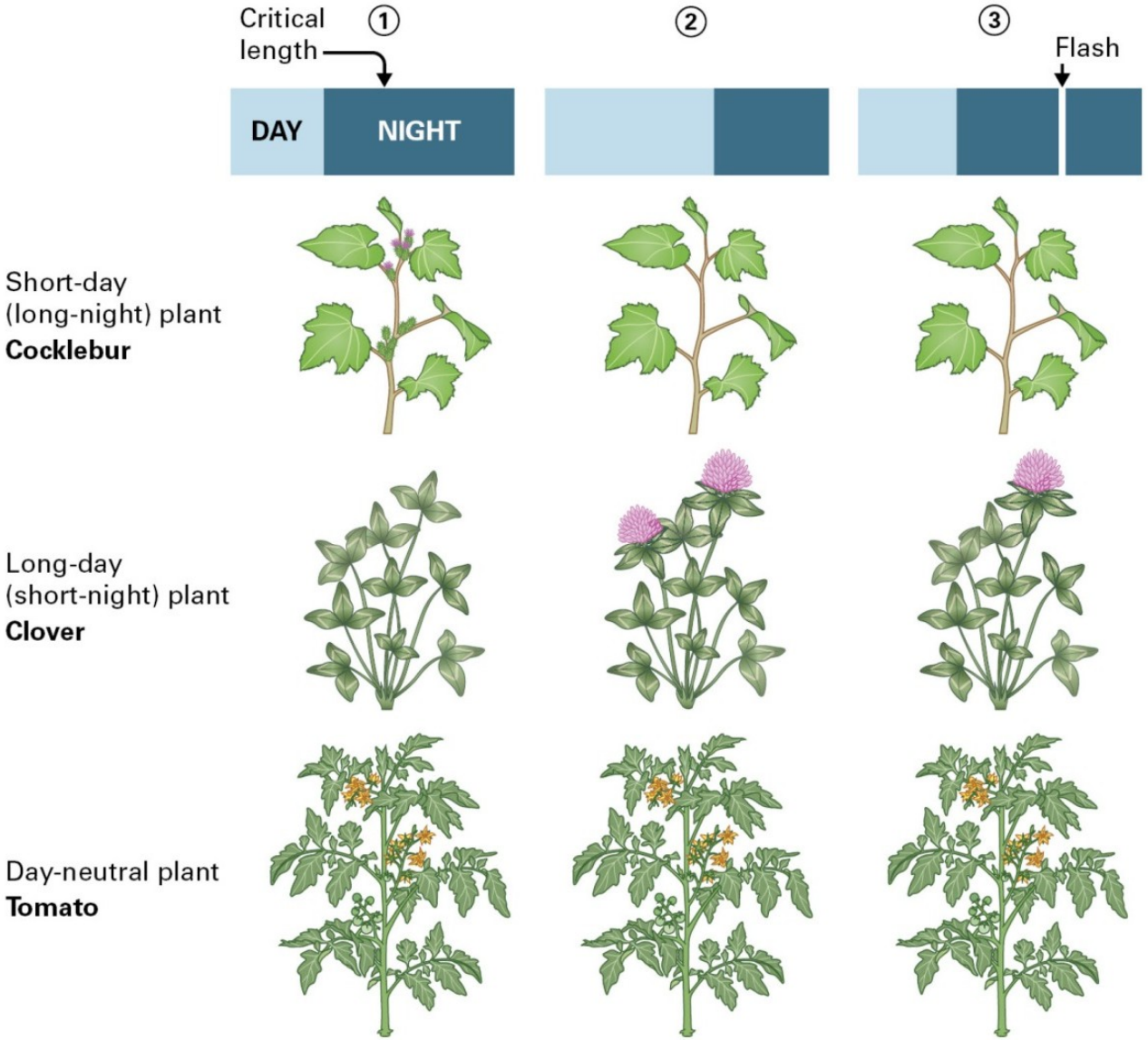
Figures adopted from Buchanan et al., Biochemistry & molecular biology of plants

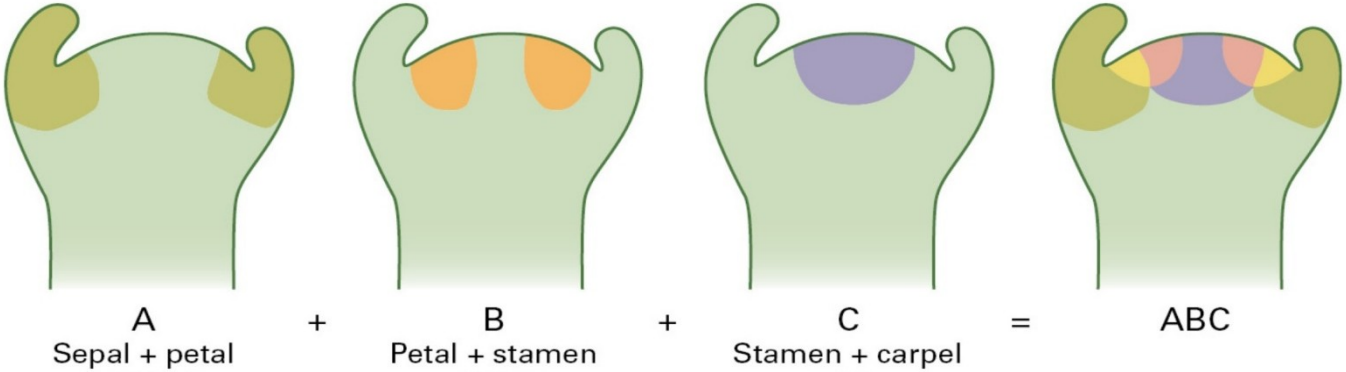
The life cycle of flowering plants

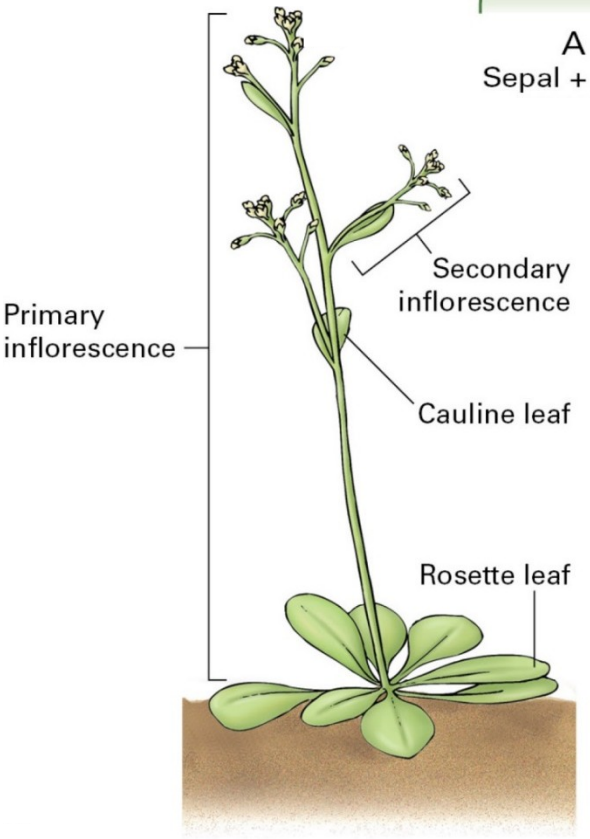


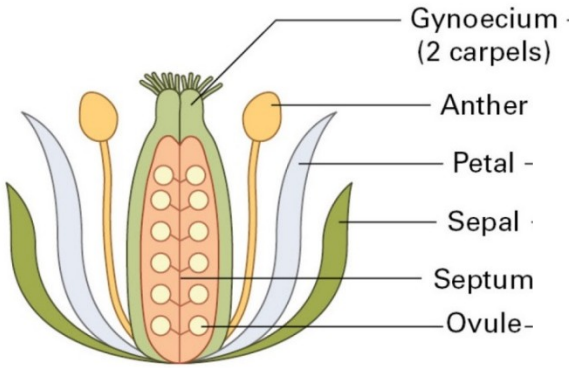
The transition to reproductive development



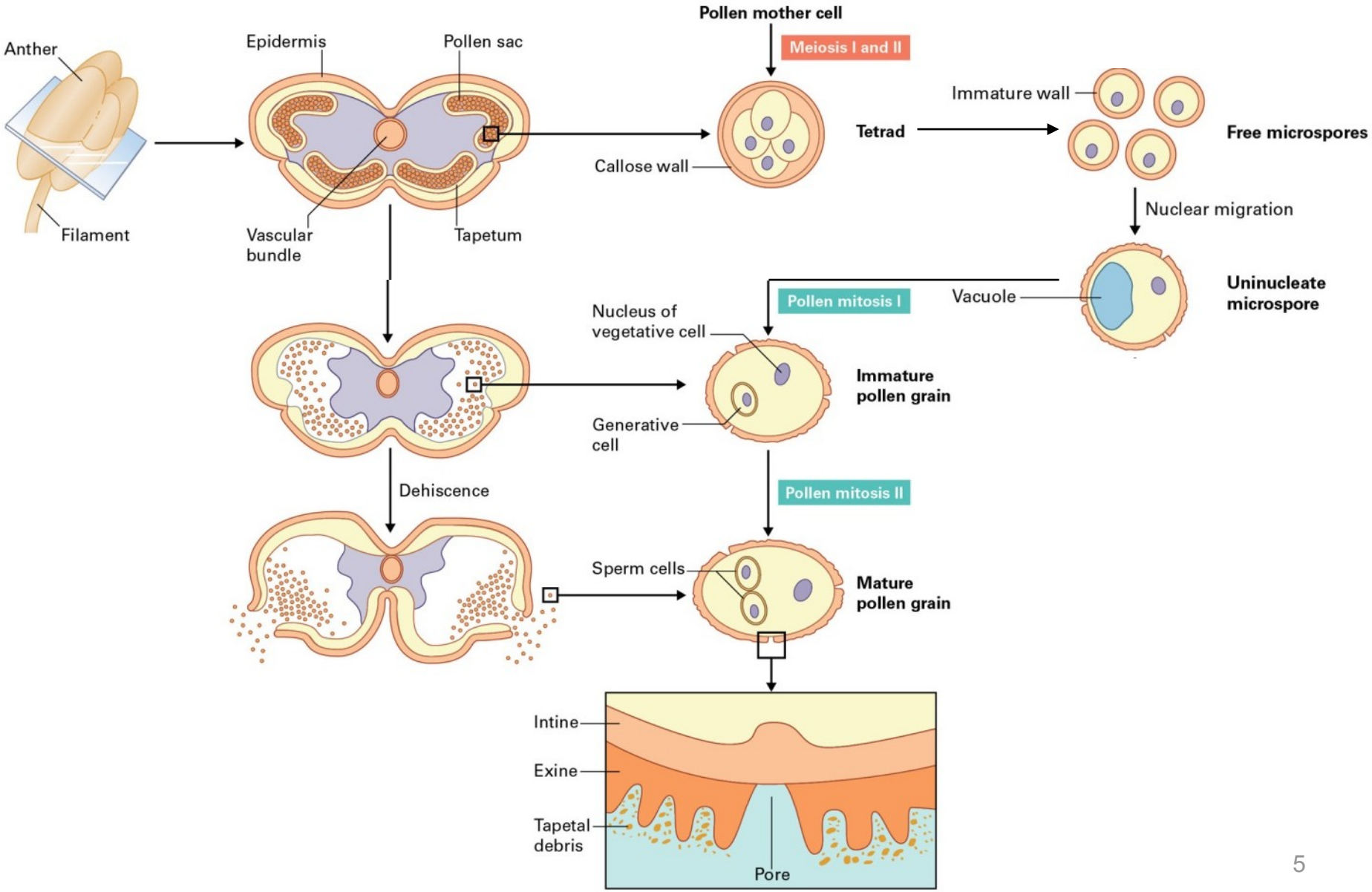
Flower development



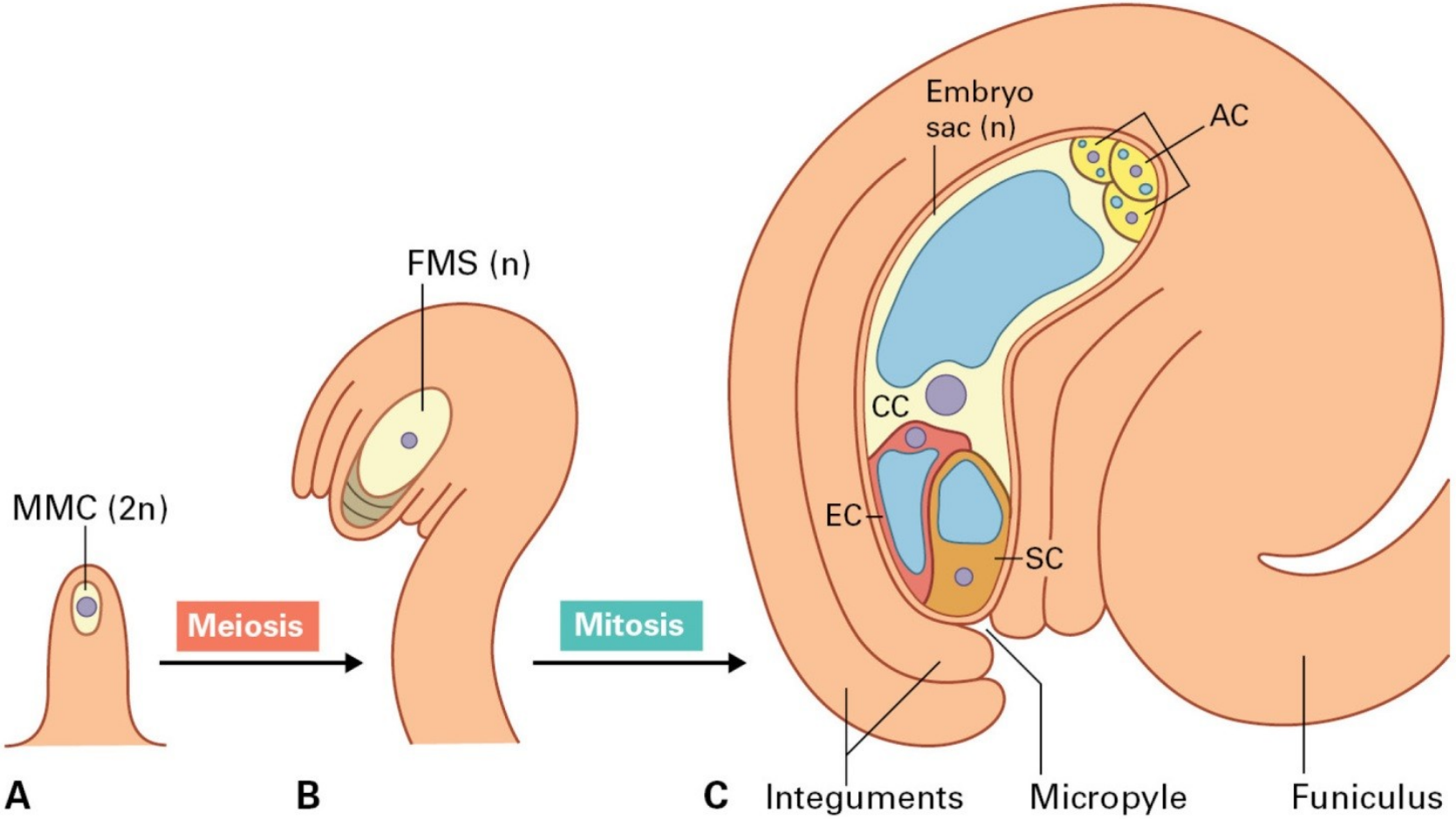




Male gametes

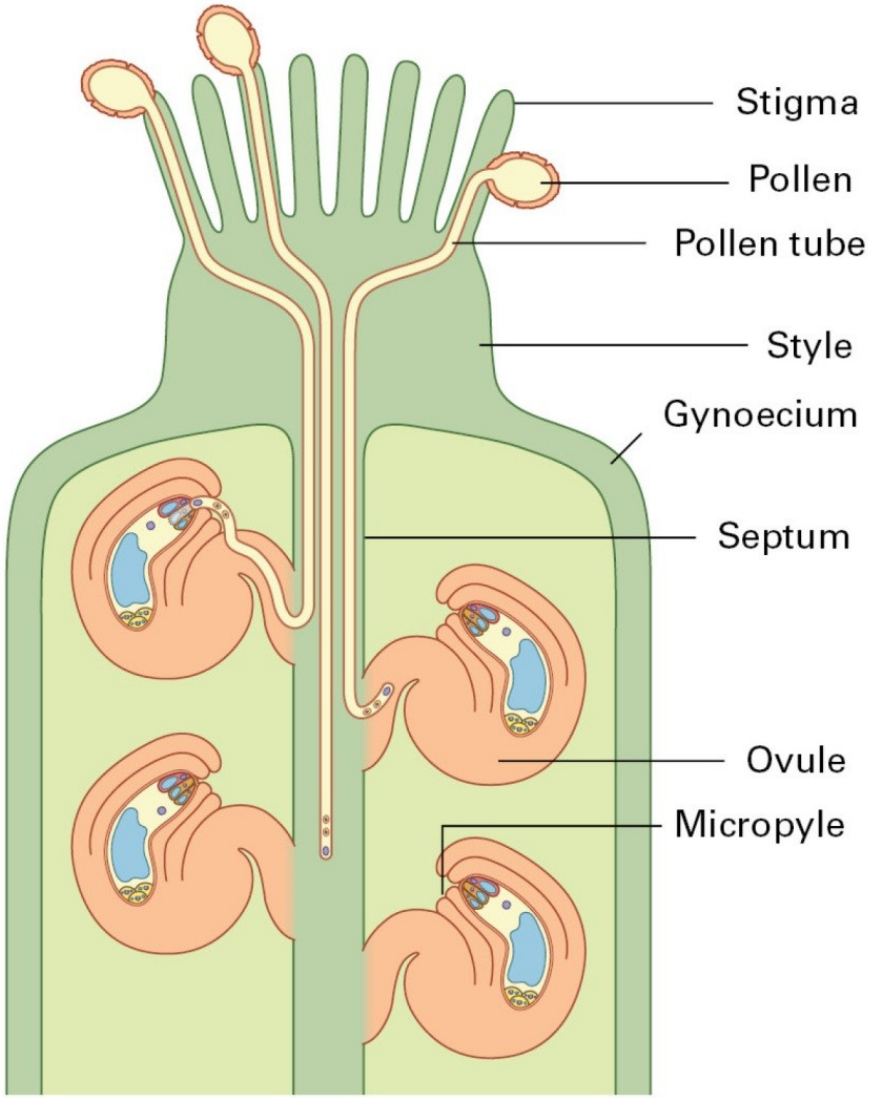


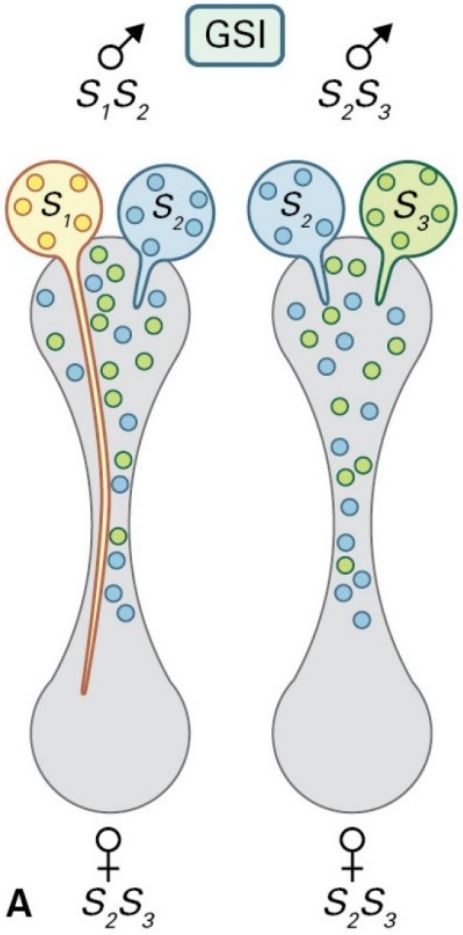
Female gametes



(A) Megaspore mother cell at the tip of a young ovule primordium
(B) Functional megaspore initiates embryo sac development
(C) Mature ovule containing synergid cells, egg cell, central cell, and antipodal cells

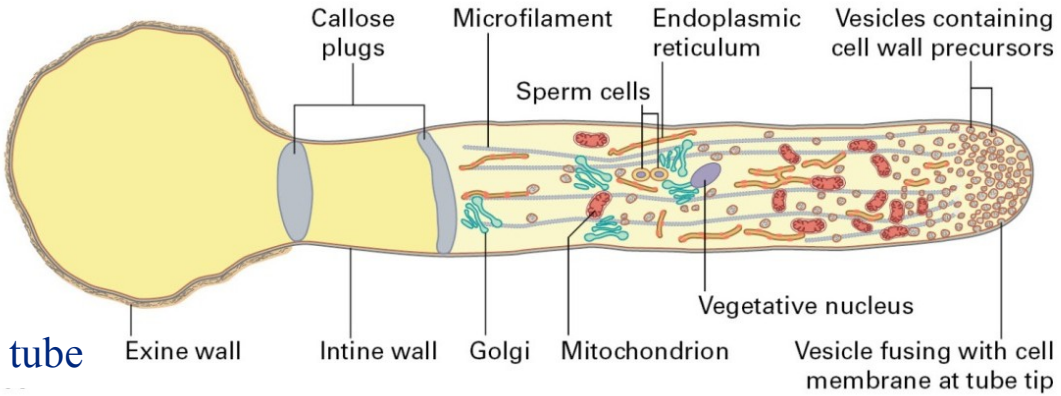
Pollination and fertilization



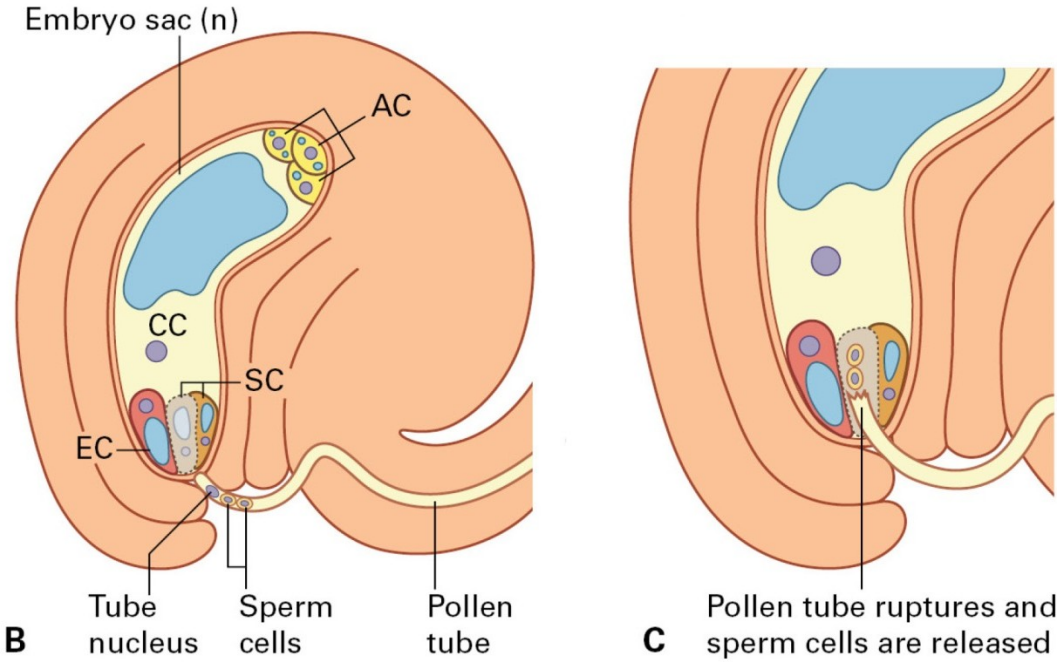


Genetic basis of self-incompatibility

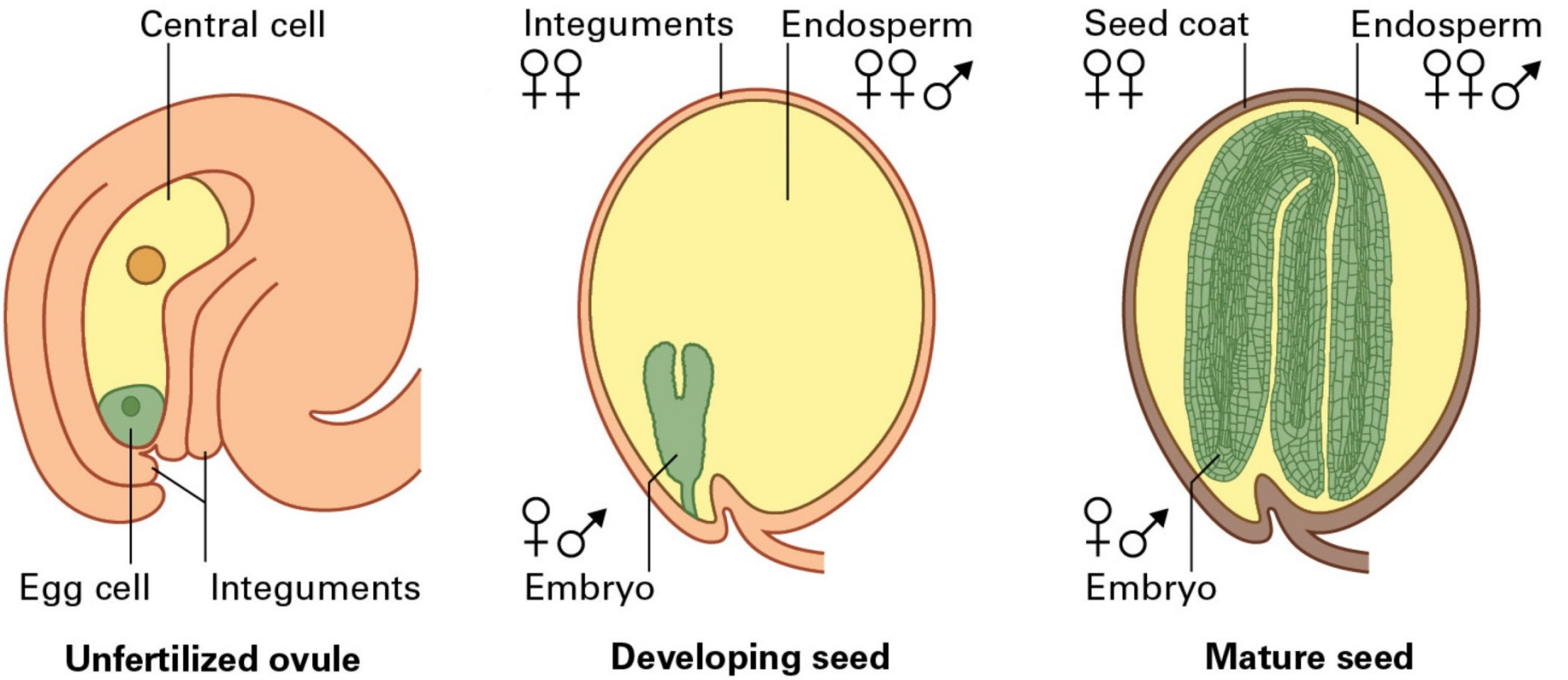
Pollination and fertilization



Growing pollen tube



Seed development



Senescence

Ipomoea tricolor

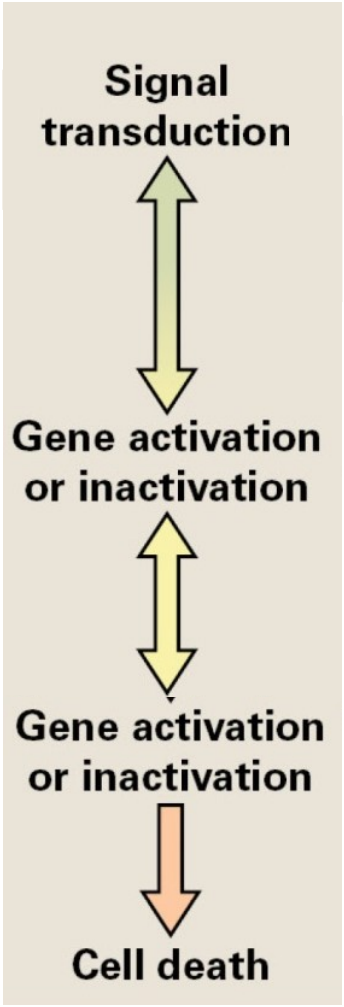
Welwitschia mirabilis

Senescence

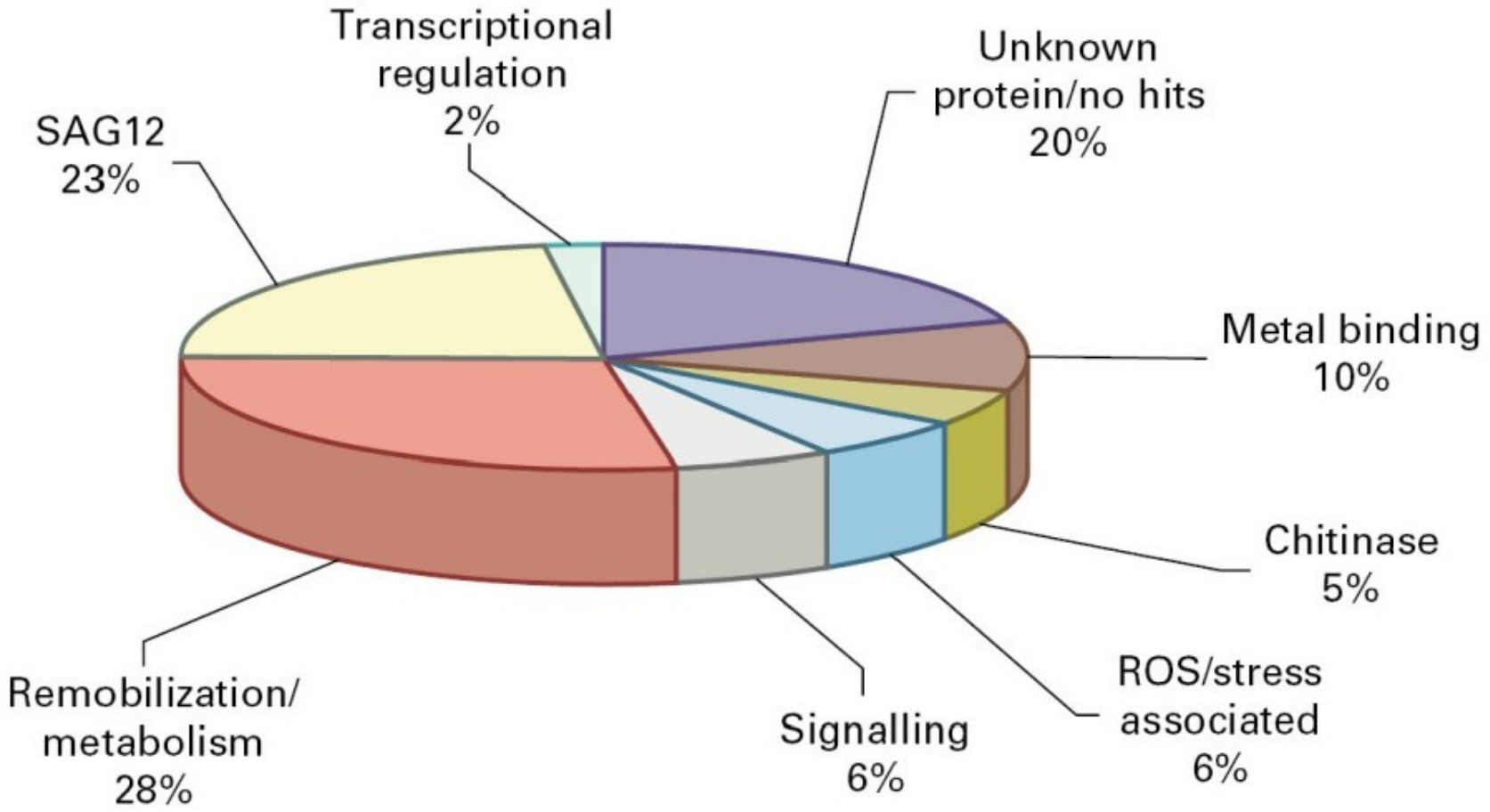
① Initiation phase
- Crossing of metabolic threshold
- Altered redox state
- Signaling cascades

② Reorganization phase
- Activation of salvage pathways
- Shift from autotrophic to heterotrophic metabolism
- Detoxification
- Reversible organelle redifferentiation

③ Terminal phase
- Antibiotic accumulation
- Release of free radicals
- Elimination of remaining metabolites
- Irreversible loss of cell integrity and viability

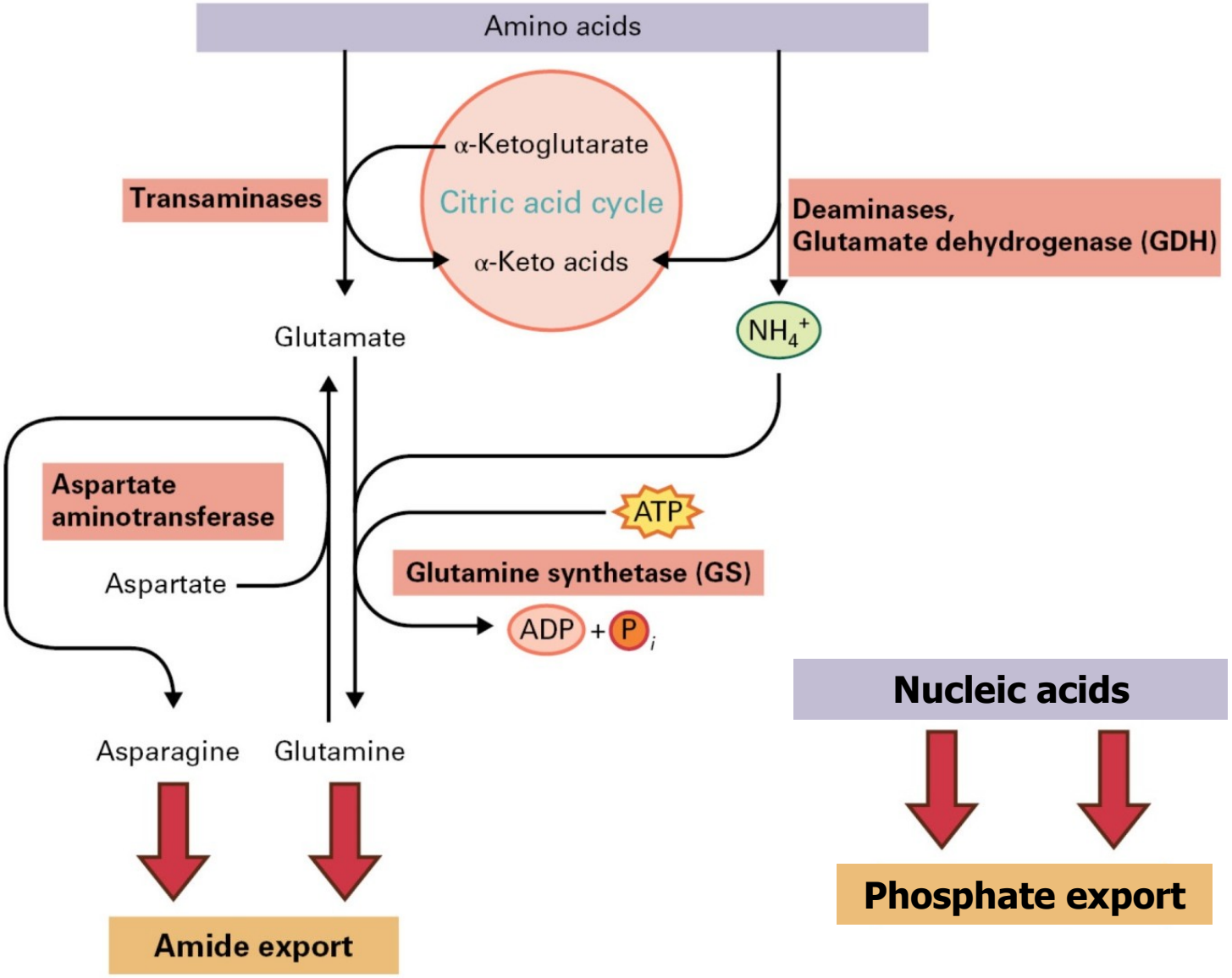


Gene expression during senescence

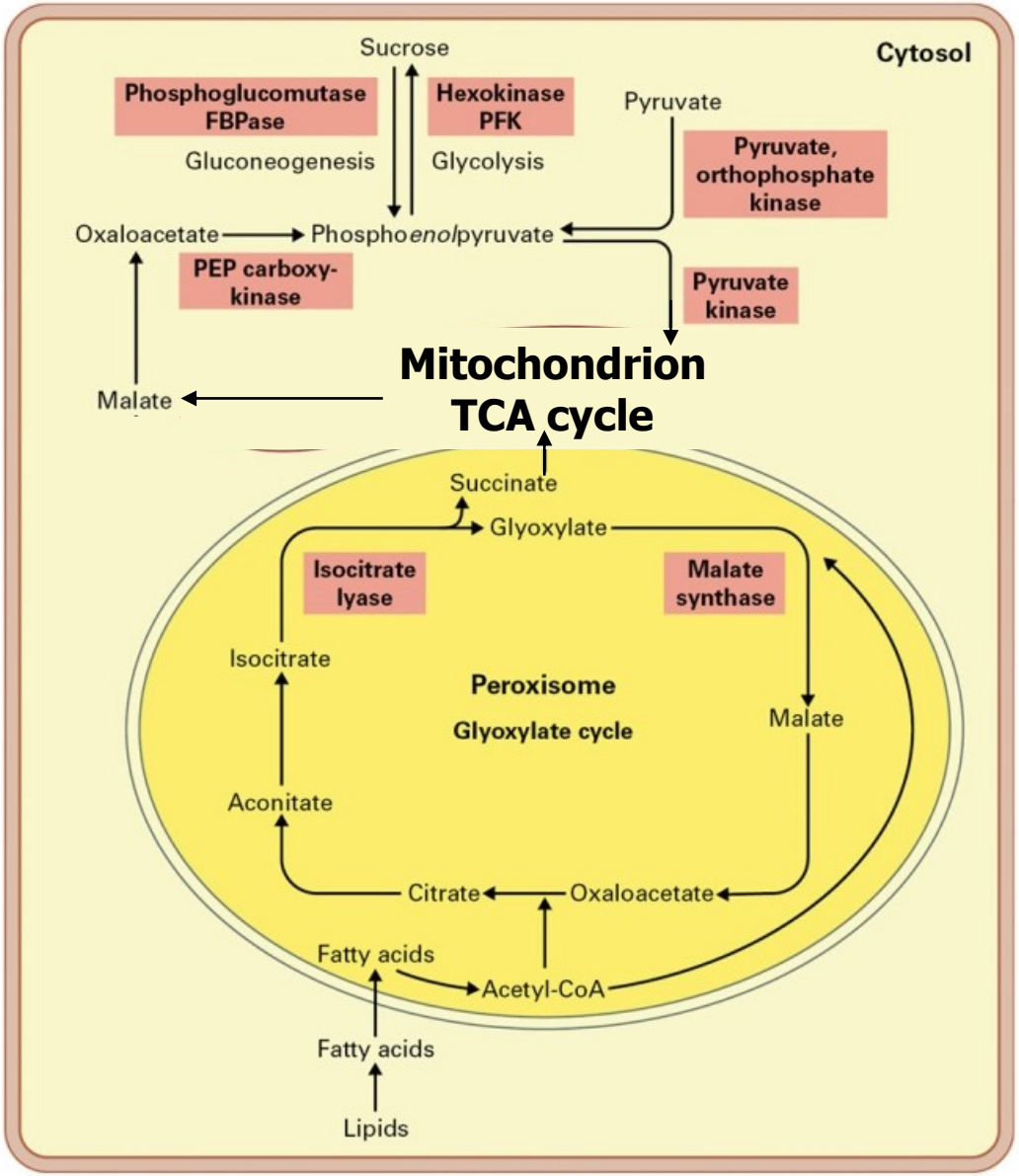


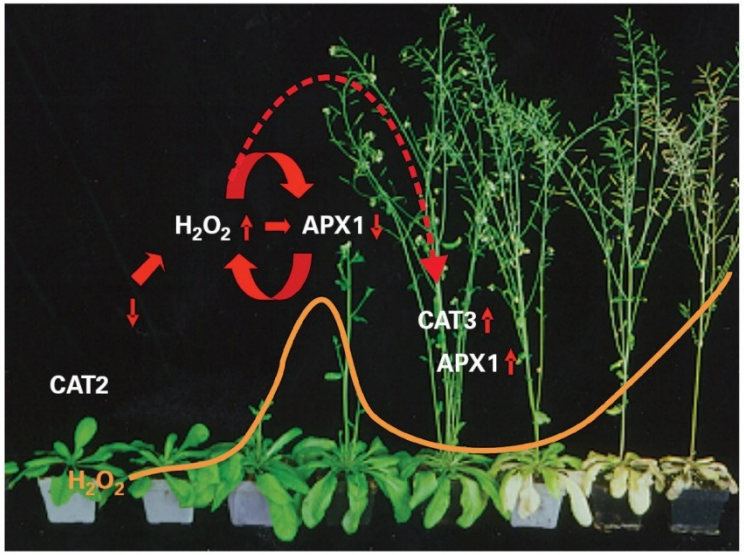
Groups of genes upregulated in senescing leaves and petals

Salvage of nutrients

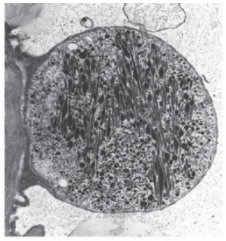


Energy and metabolism





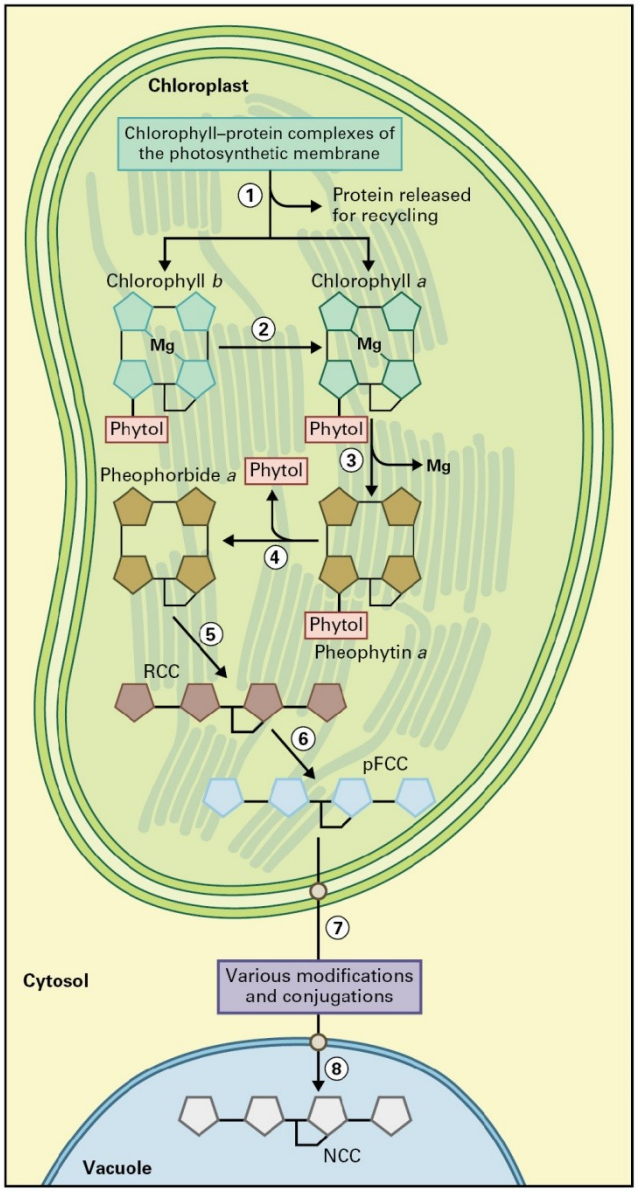
Pigment metabolism in senescence



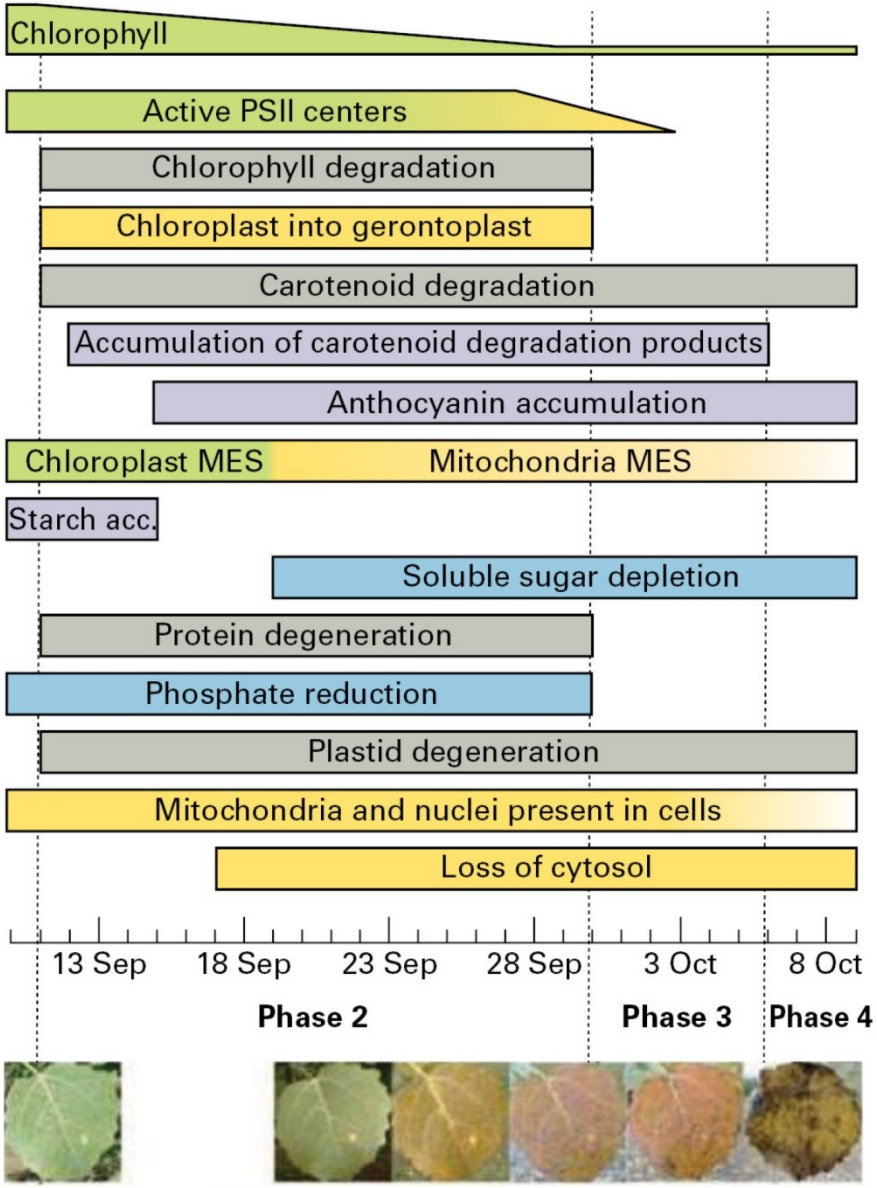
Chromoplast

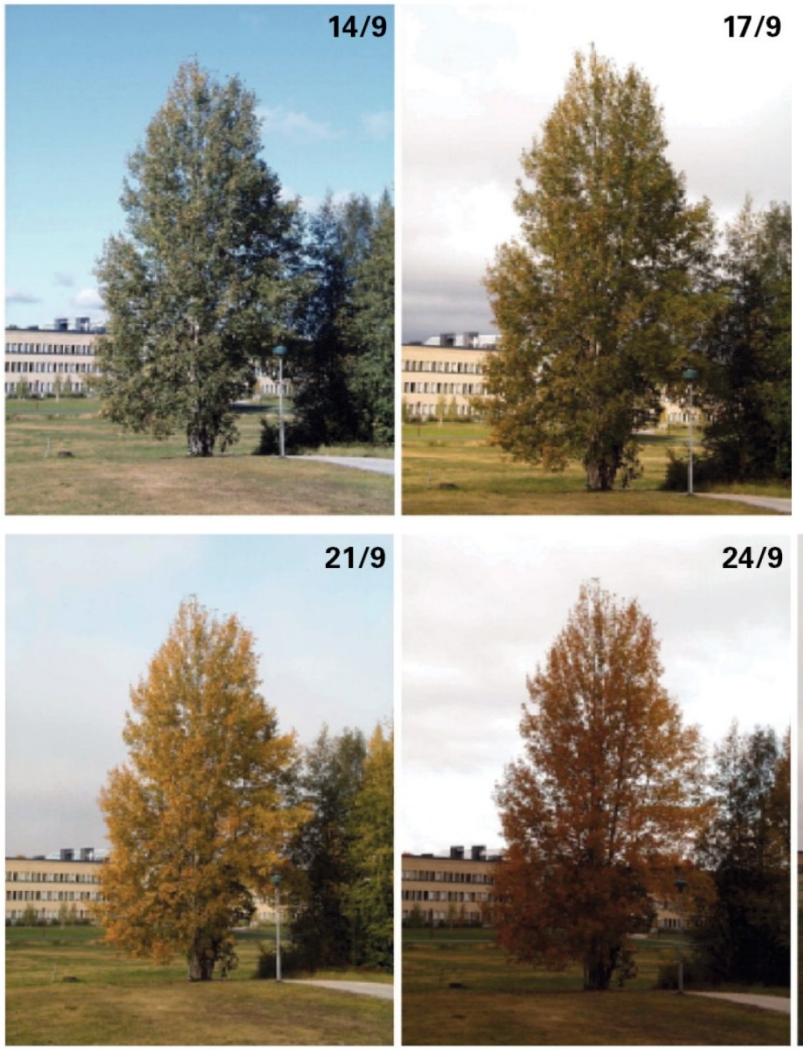
Chloroplast

Gerontoplast



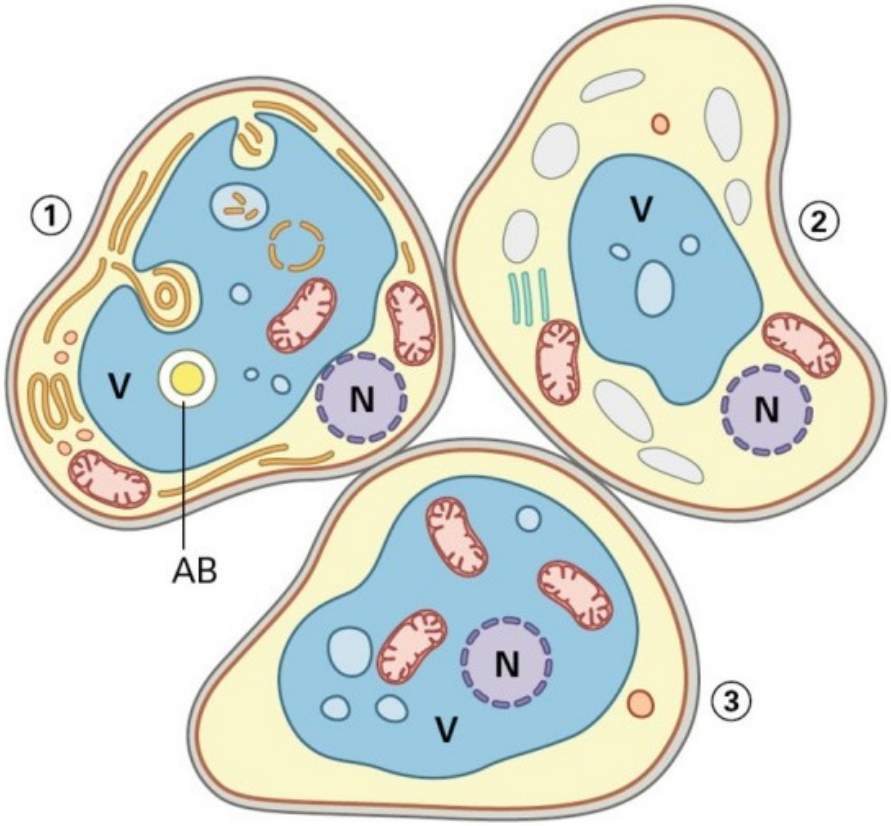
Environmental influences of senescence

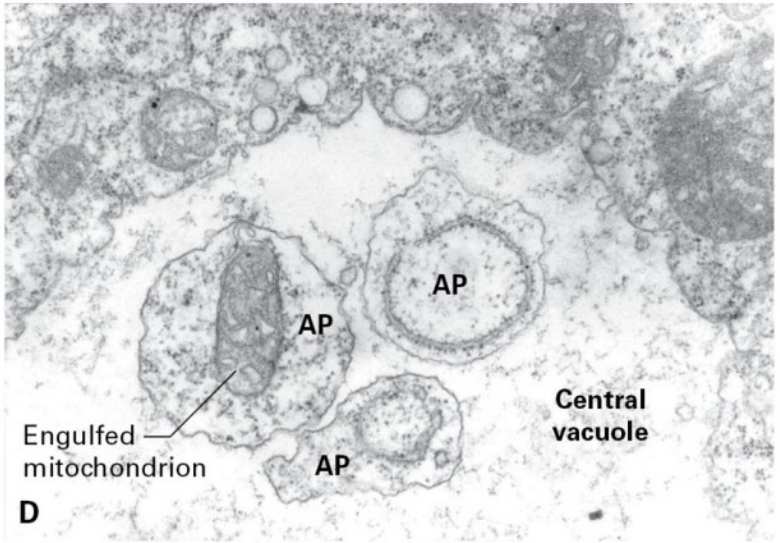




Cellular events during autumnal senescence in aspen

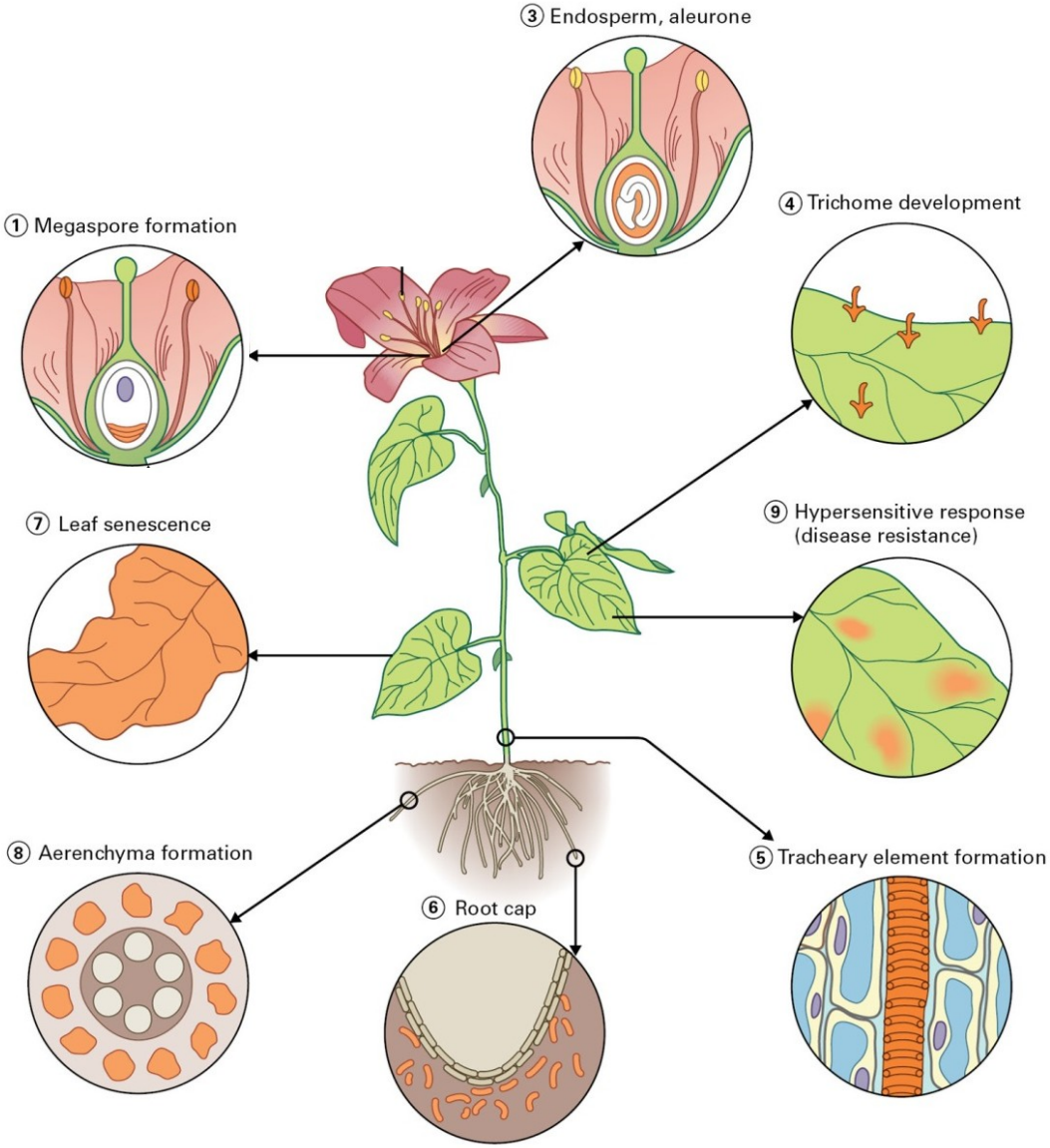
Programmed cell death



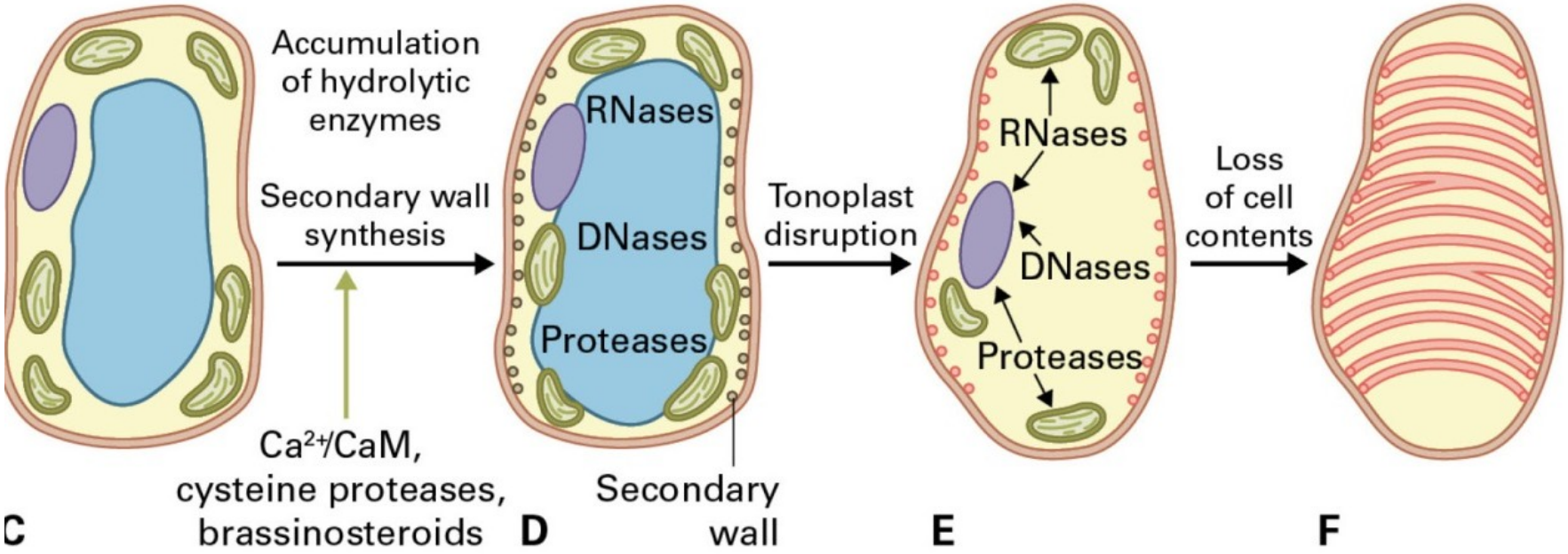


AB, autophagic body
AP, autophagosome

Programmed cell death

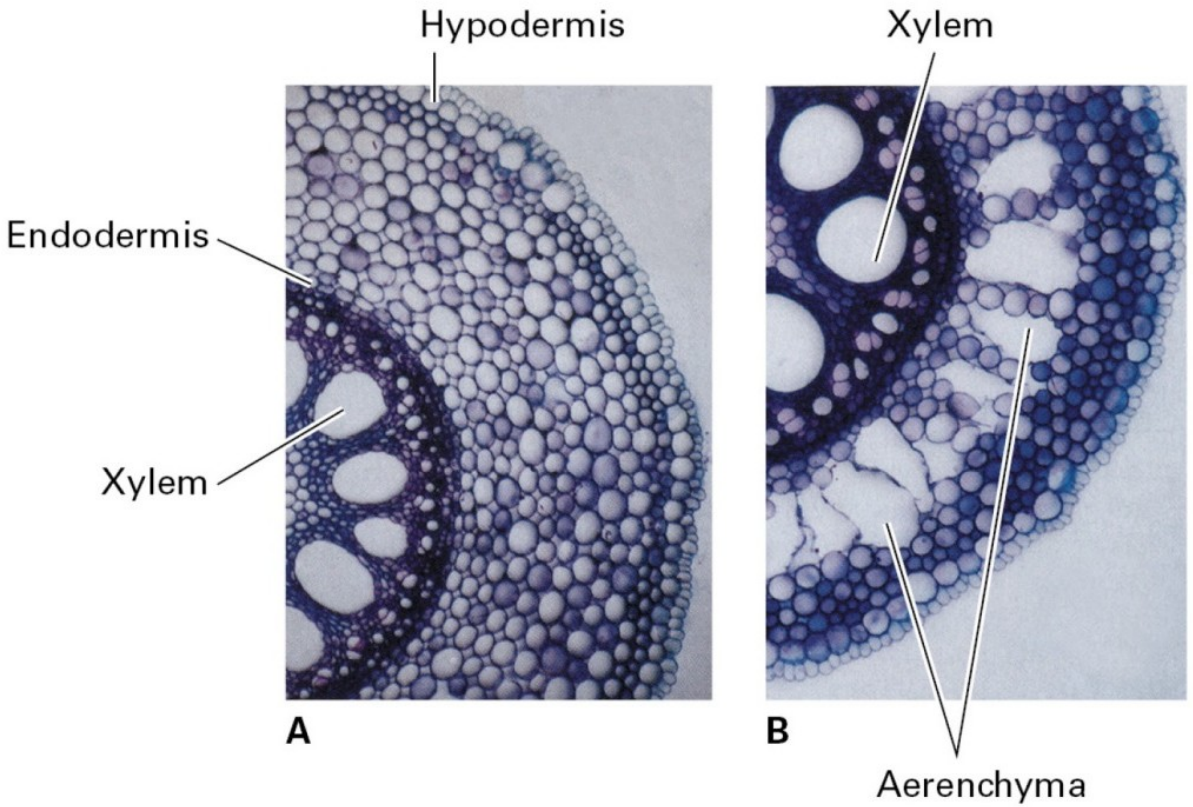


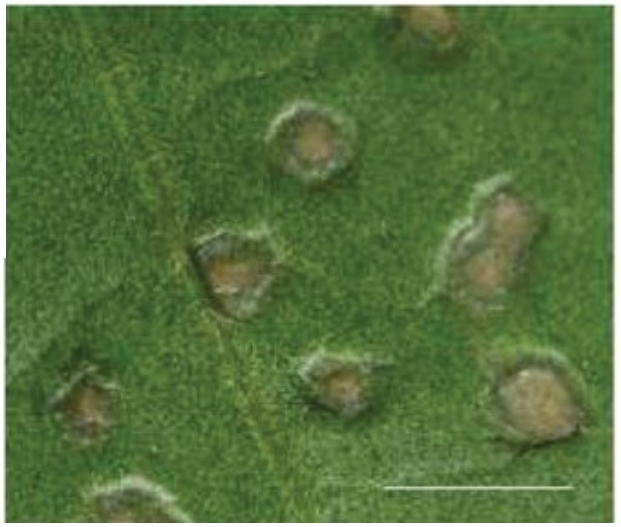
Programmed cell death



The differentiation of tracheary elements

Environmental influences of PCD





Cell death during the HR