

Introduction to Botany. Lecture 33

Alexey Shipunov

Minot State University

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- 1 Questions and answers
- 2 Growing stem
 - Modifications of stem / shoot
- 3 Seed plants
 - Seed



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Previous final question: the answer

How is conifer wood different from other types of wood?



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How is conifer wood different from other types of wood?

- Tracheids only
- Simple (one cell wide) rays
- Resin ducts



Growing stem

Modifications of stem / shoot

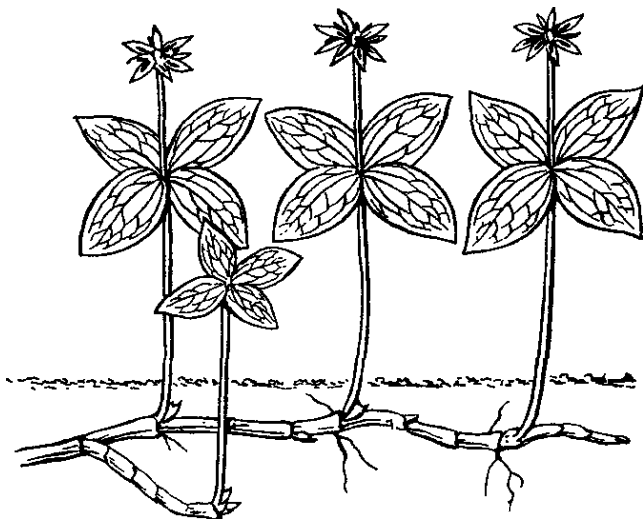


Modifications of shoots and stems

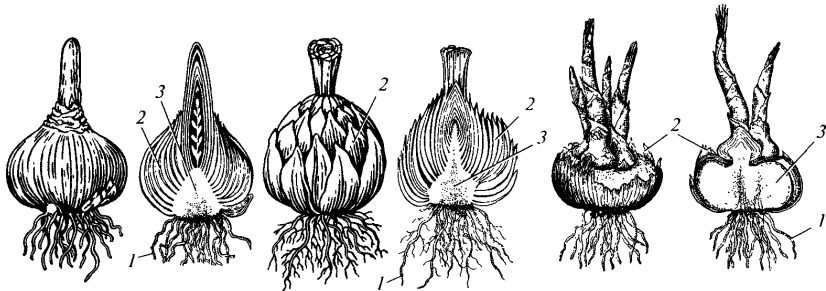
- **Rhizomes**: underground stems
- **Stolons** (runners): aboveground horizontal shoots
- **Tubers**: enlarged portions of rhizomes
- **Bulbs**: storage shoots, leaves $> 50\%$ of volume
- **Corms**: storage shoots, leaves $< 50\%$ of volume
- **Thorns**: defense shoots
- **Spines**: defensive emergencies of stem surface
- **Cladophylls**: leaf-like shoots
- **Stem traps**: catch animals for some carnivorous plants



Rhizome

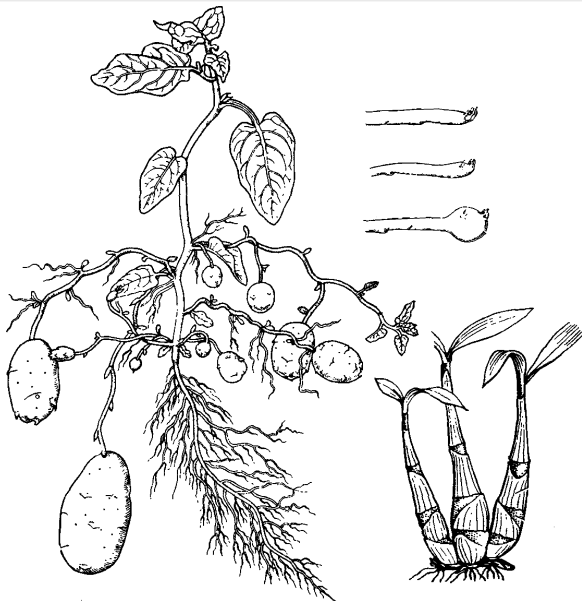


Bulbs and corms

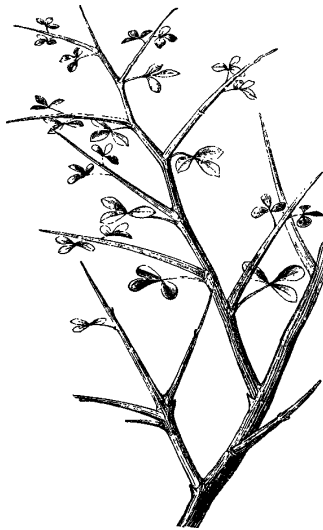


(1) roots, (2) leaves, (3) stems

Tubers: potato and orchids



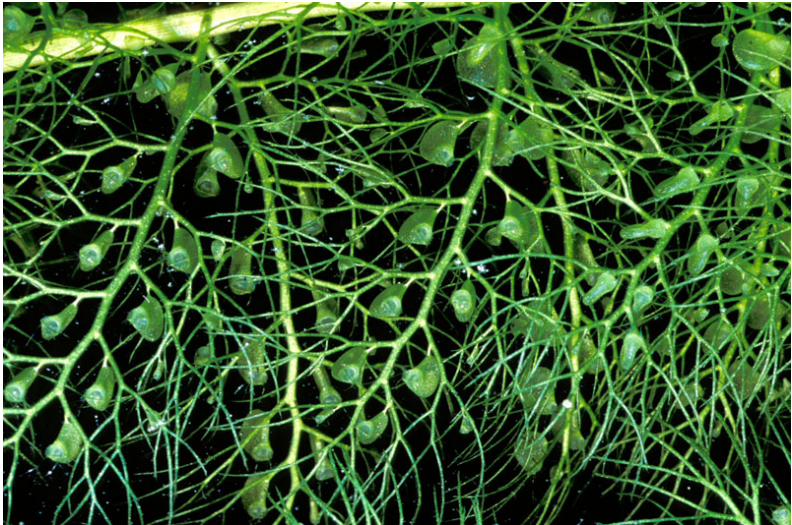
Thorns



Cladophylls: leafy stems



Traps of bladderwort (*Utricularia*)



External function and modifications

Function	Leaf	Stem/shoot	Root
Absorption	Absorption leaves (bromeliads)	Rhizoids	<i>Default</i>
Defense	Spines, scales	Thorns, prickles	Spines
Expansion	Plantlets	Rhizomes, stolons, runners	Adventive buds
Interactions	Traps, sticky epidermis, urns, colored leaves	Traps, insect nests	Haustoria, mycorrhizae, root nodules, nematode traps, insect nests
Photosynthesis	<i>Default</i> , phyllodes	Cladophylls	Green roots (orchids)
Storage	Succulent leaves, pitchers	Bulbs, corms, tubers	Storage roots
Support	Tendrils, false stems, floats, suckers	<i>Default</i> , tendrils	Buttress, aerial and contractile roots, suckers

Each external function requires a specific modification of organ.

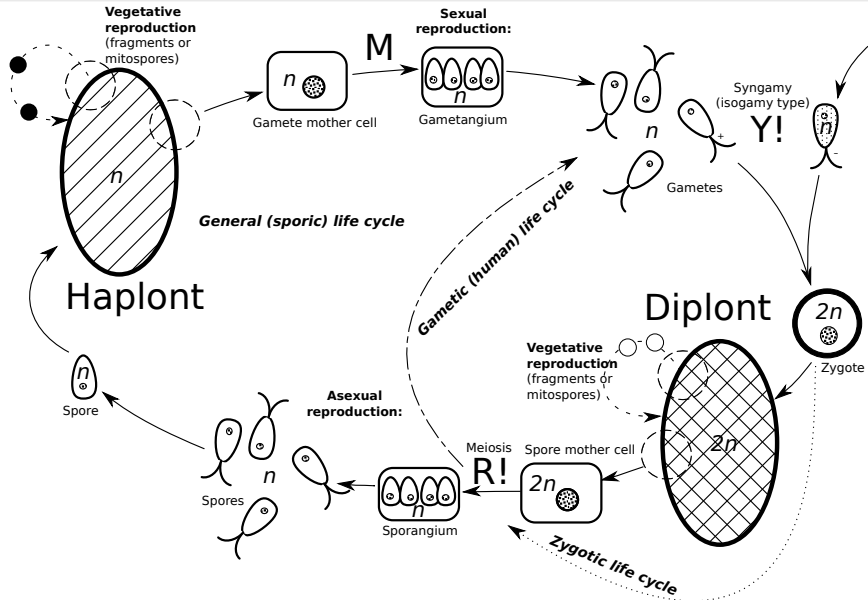


Seed plants

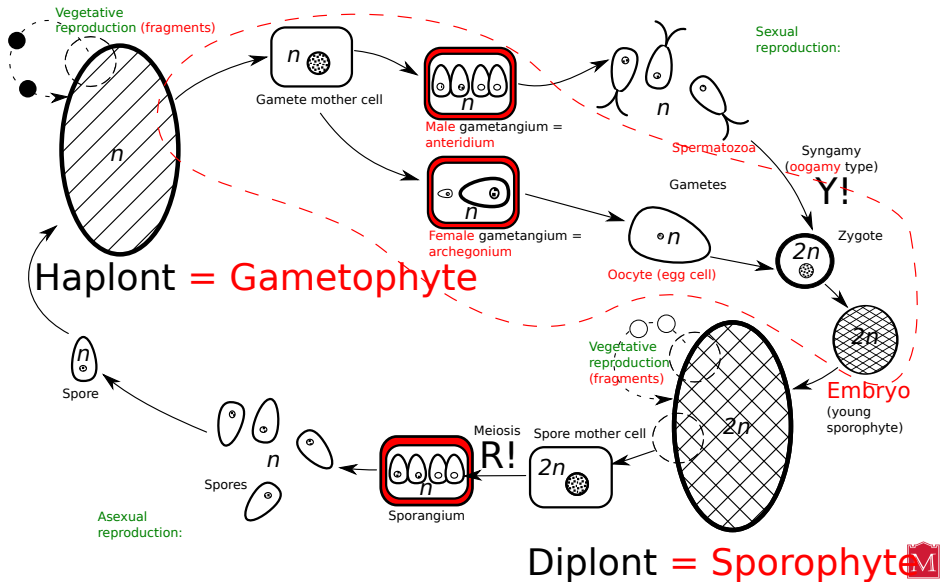
Seed



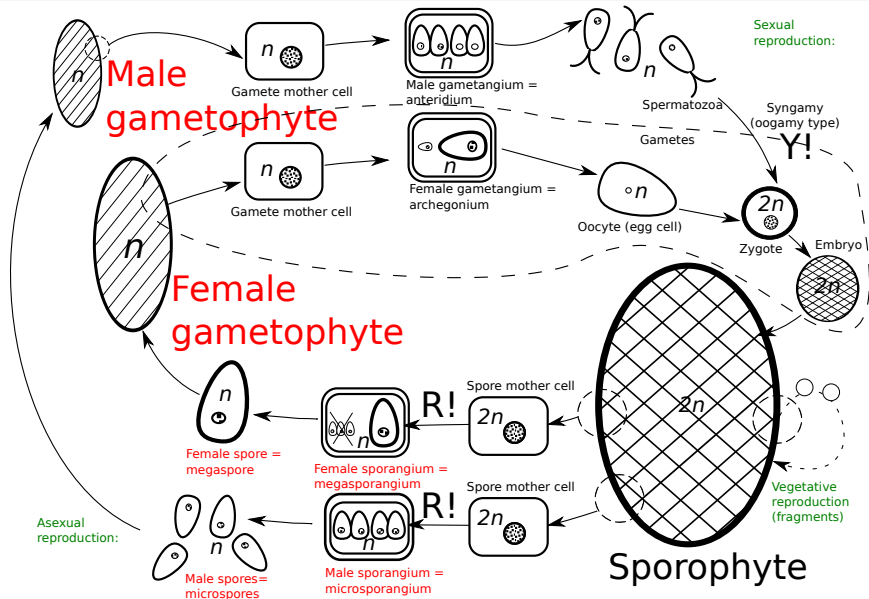
General life cycle



Life cycle of land plants: differences



Heterosporic cycle: differences

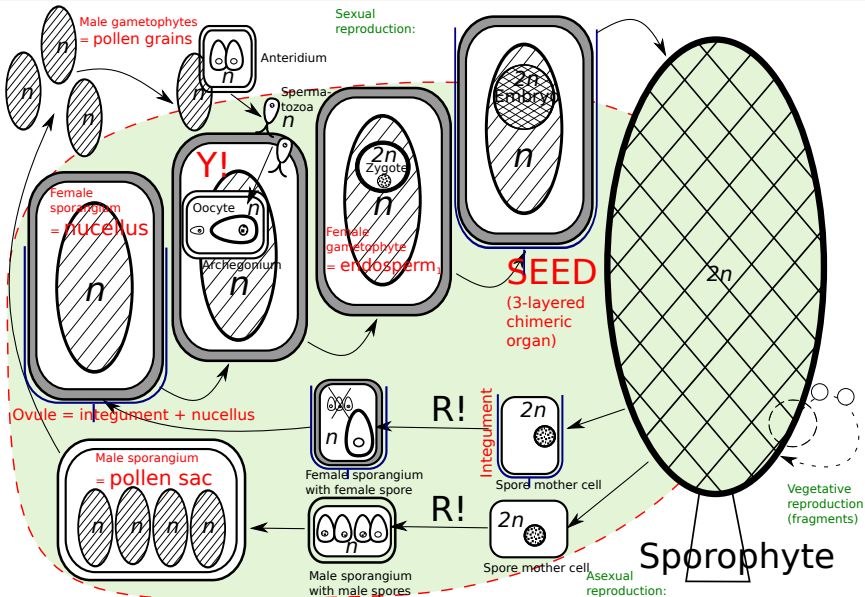


Origin of seed

- “**Dinosaur problem**”: without control on the *r*-strategic gametophyte, *K*-strategic tree sporophyte cannot guarantee its reproduction
- **Seed is the result of enforced control of sporophyte over gametophyte**
- Growing of gametophytes, syngamy (fertilization) and growing of daughter sporophyte—everything happens **directly on mother sporophyte**



Seed plant cycle: differences



Final question (2 points)



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What is the male gametophyte of seed plants?



Summary

- Storage, defense and underground growth result in extensive modification of shoot
- Heterosporous plants have two kinds of spores: female (megaspores) and male (microspores)
- Seed plants have compact life cycle where almost all stages happen on mother sporophyte



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2010—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_154



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.

Plant Biology. 2nd edition.

Thomson Brooks/Cole, 2006.

Chapter 5, 24.

