Introduction to Botany. Lecture 34

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Outline

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Previous final question: the answer

Please describe the difference(s) between heartwood and sapwood

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Please describe the difference(s) between heartwood and sapwood

- Heartwood is darker (cells are compressed), sapwood lighter
- Heartwood is non functional, no living rays; sapwood functional, living rays present

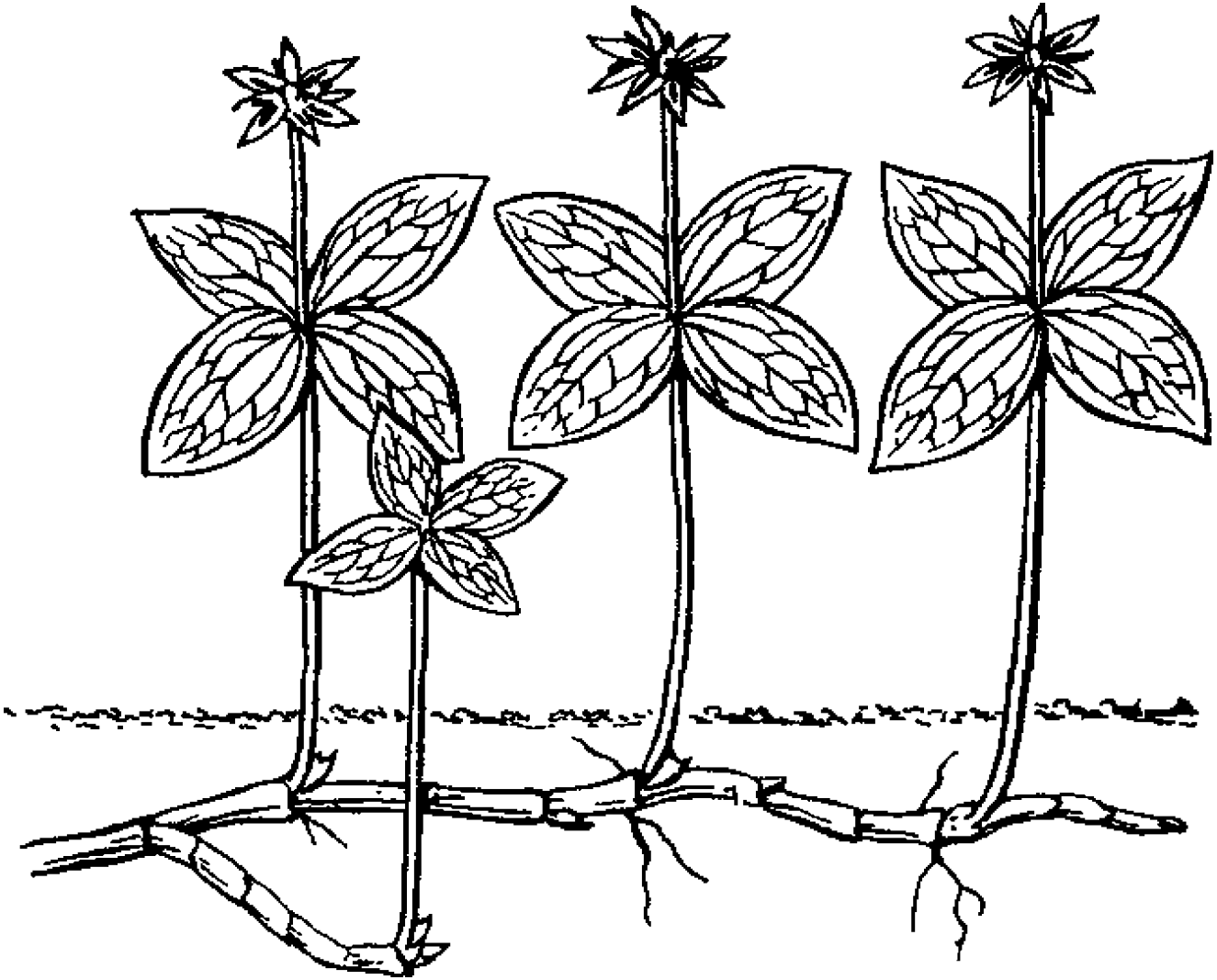
Stem and shoot

Modifications of stem / shoot

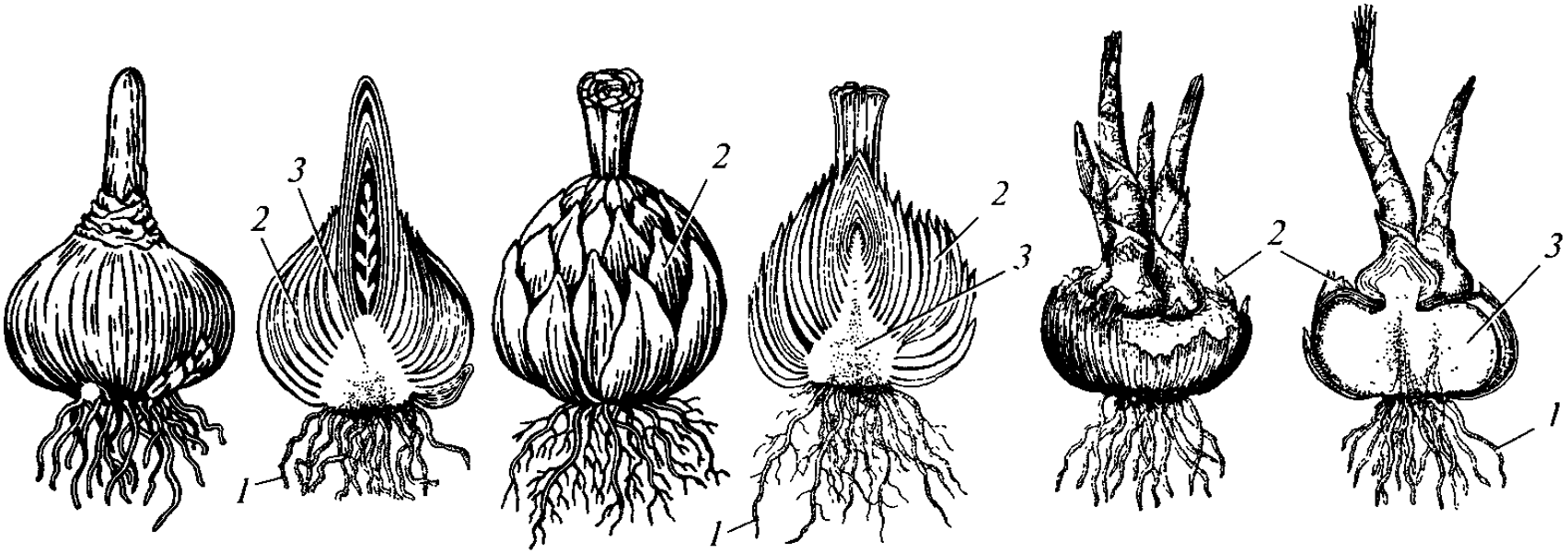
Modifications of shoots and stems

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

Rhizome

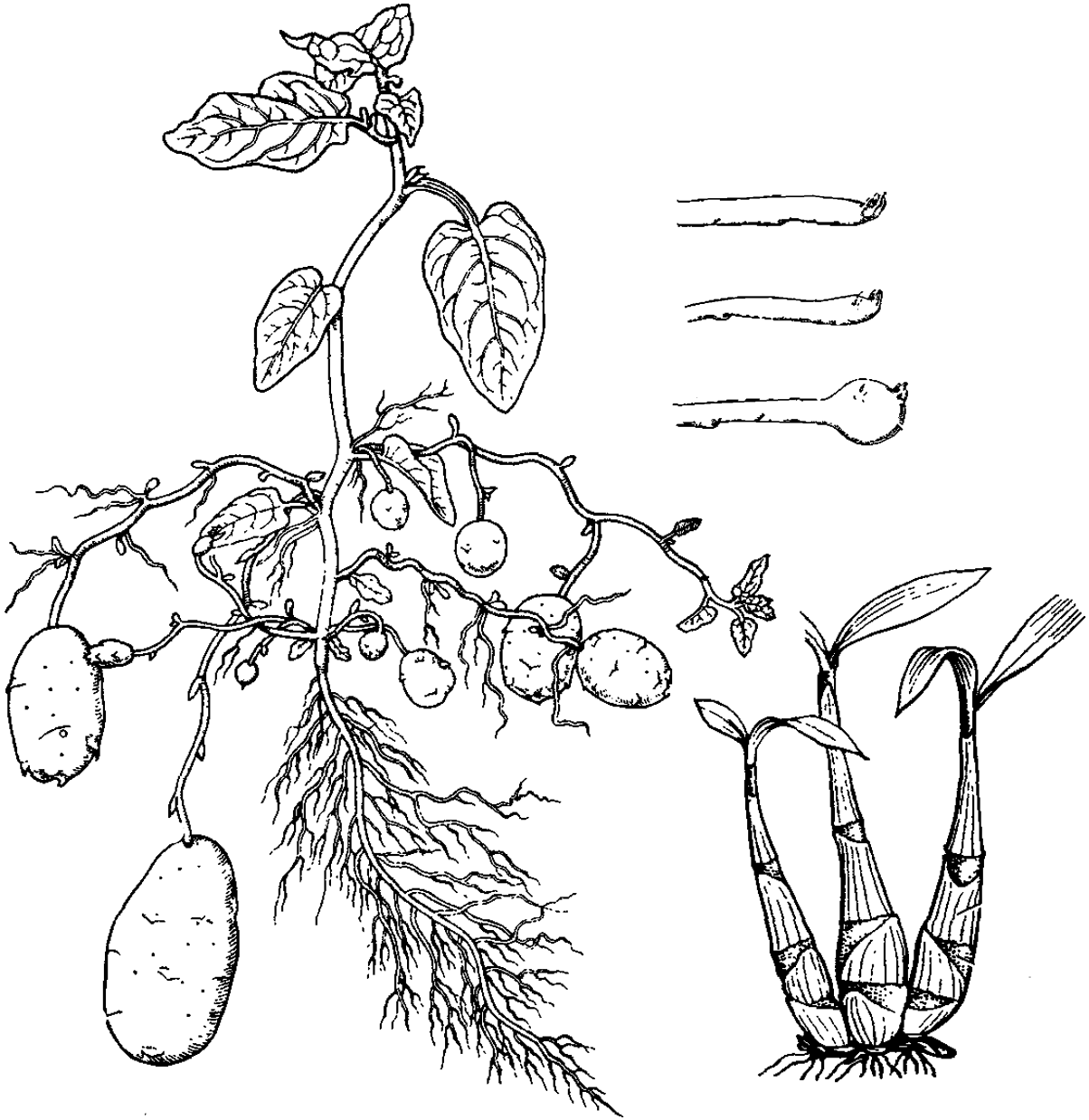


Bulbs and corms

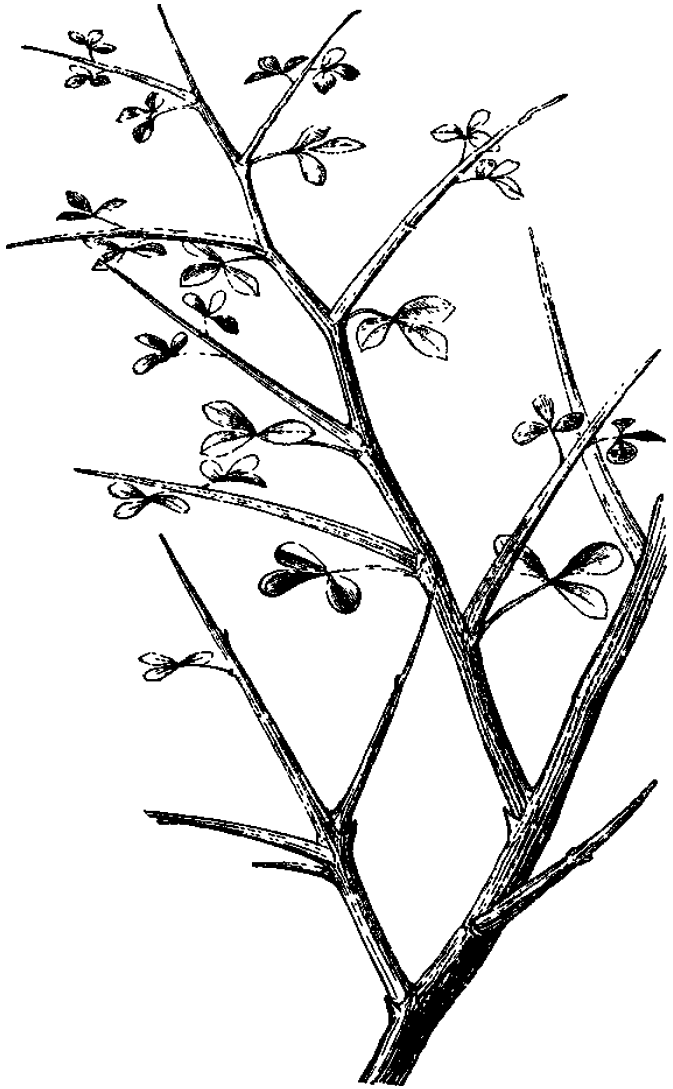


(1) roots, (2) leaves, (3) stems

Tubers: potato and orchids

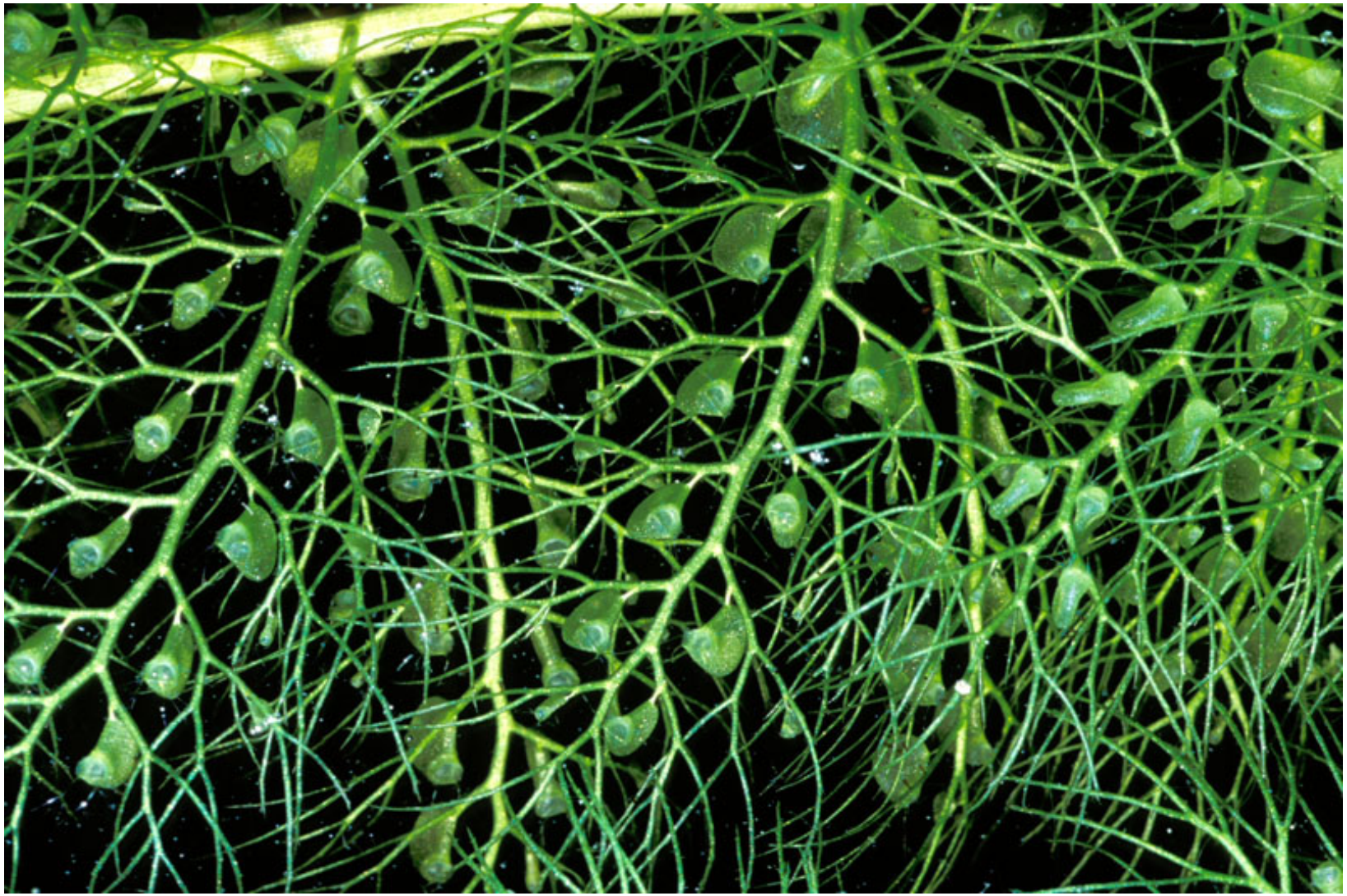


Thorns



Cladophylls: leafy stems

Traps of bladderwort (*Utricularia*)



External function and modifications

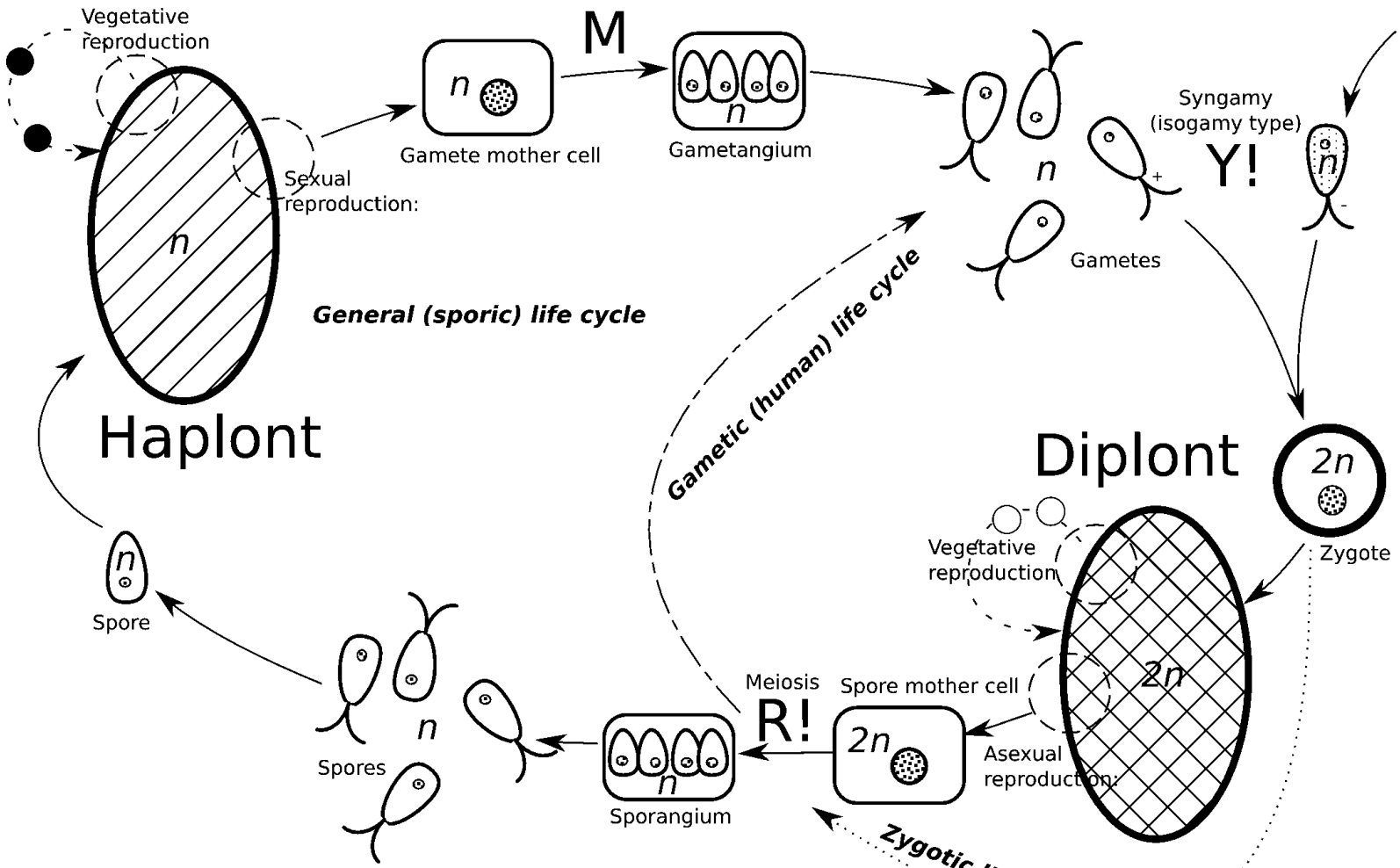
Function	Stem	Leaf	Root
Expansion	Rhizomes, stolons	Plantets	Adventive buds
Storage	Bulbs, corms, tubers	Succulent leaves	Storage roots
Photosynthesis	Rhizomes, stolons, bulbs, corms, tubers	DEFAULT	Some aerial roots
Defense	Thorns, spines	Spines, scale	Root spines
Support	DEFAULT	Leaf tendrils	Haustoria, aerial and contractile roots
Interactions	Traps (bladderwort)	Traps, “sticky tapes”, urns	Mycorrhizae, nodulated roots

Each external function requires a specific modification of organ.

Seed plants

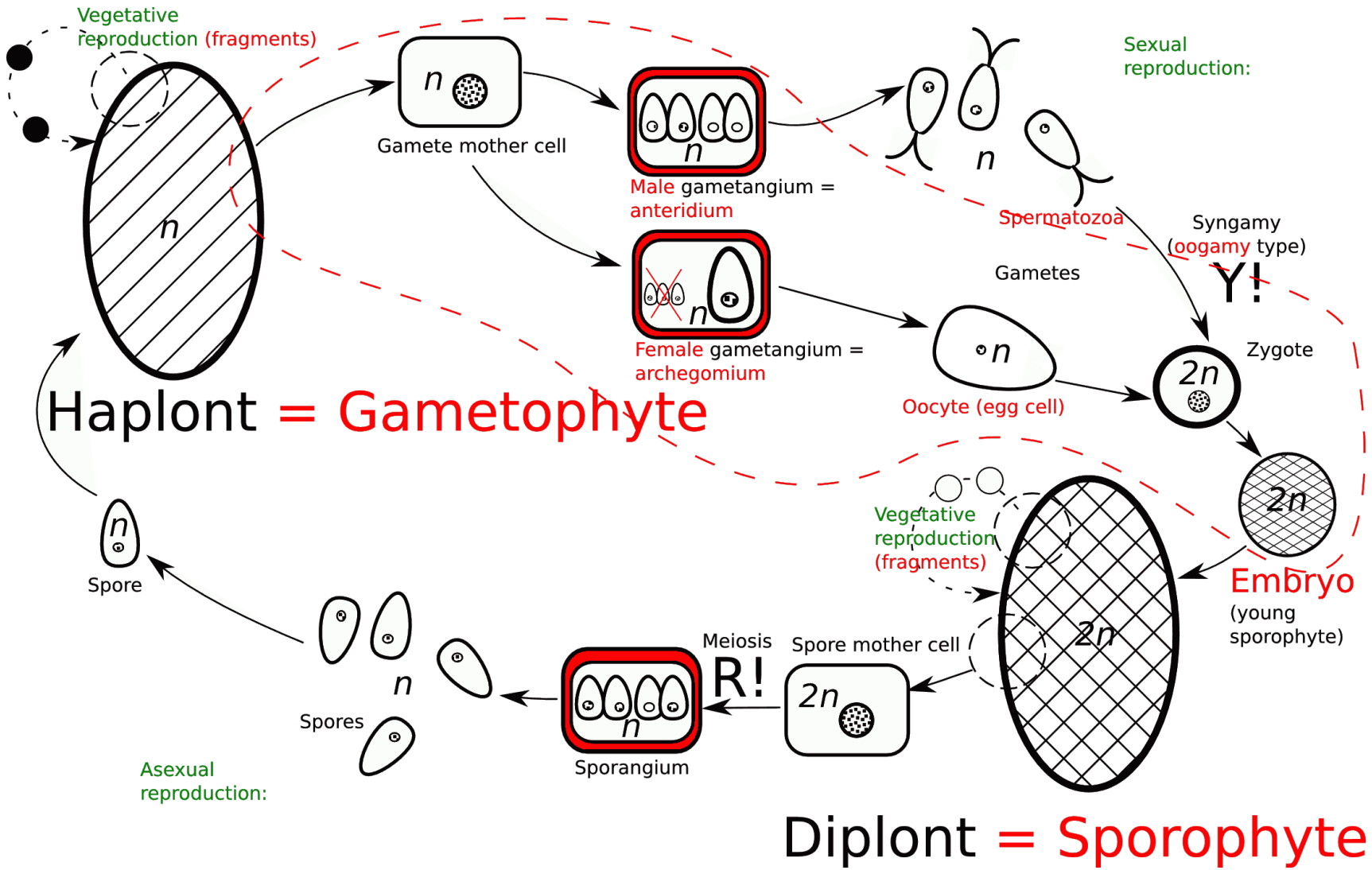
Seed

General life cycle

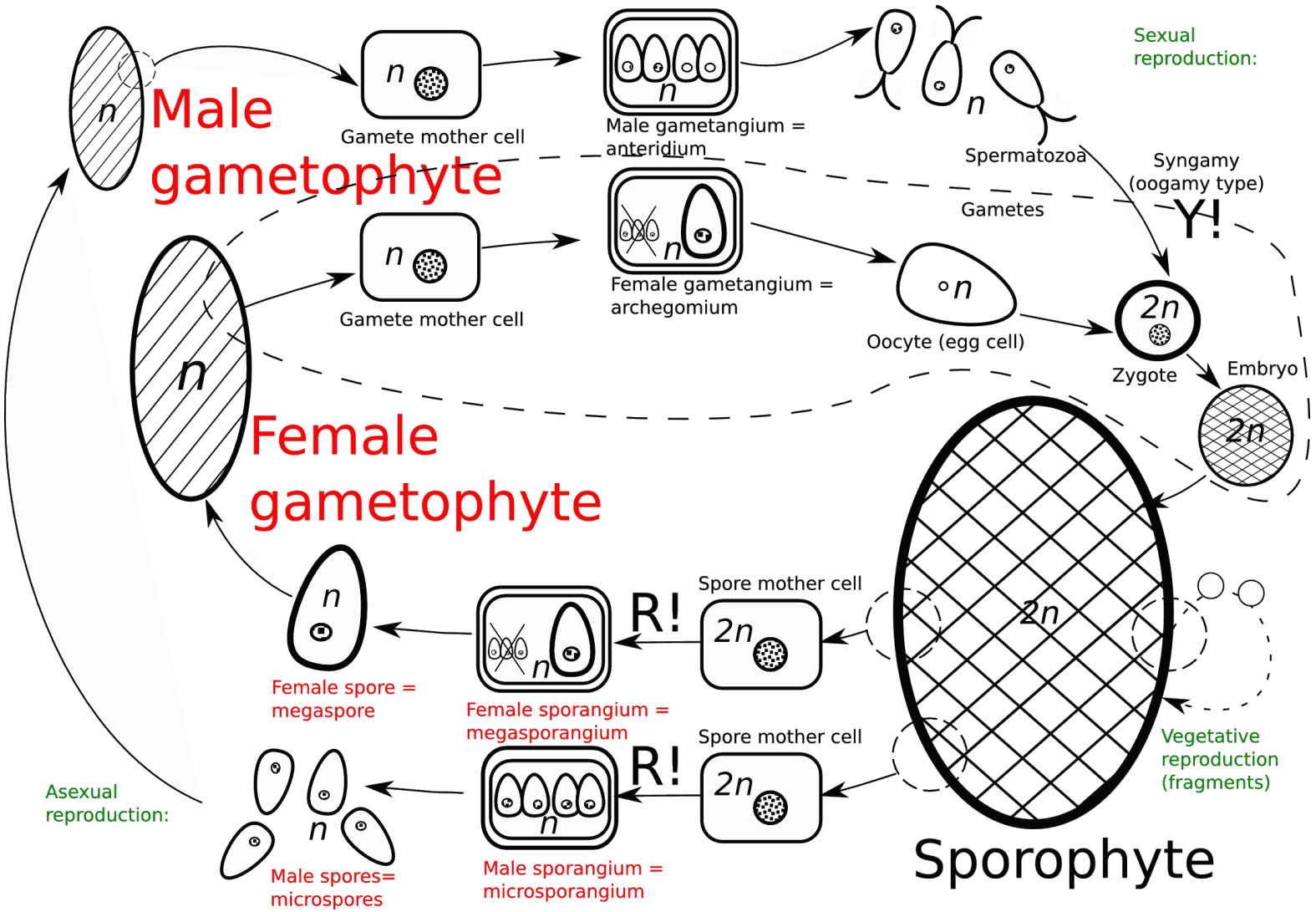


Eukaryote life cycles

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**

Final question (2 points)

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What is a difference between bulb and corm?

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

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Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 5, 24.