

# Introduction to Botany. Lecture 31

Alexey Shipunov

Minot State University

November 20, 2015



## 1 Questions and answers

## 2 Branching, thickening and the origin of seed

- Branching
- Secondary stem



- 1 Questions and answers
- 2 Branching, thickening and the origin of seed
  - Branching
  - Secondary stem



# Previous final question: the answer

Which fern has no roots?



# Previous final question: the answer

Which fern has no roots?

- *Psilotum*, whisk fern
- ... and also *Tmesipteris*, its New Zealand relative



# Branching, thickening and the origin of seed

## Branching

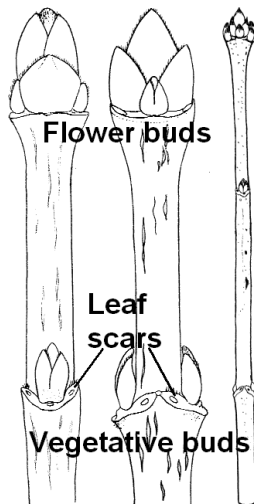


# Winter shoot

- 1 Vegetative, flower, and mixed buds
- 2 Leaf and bud scars
- 3 Leaf traces



# Winter shoot of maple (*Acer platanoides*)



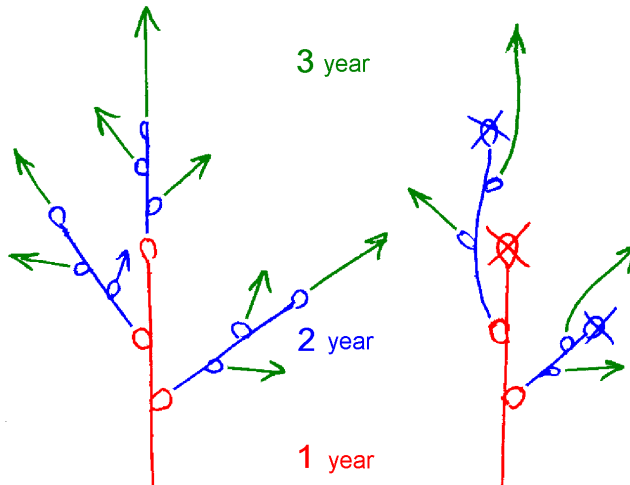


# Types of branching

- **Monopodial:** buds do not degrade, all shoots continue to grow
- **Sympodial:** terminal buds degrade, the lateral shoot closest to terminal bud becomes terminal shoot



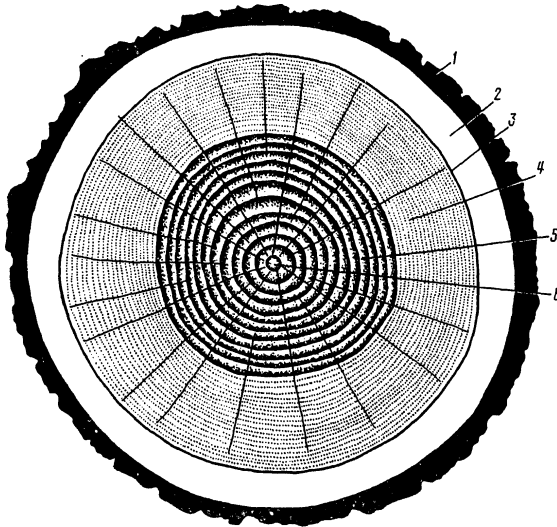
# Monopodial (left) and sympodial branching



# Branching, thickening and the origin of seed Secondary stem



# Secondary stem = bark + wood



1 cork, 2 bast, 1 + 2 = bark, 3 cambium, 4 + 5 wood, 4 **sapwood**, 5 **heartwood**, 6 pith (if any)



# Bark, cork, periderm and wood

- **Bark** = secondary phloem (bast) + periderm + (optionally) epidermis
- **Periderm** = phellem (cork) + cork cambium (phellogen) + phelloderm
- **Wood** = trunk — bark, or simply secondary xylem + all remnants of central primary tissues

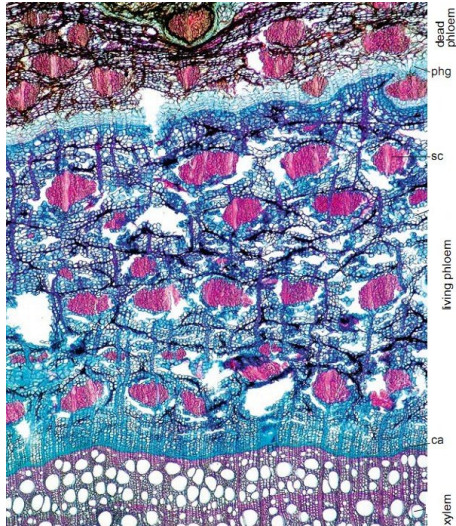


# Cork cambium and origin of bark

- **Bark** is everything outside vascular cambium, therefore, bark = secondary phloem + periderm
- Each year new layer of cork cambium appear from parenchyma cells of secondary phloem
- Consequently, bark consists of multiple and mostly uneven layers



# Renewal of bark in sea buckthorn (*Hippophaë rhamnoides*)



phg phellogen, ca cambium, sc sclerenchyma



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

2015.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_154](http://ashipunov.info/shipunov/school/biol_154)

