

# Lycopodiidae

- Enacije (nisu vaskularizovane ili jesu samo pri osnovi), mikrofilii
- Ligula
- Sporofili, trofofilii
- Bubrežaste sporangije
- Strobilusi, sporonosne zone
- Izospore (dvopolni gametofit), heterospore (jednopolni gametofit)
- Dihotomija, nejednaka dihotomija
- Adventini korjeni, bez korjenovih dlaka

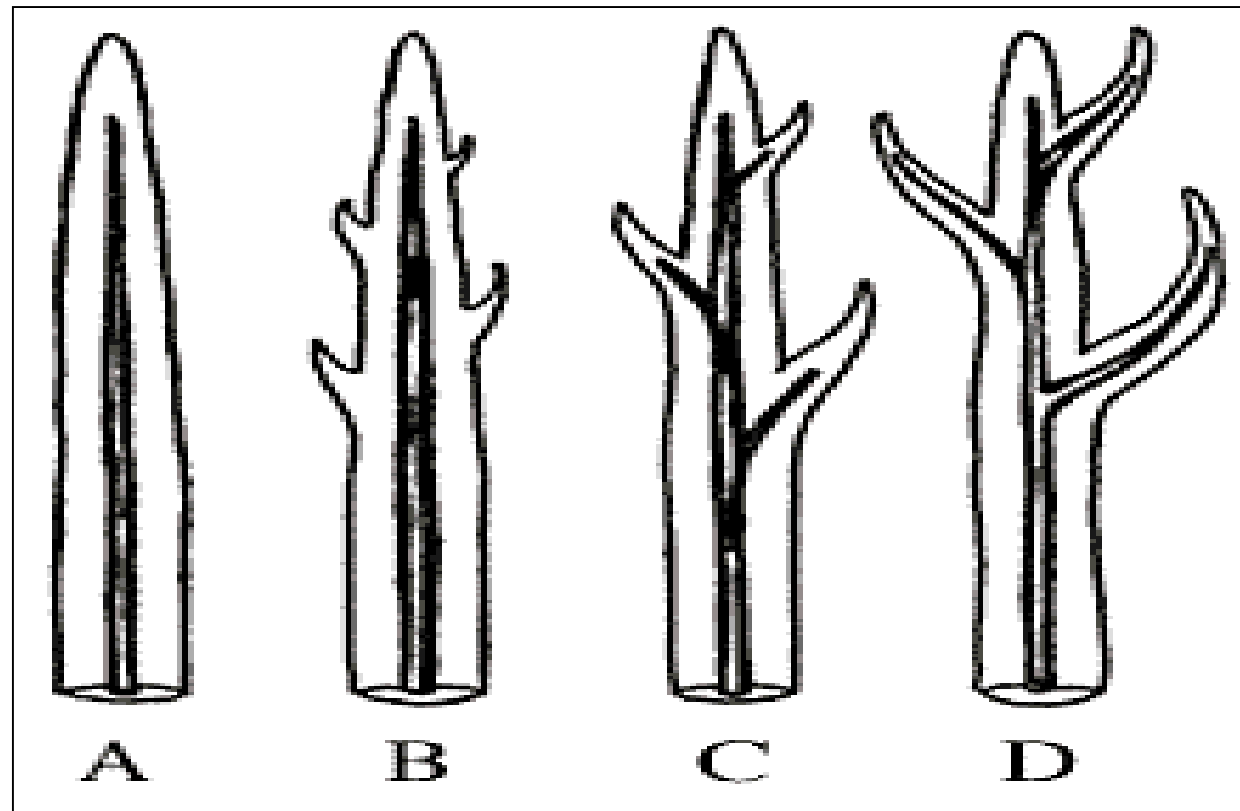
Vaskularizacija kod *Zosterophyllum*, *Sawdonia*, *Asteroxylon* i *Leclercqia* (Kenrick i Crane, 1997).

(A) *Zosterophyllum* (gola osovina, ovalna protostela),

(B) *Sawdonia* (enacije, bez provodnih elemenata)

(C) *Asteroxylon* (enacije sa provodnim elementima koji zalaze u njenu osnovu),

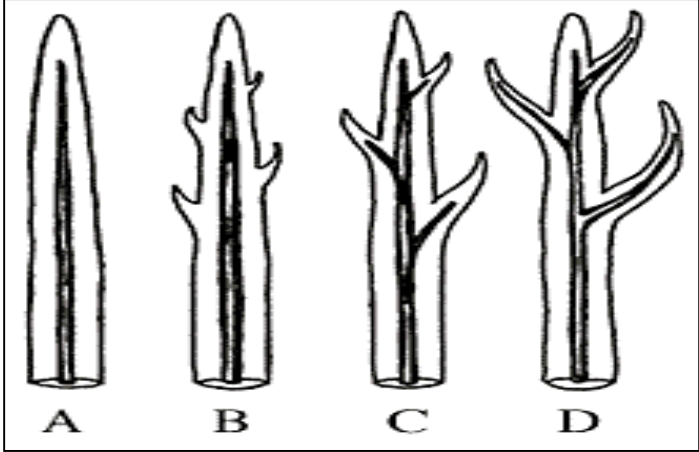
(D) *Leclercqia* (osovina sa vaskularizovanim mikrofilima).



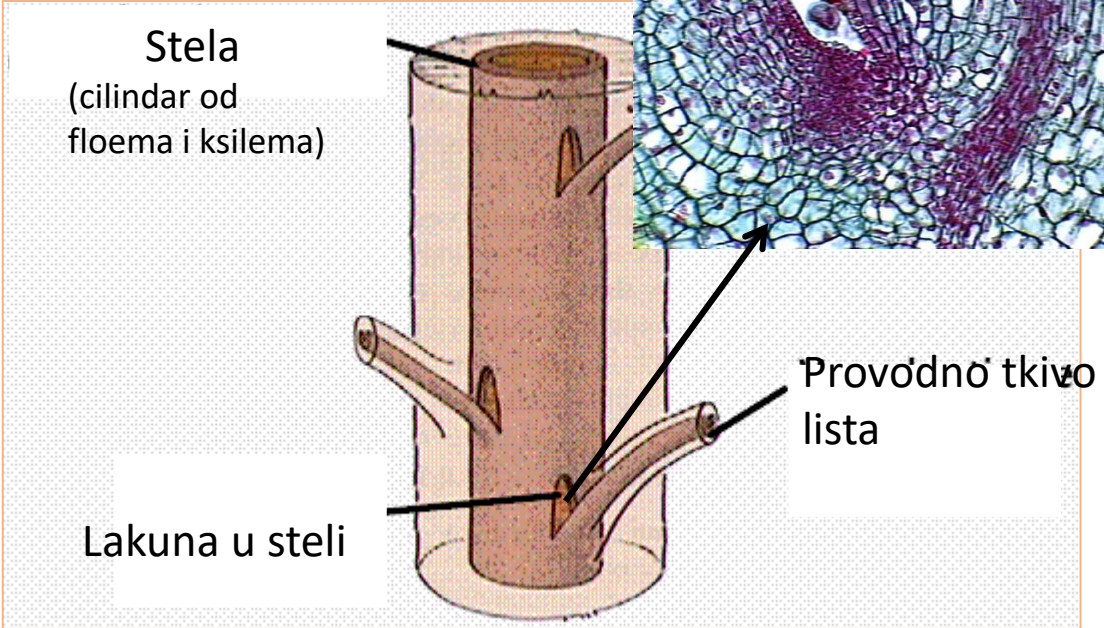
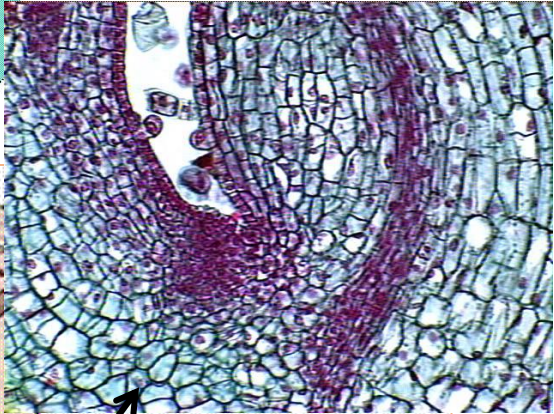
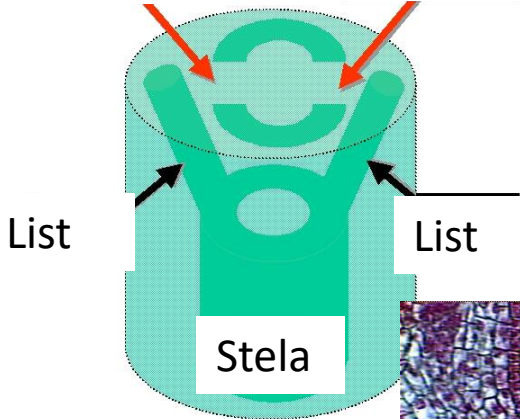
Enacije i mikrofilii- bez lakuna u steli

# Telomni listovi- sa lakunama u steli

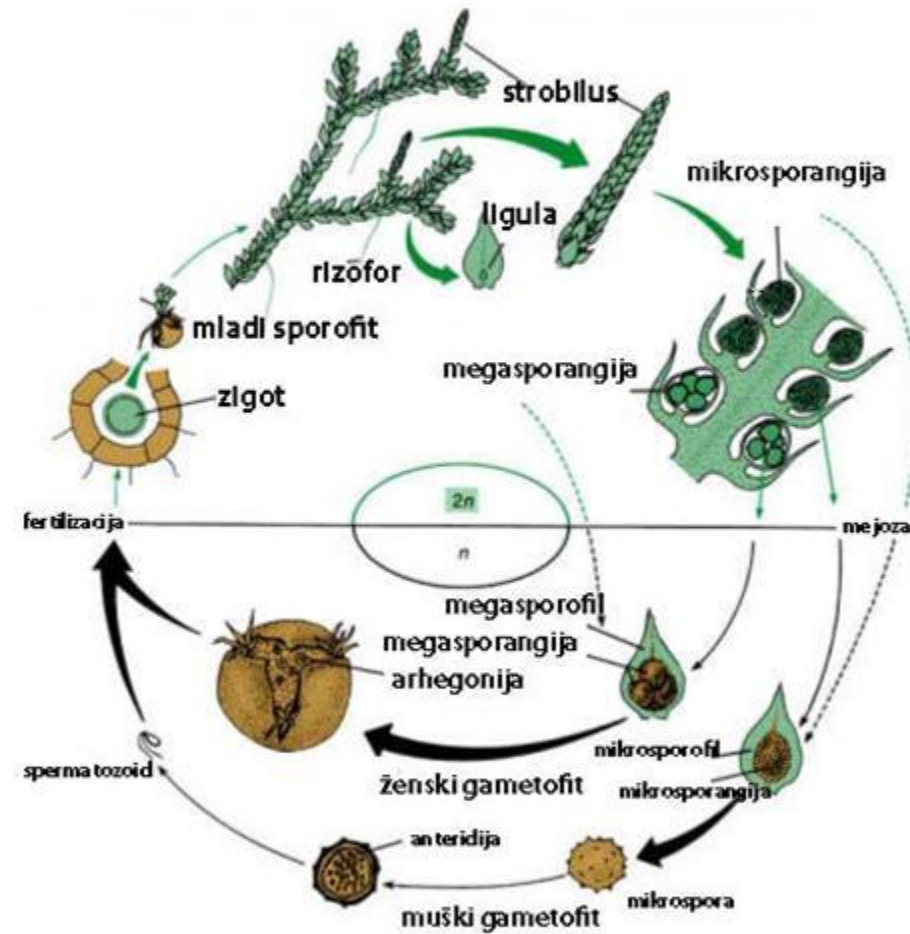
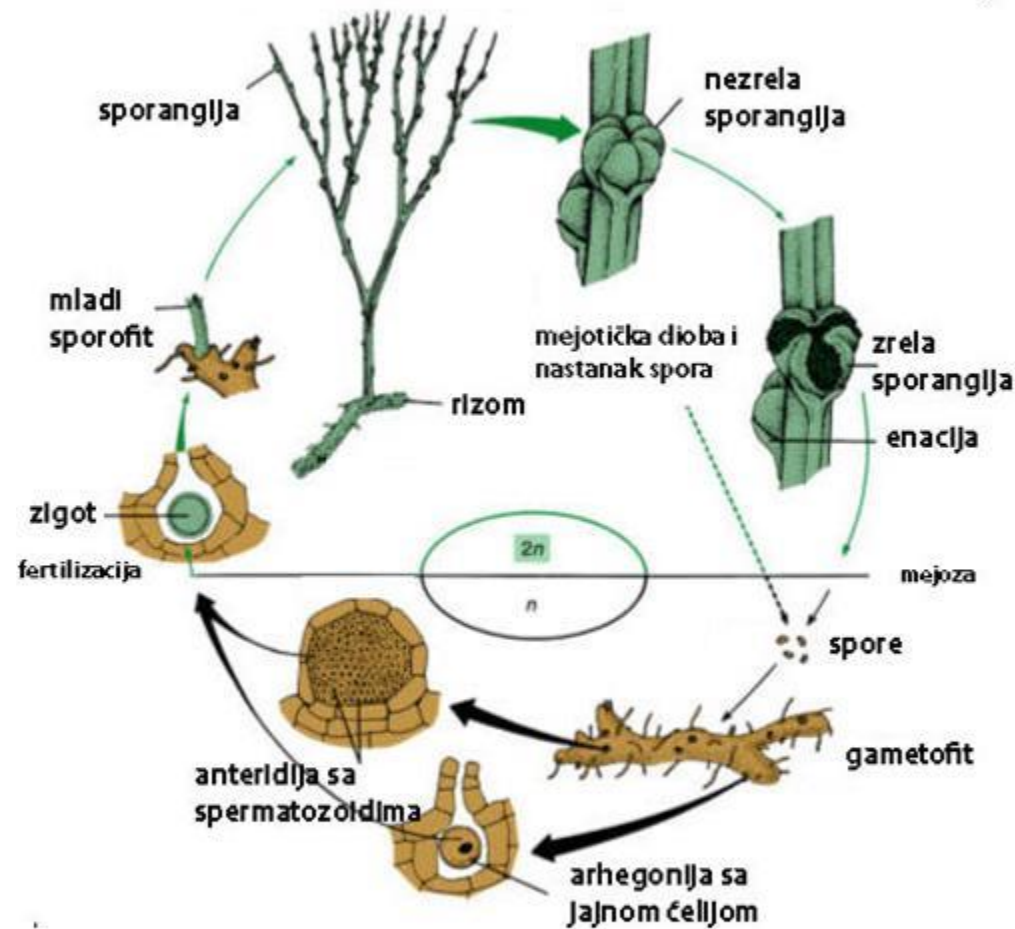
Enacije, mikrofilii- bez lakuna u steli



Lakuna u steli      Lakuna u steli



# Ciklus razvića izo- i heterospornih prečica



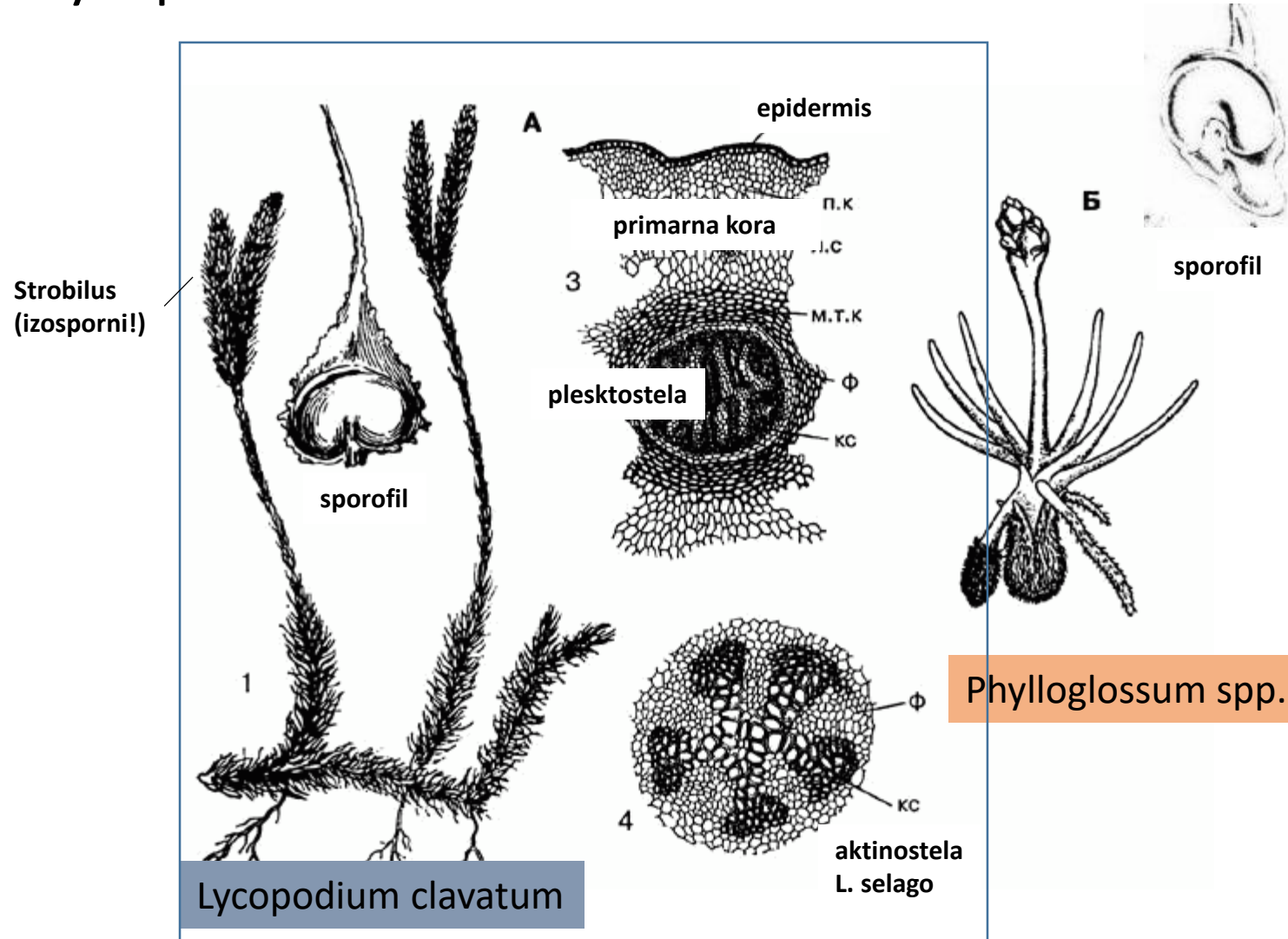
Jednodomo, jednopolno

Sporofit: ..... Gametofit generacija: .....

# Recentni predstavnici

- o. Lycopodiales
- o. Selaginellales
- o. Isoetales

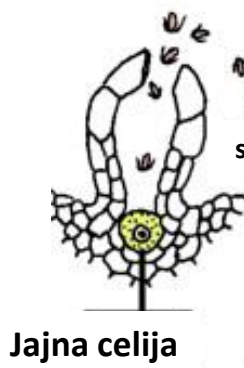
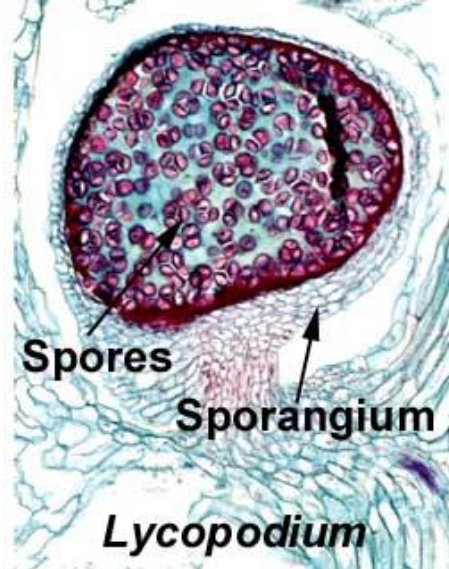
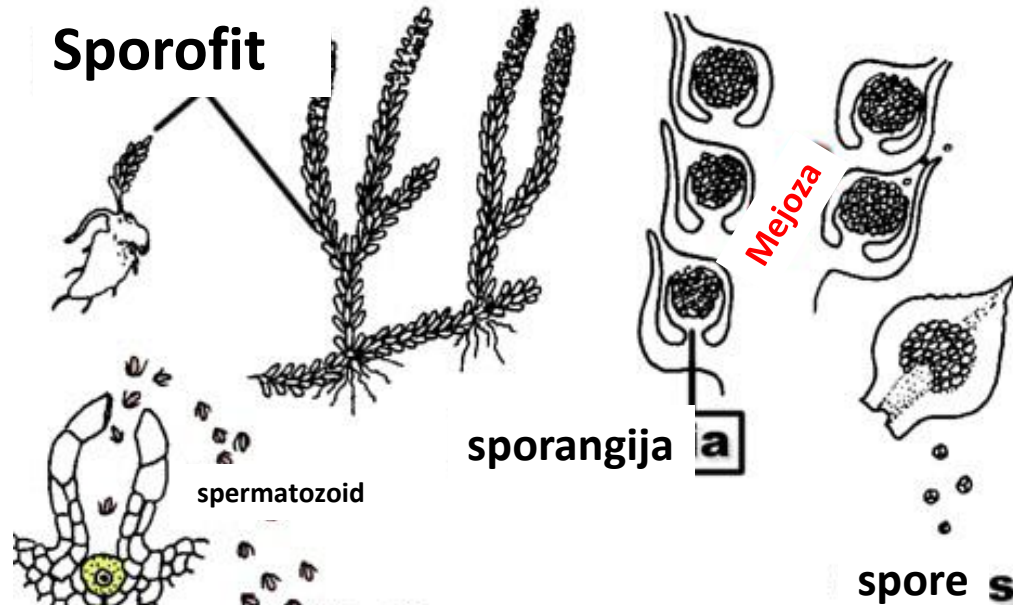
# o. Lycopodiales



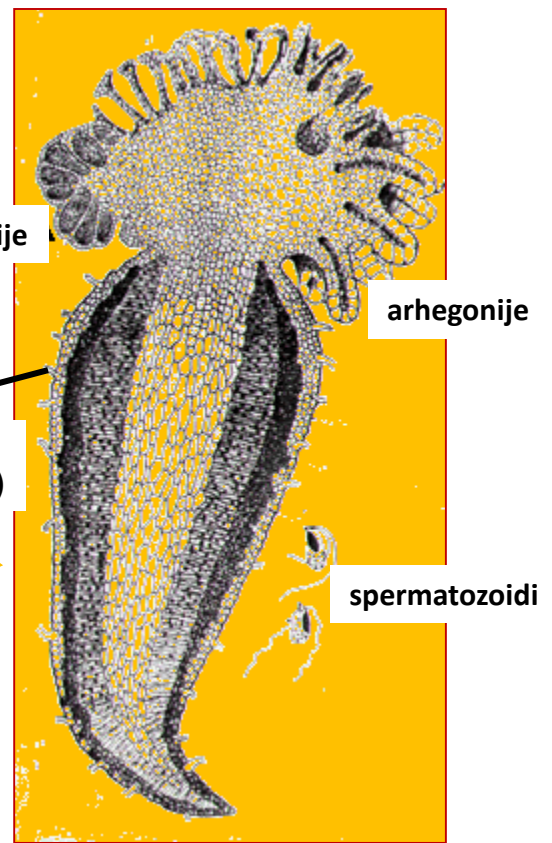
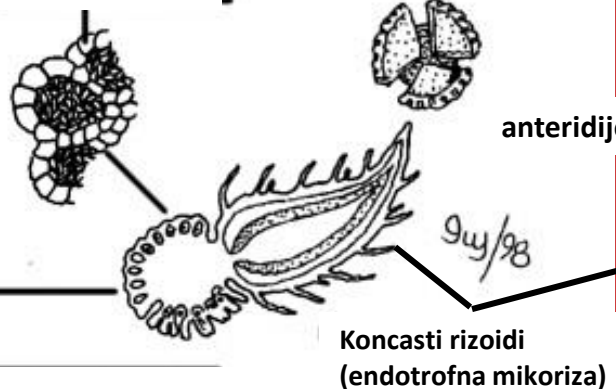
Lycopodium (*Huperzia*, *Phlegmariurus*), *Phylloglossum* ...



# Sporofit



# Gametofit (vodi podzemni nacin zhivota)





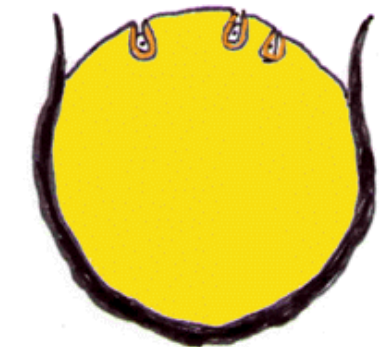
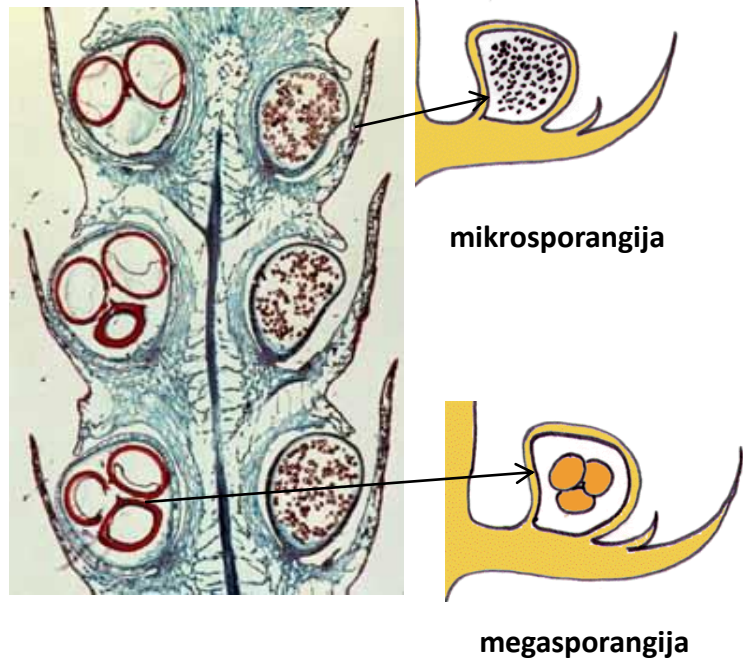
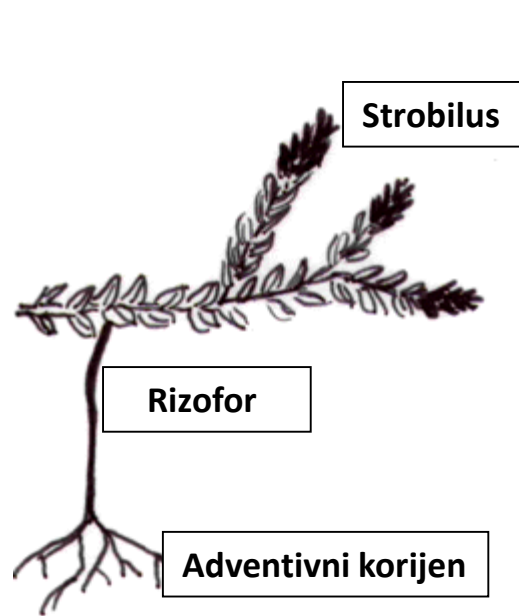
*Huperzia selago* (syn. *Lycopodium selago*)



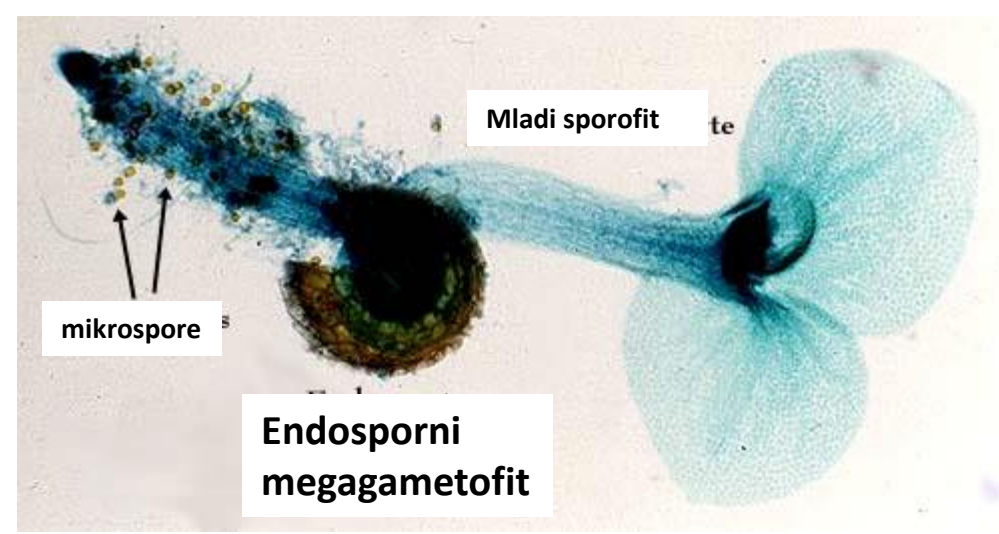
*Lycopodium annotinum*



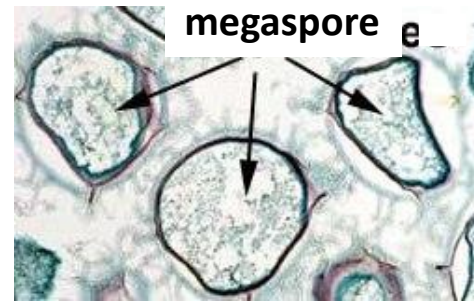
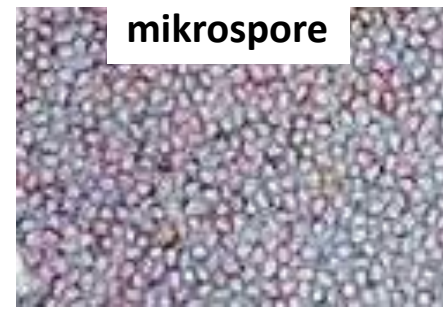
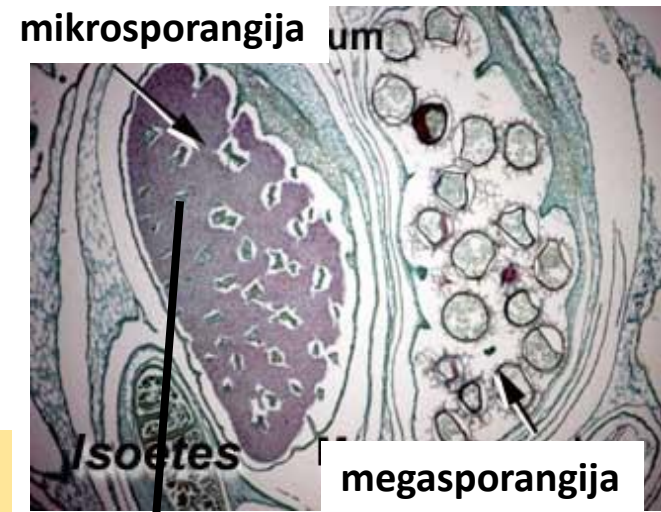
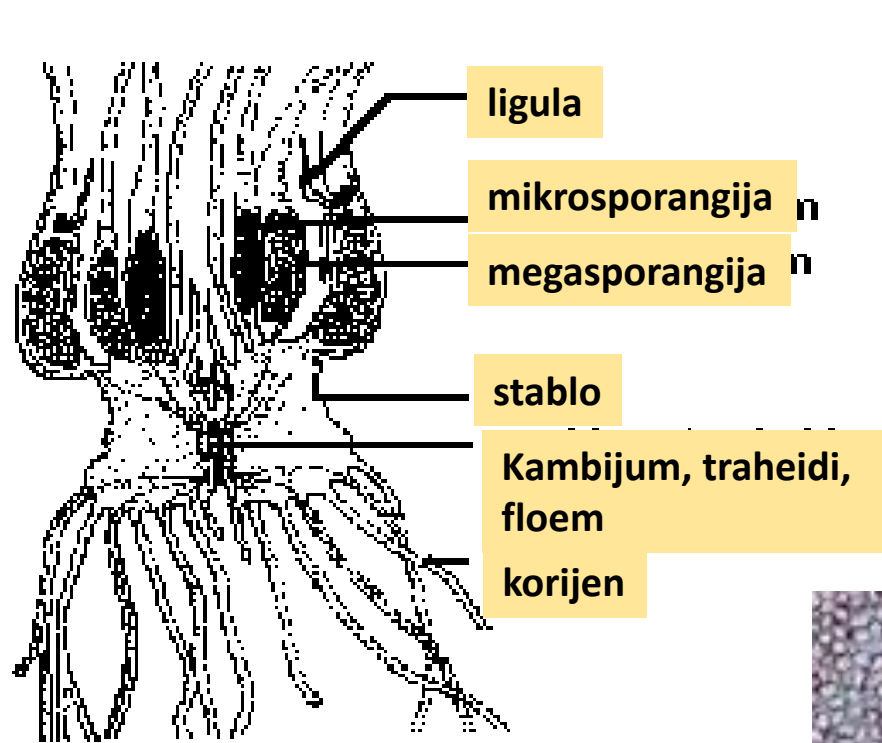
# o. Selaginellales



Megaspora sa megagametofitom  
(protalijum sa arhegonijama)



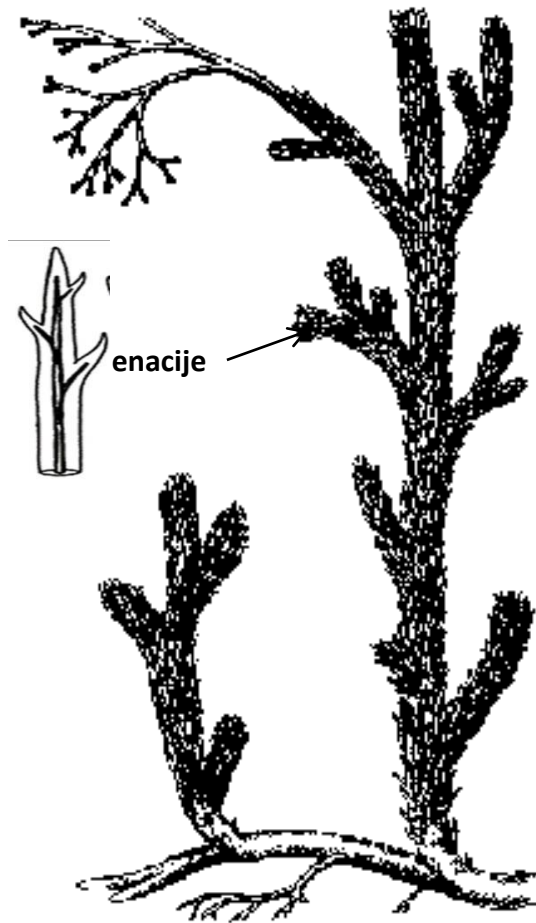
# o. Isoetales



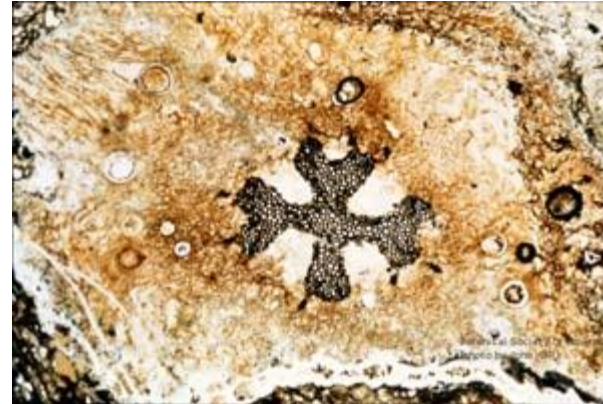
# Fossilni predstavnic

- o. Asteroxylales (†)
- o. Protolepidodendrales (†)
- o. Lepidodendrales (†)

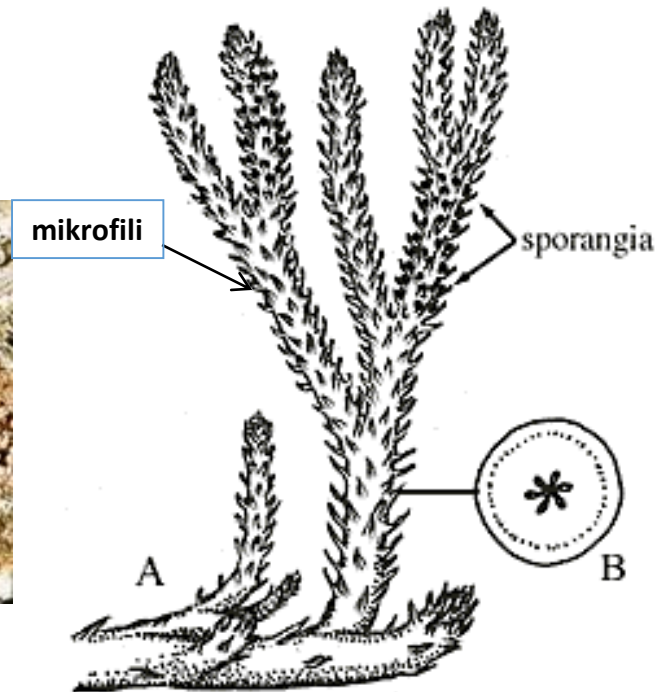
## o. Asteroxylales (†)



**Asteroxylon spp.**



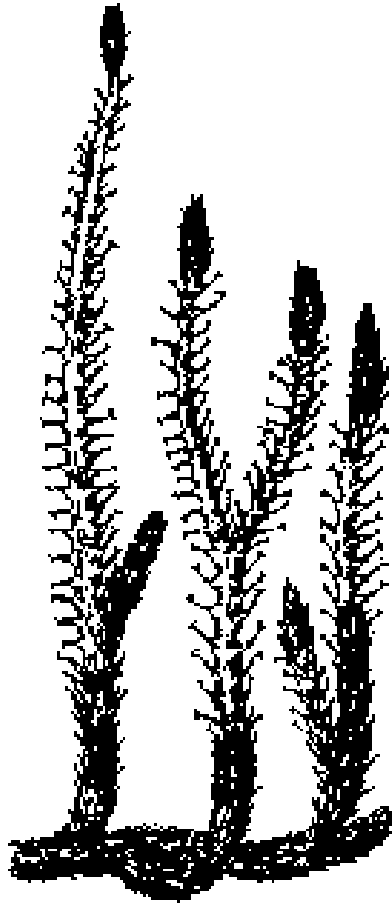
Presjek kroz stablo  
(zvjezdasti ksilem, drvo).



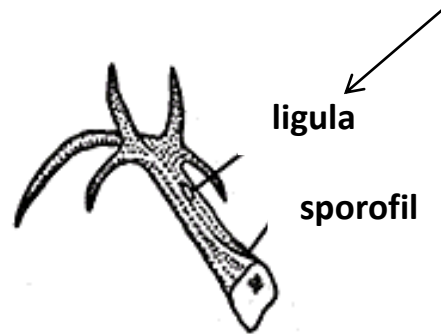
**Drephanohycus spp.**



# o. Protolepidodendrales (†) (viljuškasti listovi)



Protolepidodendron spp.



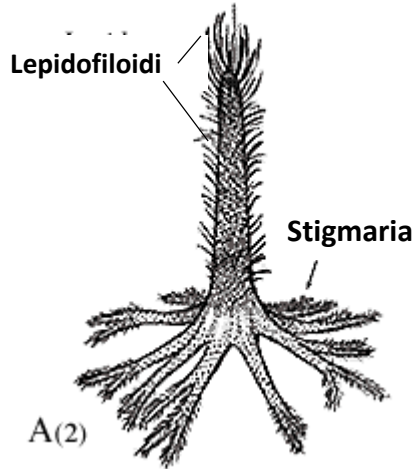
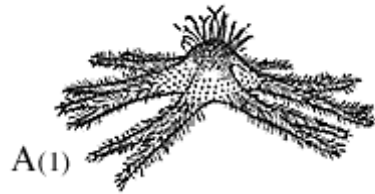
Kod recentnih prečica iz  
klase Lycopodiopsida  
ligula ne postoji!!!

Mikrofilii *Leclercqia spp.*,  
sporangija se nalazi  
adaksijalno tačno ispod  
jezička **ligule**.

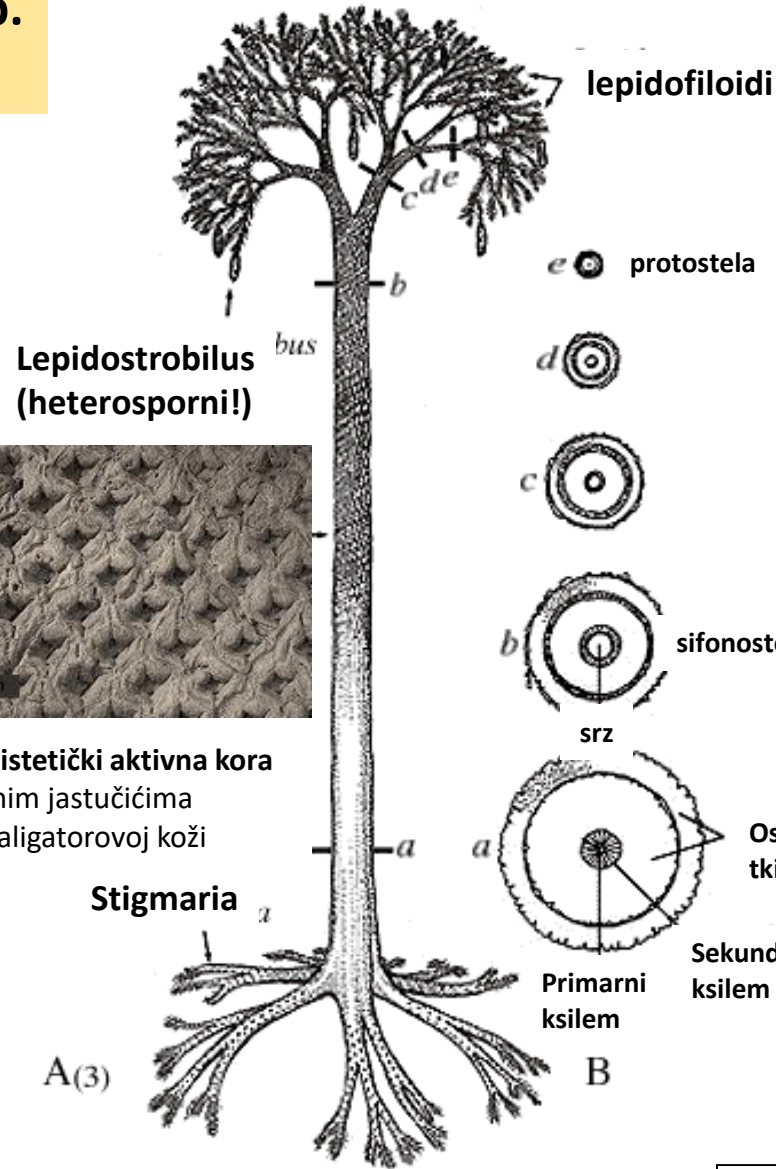
Archaeosigillaria- još jedna izosporna prečica sa  
ligulom!

# o. Lepidodendrales (†)

**Lepidodendron spp.  
(razviće)**



„korasto drveće“



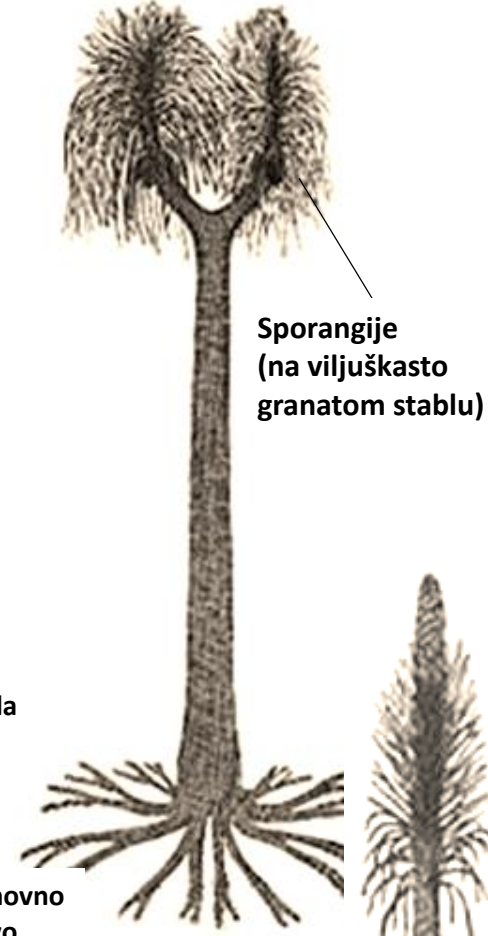
**Lepidostrobilus  
(heterosporni!)**



Fotosistetički aktivna kora sa lisnim jastučicama nalik aligatorovoj koži

Monokarpne biljke!!!

**Sigillaria spp.**



**Pleuromeia spp.**

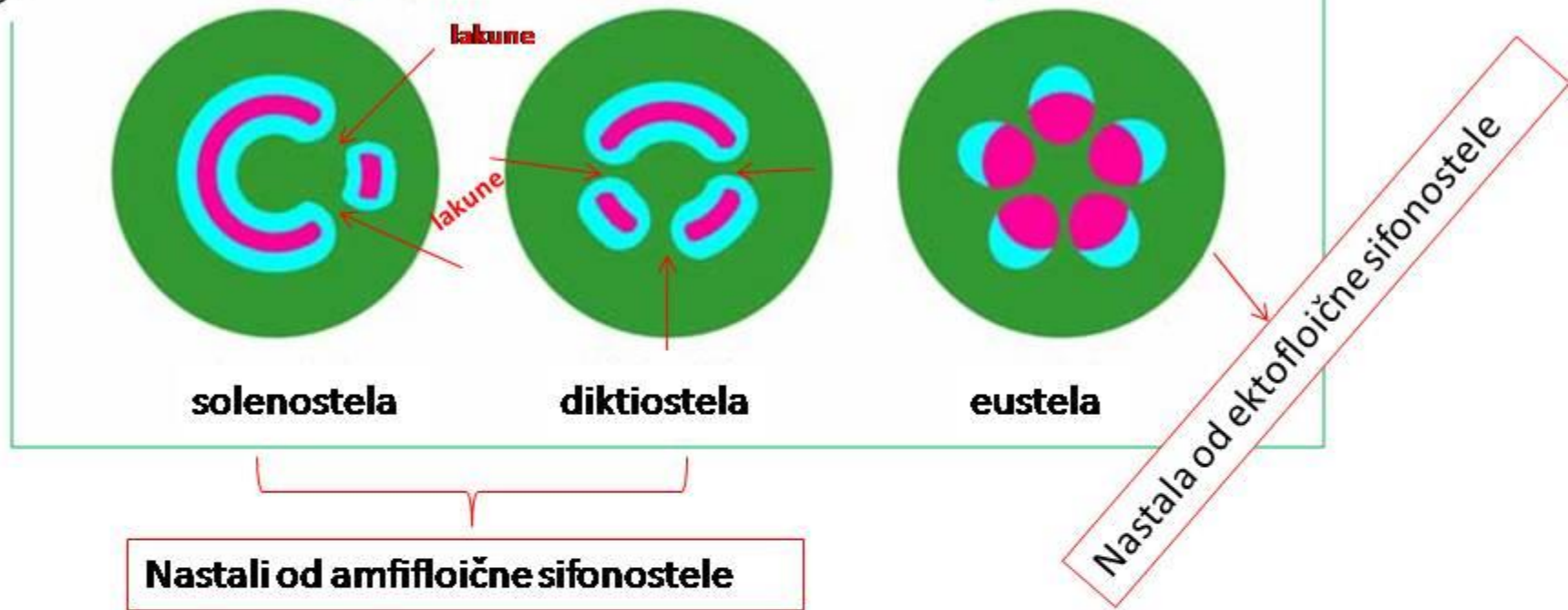
# Euphyllphyta

Monilophyta

Spermatophyta

Protostela  
Sifonostela

## Tipovi sifonostele

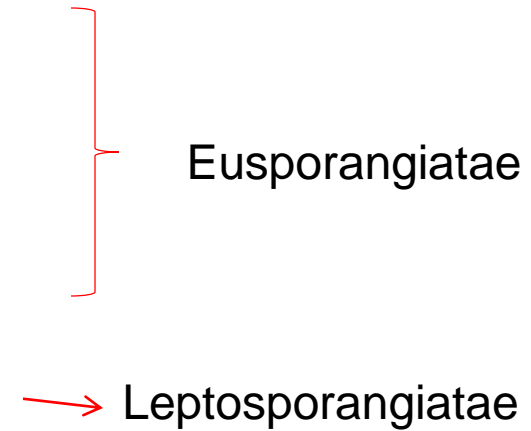


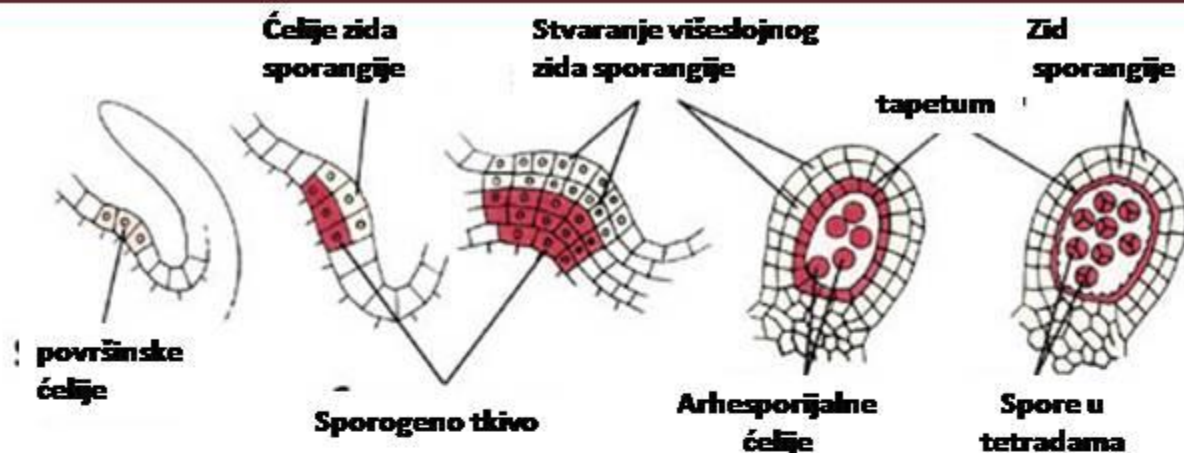
- **solenostela** – najprimitivniji tip sifonostele, u kojoj se javlja srž koja je okružena floemom i ksilemom (tipična za neke primitivne paprati).
- **diktiostela** – slična solenosteli, ali sa više lakuna u prstenu od floema u ksilema, na mjesti kojih se javljaju listovi (sreće se samo kod paprati).
- **eustela** – prsten od floema i ksilema je “razbijen” i diferenciran na provodne snopiće, koji su kružno raspoređeni oko srži (tipičan za biljke sa sjemenom).



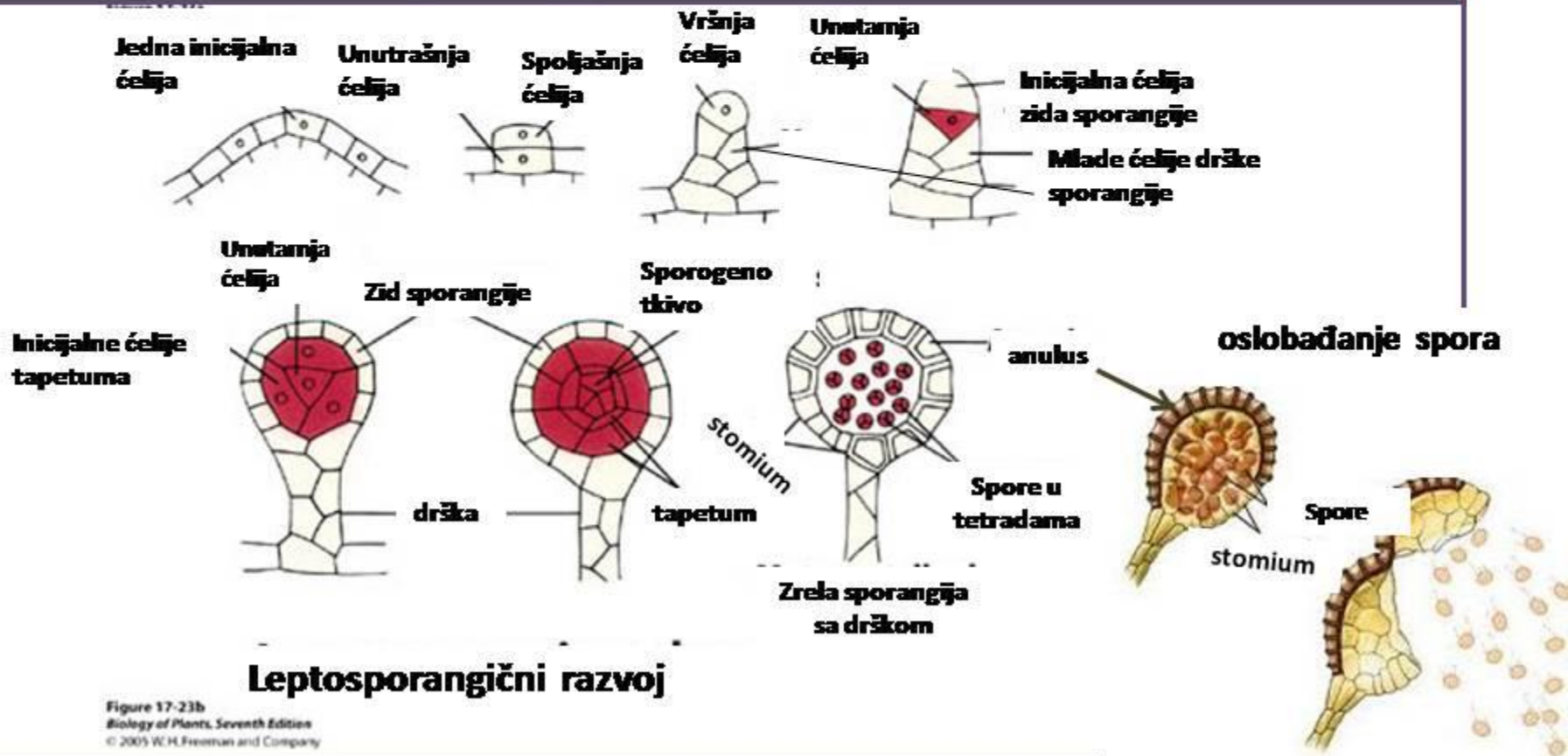
# Monilophyta

- Psilotidae
- Equisetidae
- Marratiidae
- Polypodiidae





### Eusporangični razvoj



### Leptosporangični razvoj

Figure 17-23b  
Biology of Plants, Seventh Edition  
© 2005 W. H. Freeman and Company

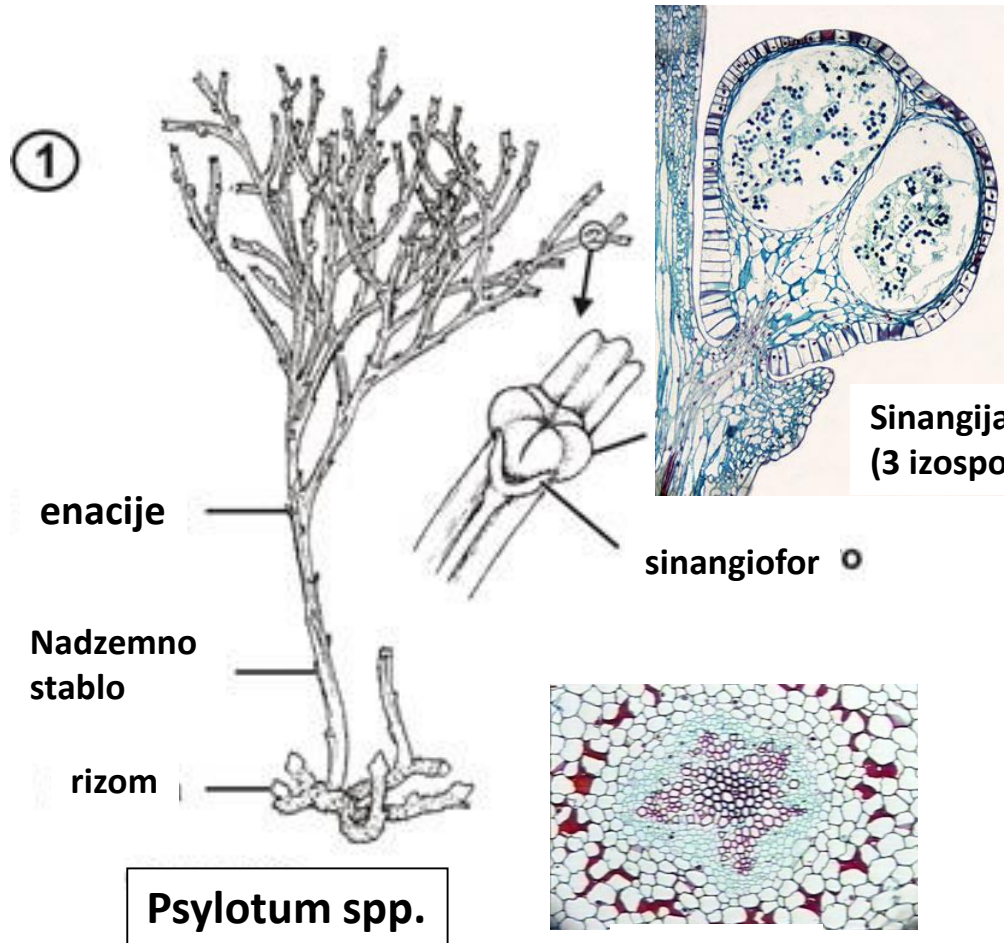
# Psilotidae

(Divisio: Psilotophyta)

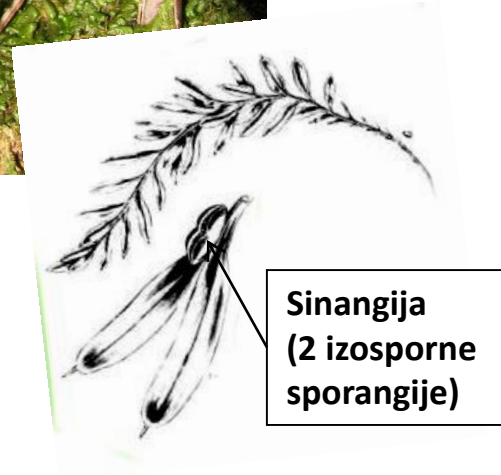
- Psilotales
- Ophioglossales

# Psilotales

Potpuno odsustvo korjena!!!

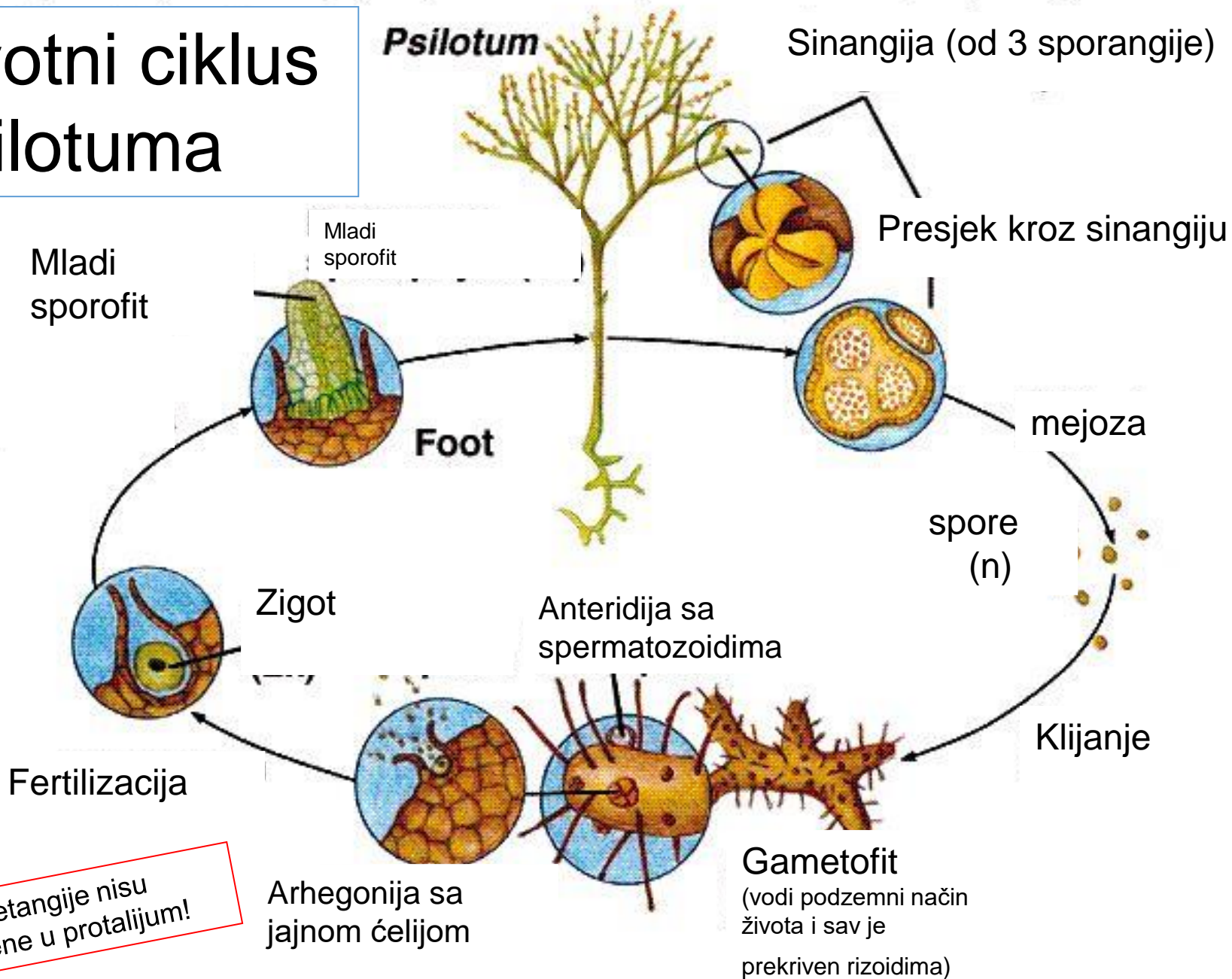


Sinangija  
(3 izosporne sporangije)

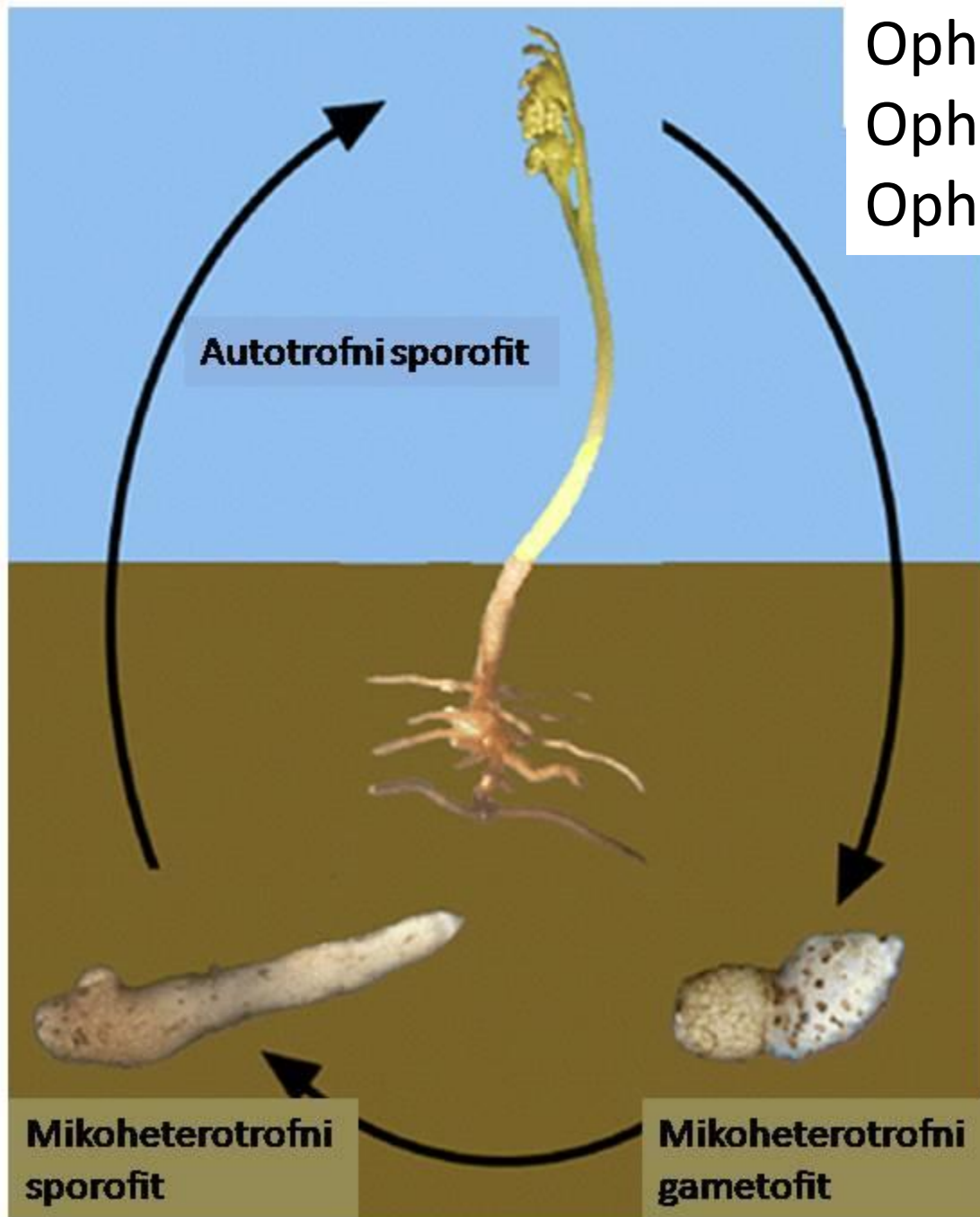




# Životni ciklus Psilotuma



Ophioglossales  
Ophioglossaceae  
*Ophioglossum vulgatum*





## Fam. Ophioglossaceae



*Ophioglossum* ssp.  
Sporofil i trofofil jednostavni!



*Botrychium lunaria*  
Sporofil i trofofil granati!