

Papratnjače II

Podrazredi: *Equisetidae*, *Marattiidae*
Ophioglossidae, *Polypodiidae*, *Psilotidae*

izmjena generacija, morfologija, filogenija, raznolikost



Udžbenik, str. 233-262

Pteridophyta

podraz. Lycopodiidae
crvotočine, crvotočinke



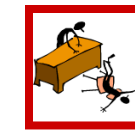
izosporne i heterosporne
listovi - mikrofili
trofofili i sporofili
sporofili grade **strobilus**
oko 750 vrsta, u Hr 8

Monilophyta

Papрати s.s. (4 podraz. Equisetidae,
Marattiidae, Polypodiidae,
Psilotidae)



vrlo heterogena skupina
papratnjača
većinom **izosporne**
pravi listovi – **makrofili**
trofosporofili, trofo+sporofili
sporofili **strobilus / bez**
strobilusa
oko 10000 vrsta, u Hr oko 90



Klasifikacija:

Spermatophyta

Sjemenjače (5 podraz. Ginkgooidae,
Cycadidae, Pinidae, Gnetidae,
Magnoliidae)



pravi listovi
vrlo heterogena skupina,
velika divergencija
velika adaptivna radijacija
dominantne biljke Zemlje
sve **heterosporne**
sporofili grade **cvijet**
oko 250.000 vrsta, u Hr oko
5020

Polysporangiophyta

Tracheophyta, vaskularne biljke

Euphylllophyta, biljke s "pravim" listovima

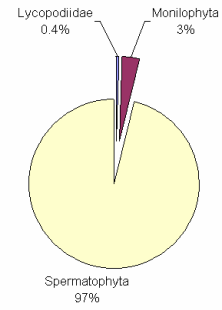
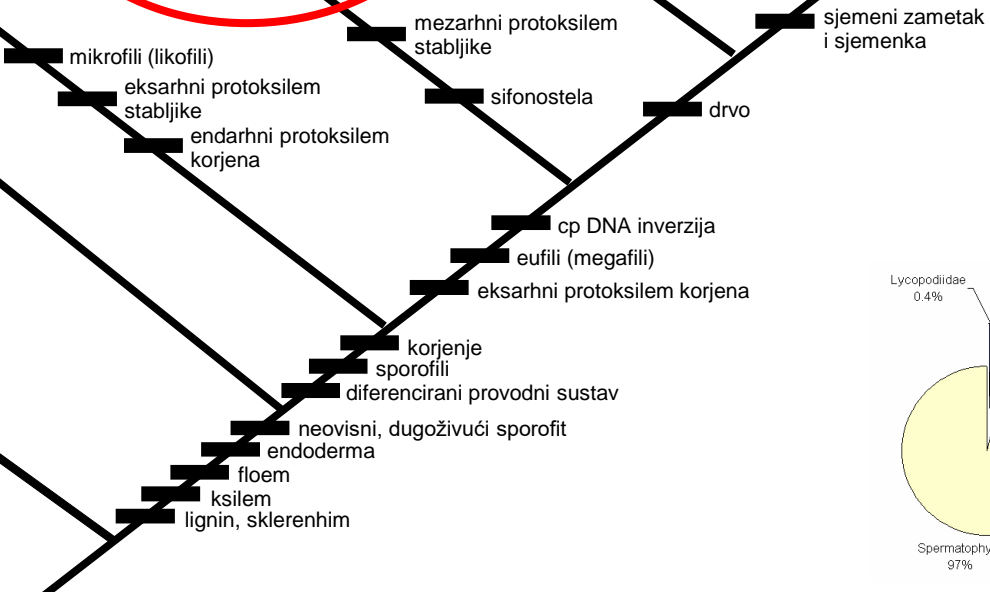
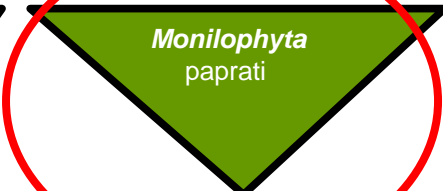
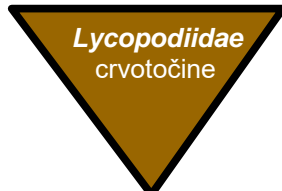
tradicionalne papratnjače, *Pteridophyta s. l.*

Lignophyta, drvenaste biljke

Rhiniophyta

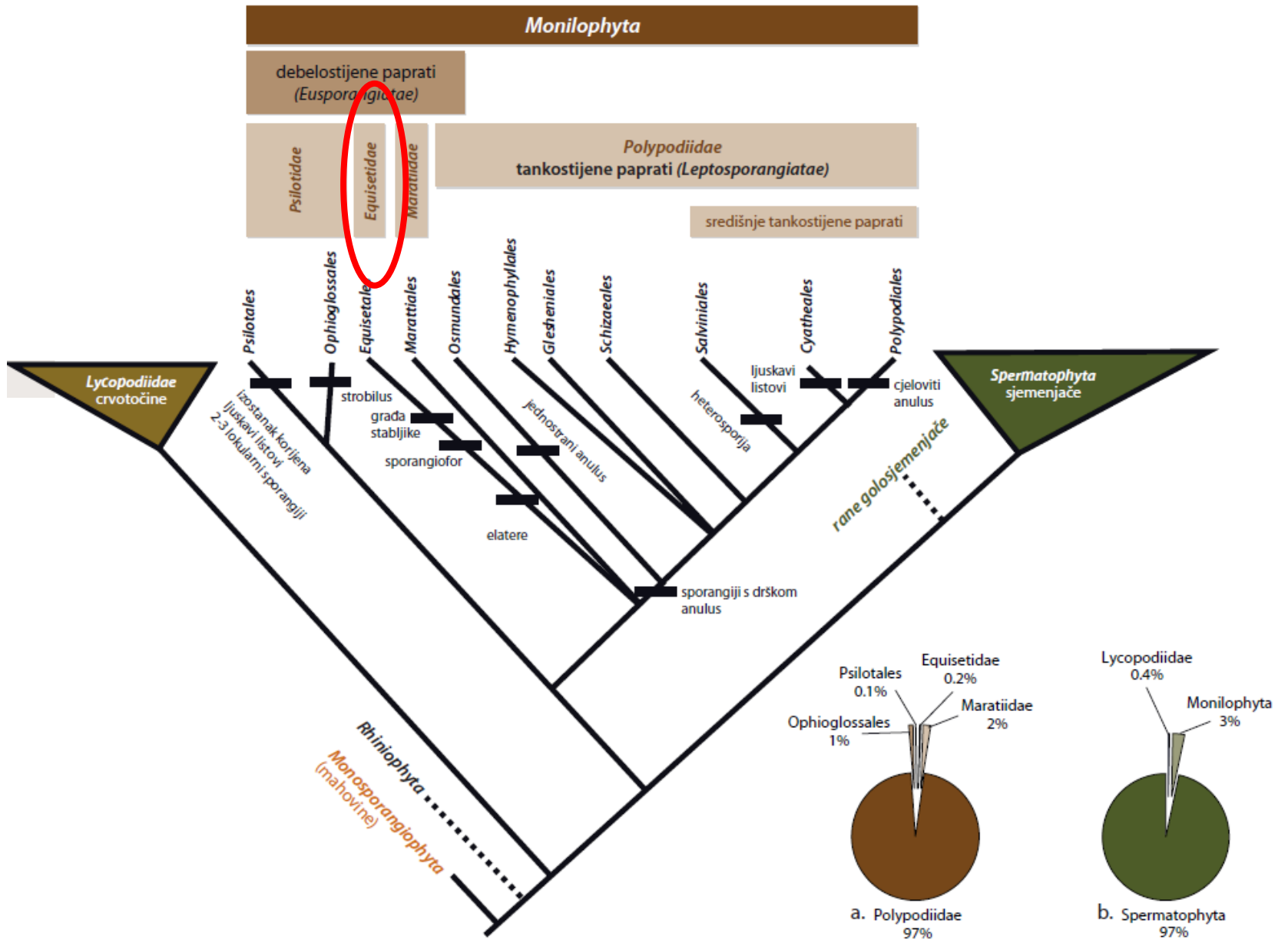
rane golosjemenjače

Monosporangiophyta (mahovine)



K: 233-262

Pteridophyta



Pteridophyta

Red: Equisetales, preslice

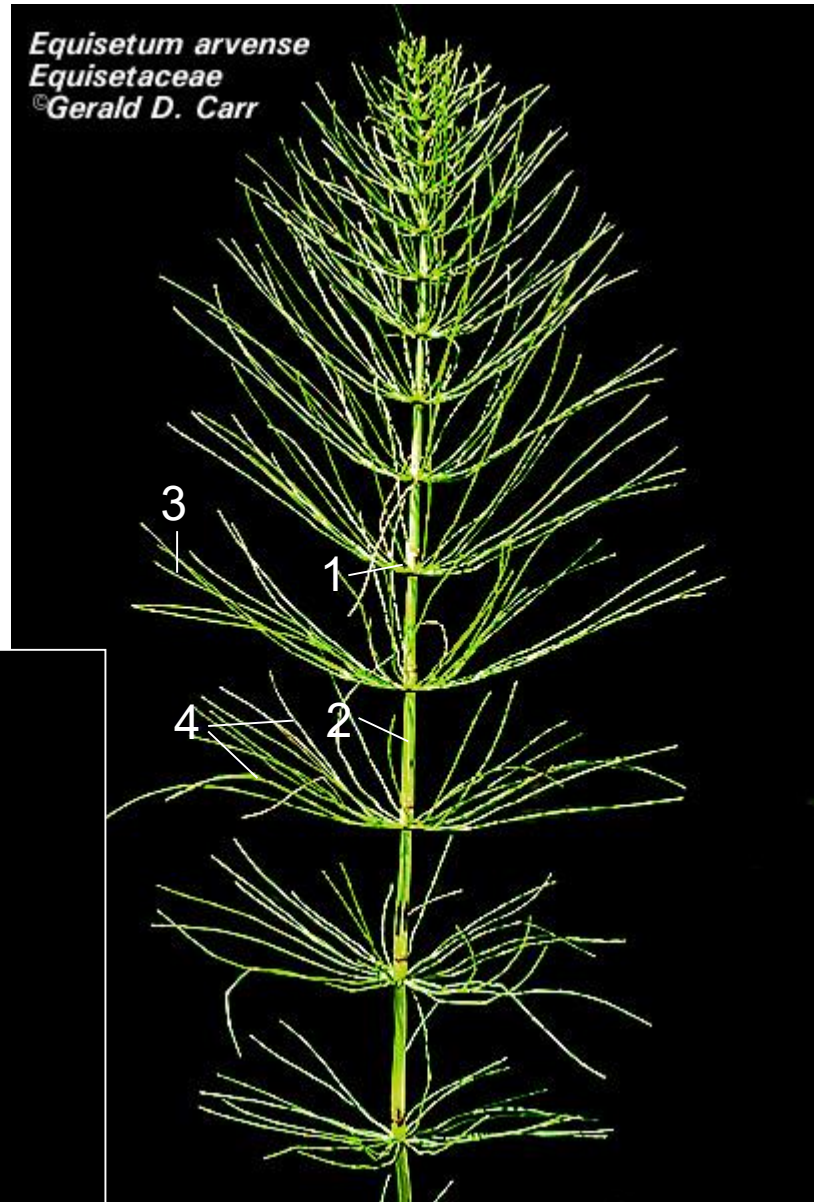
1. por. *Equisetaceae* - izosporne (preslice)

maleni broj živećih vrsta
mnoštvo izumrlih oblika, obimna klasifikacija
velika filogenetska starost

Glavne osobine:

- ➔ jedan rod - *Equisetum*
- ➔ Popis flore Hrvatske: 9 sp.
- ➔ većinom jednogodišnje biljke
- ➔ dug podzemni izdanak
- ➔ stabljika **člankovita** (nodij/1, internodij/2)
- ➔ prvotno protostela
- ➔ **mikrofilij** (3) srasli u **rukavac** (4)
- ➔ **filokladiji** (4) (ogranci) asimiliraju
- ➔ sterilne i fertilne stabljike
- ➔ **izosporne**
- ➔ sporofili - **sporangiofori**
- ➔ **strobilus** (5)

T. Nikolić



Sistematska botanika -
Pteridophyta



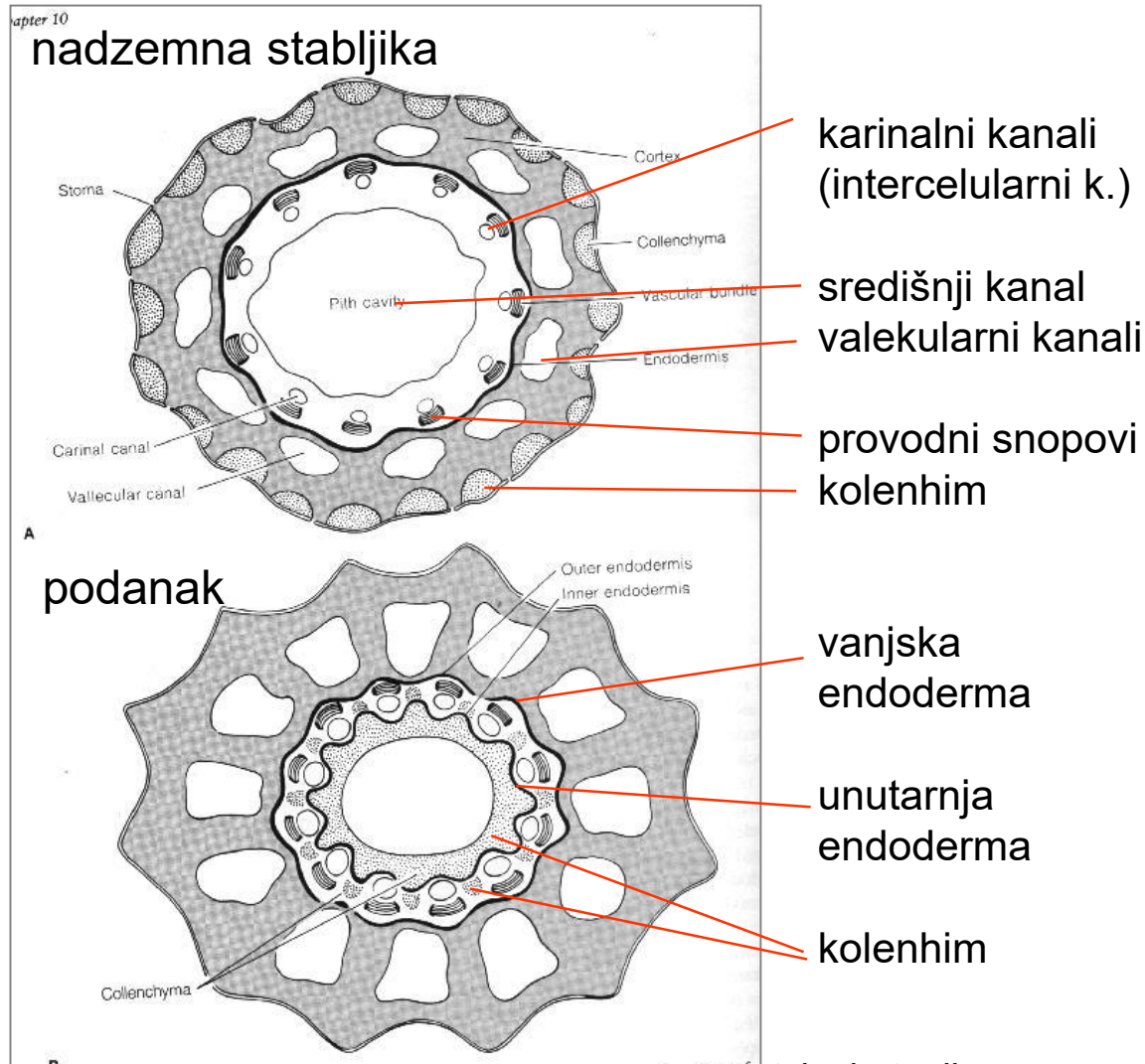
K: 241-246

5

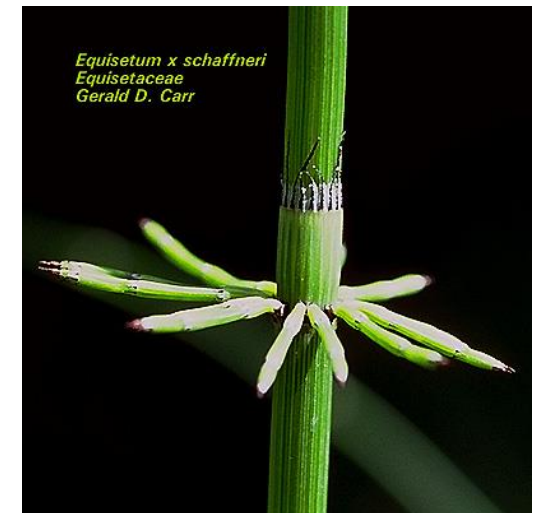
Pteridophyta

Red: Equisetales, preslice

1. por. *Equisetaceae* - preslice



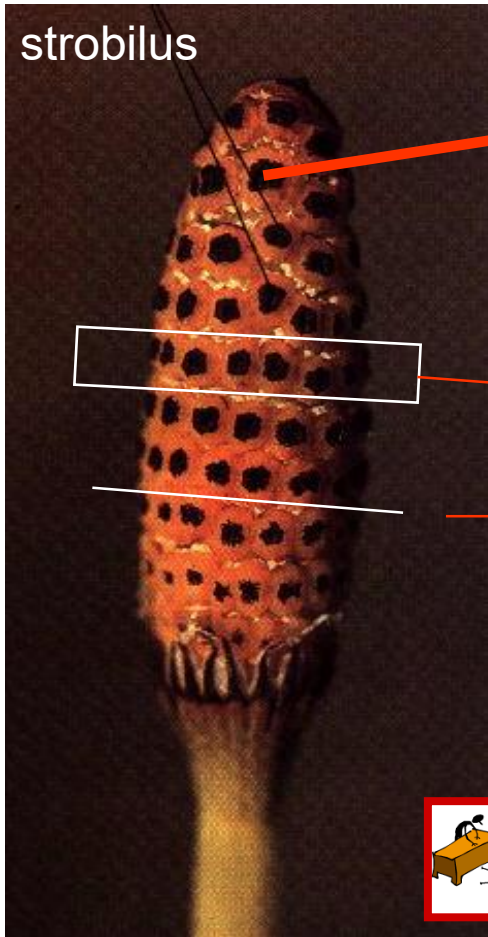
- rebrasta stabljika
- akumulacija SiO_2
- brojni kanali različita položaja i porijekla
- ogranci alterniraju s listovima, a ne razvijaju se u njihovu pazušku
- rukavci



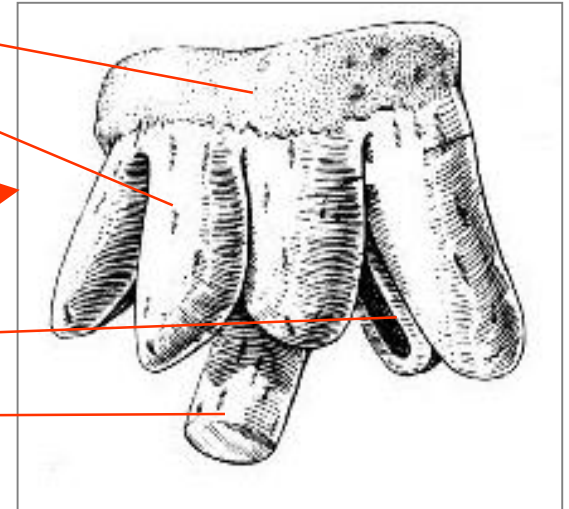
Pteridophyta

Red: Equisetales, preslice

1. por. *Equisetaceae* - preslice
građa strobilusa



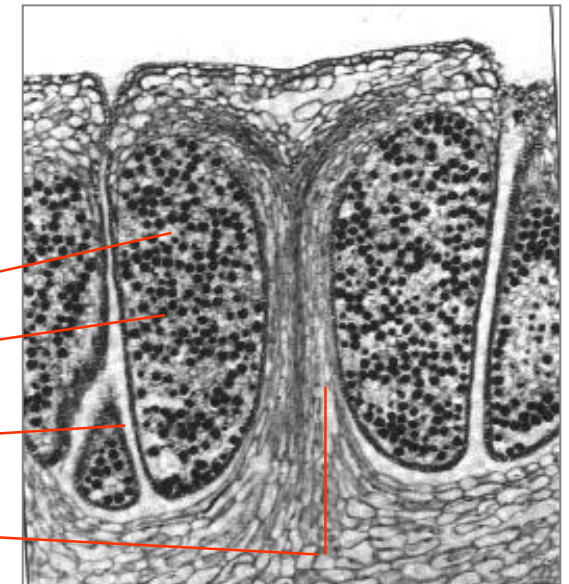
sporofil
sporangij



uzdužna
pukotina
držak

sporofil, shematski

uzdužni presjek
sporofila



periplazmodij
izospore
dvoslojna stjenka
držak

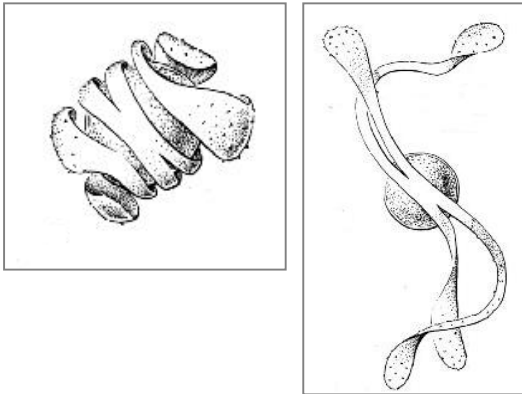
Pteridophyta

Red: Equisetales, preslice

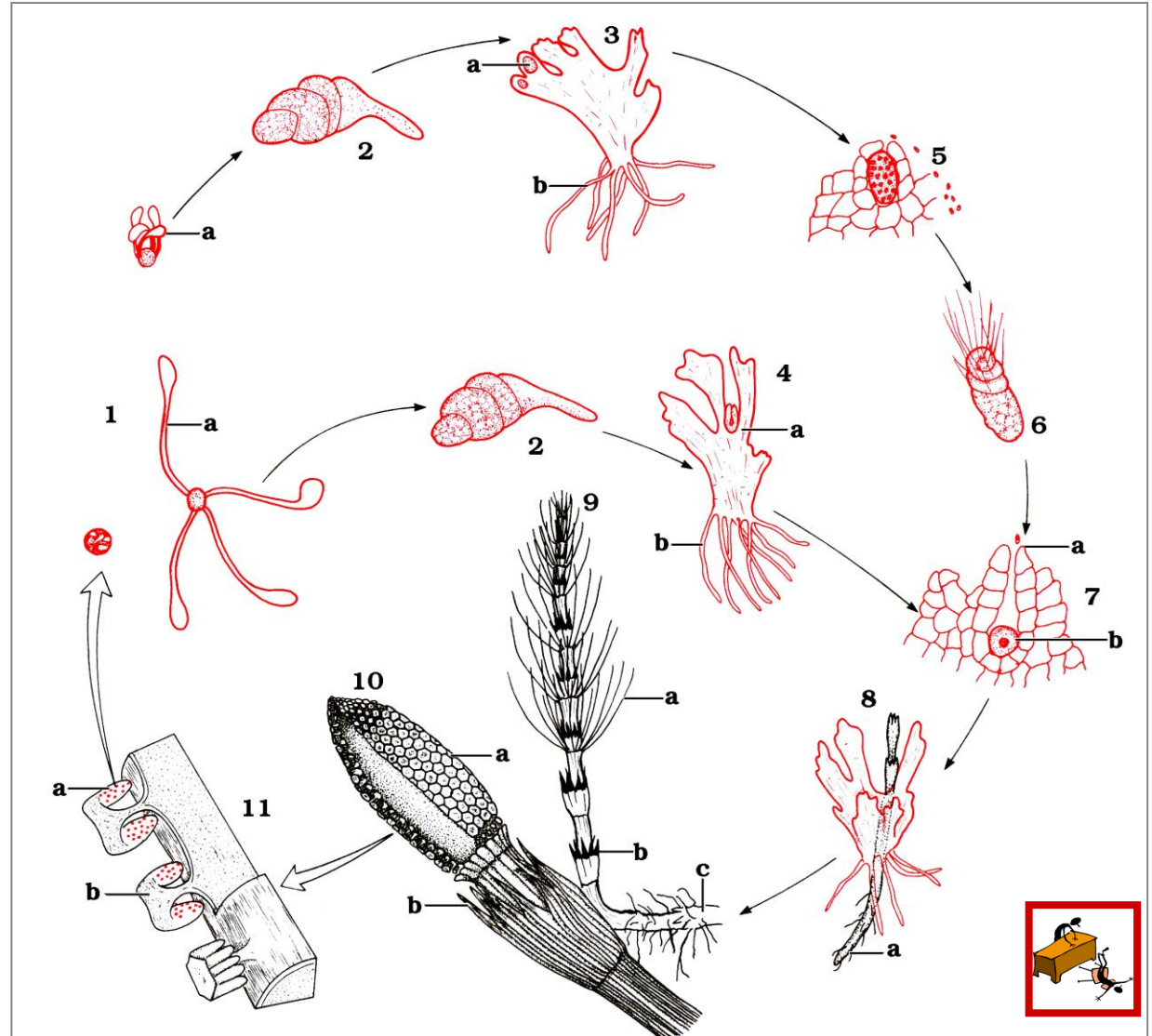
1. por. *Equisetaceae*
preslice

Životni ciklus:

crvena boja - haplo faza
crna boja - diplofaza



- higroskopsko gibanje
- haptere
- **egzosporni** protalij
- zeleni, krpasti
- gametangiji, gamete
- [video!](#) ili još bolje [ovaj](#)

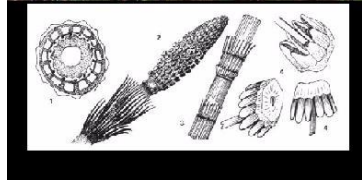


Pteridophyta

Red: Equisetales, preslice

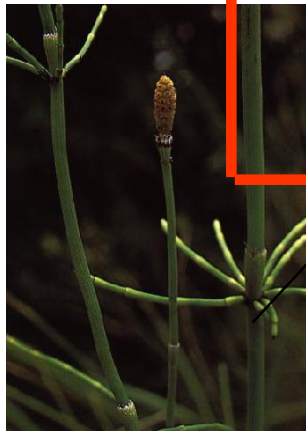


E. arvense
E. telmateia
E. sylvaticum
E. pratense



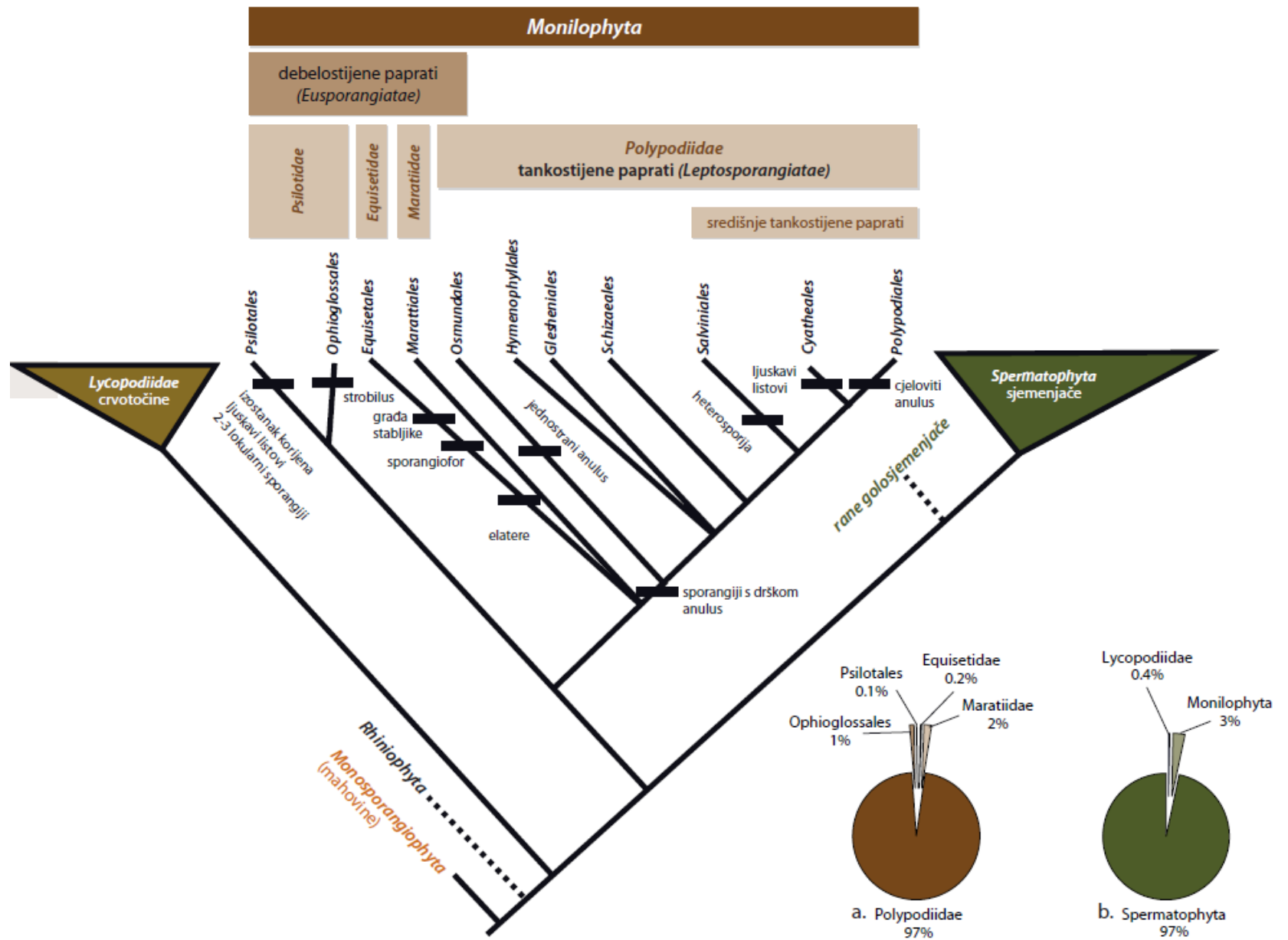
Dvije skupine:

1. fertilna i sterilna stabljika odvojene
2. fertilna i sterilna stabljika u jednoj biljci



E. palustre
E. fluviatile
E. ramosissimum
E. hyemale
E. variegatum

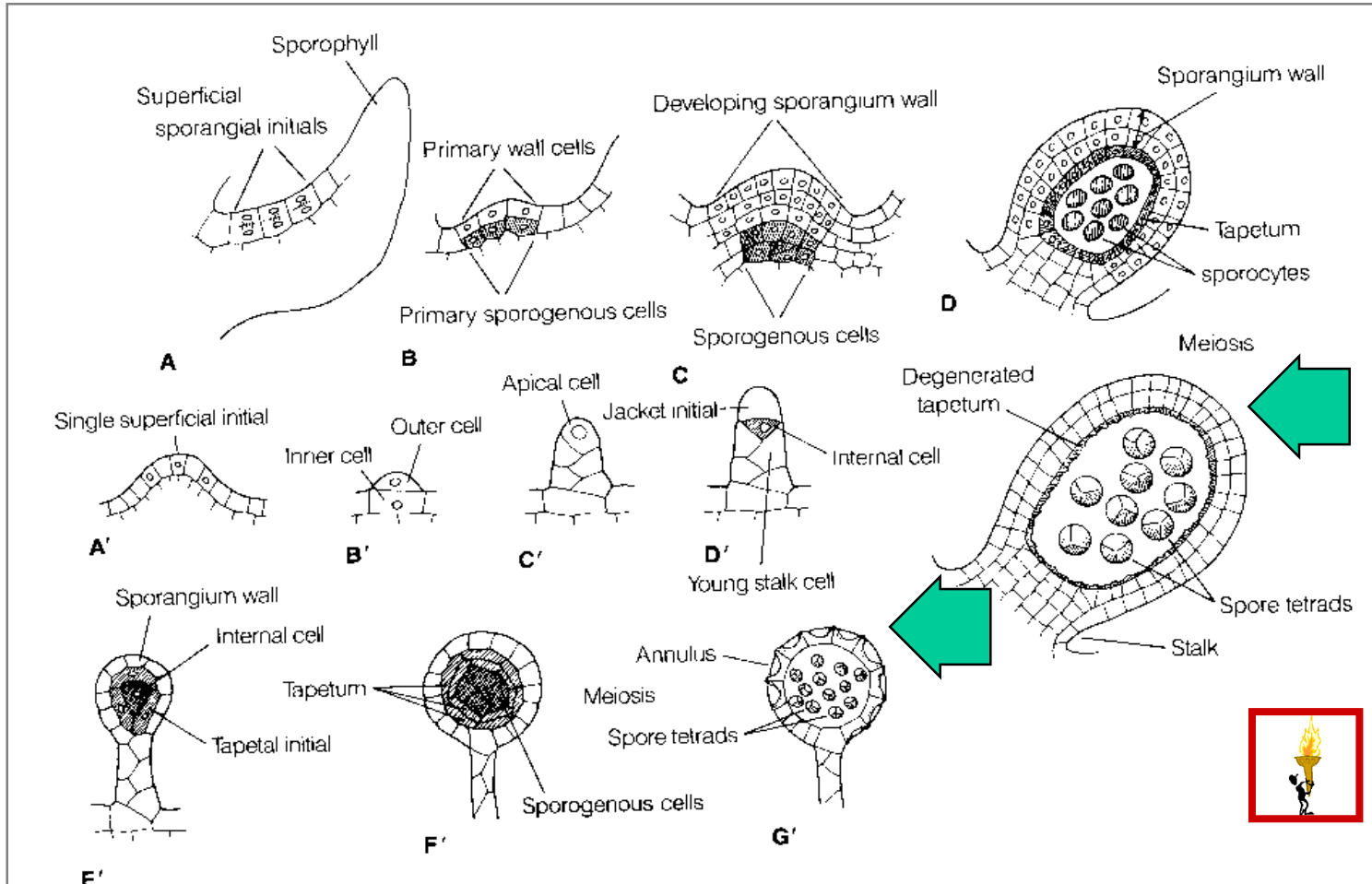


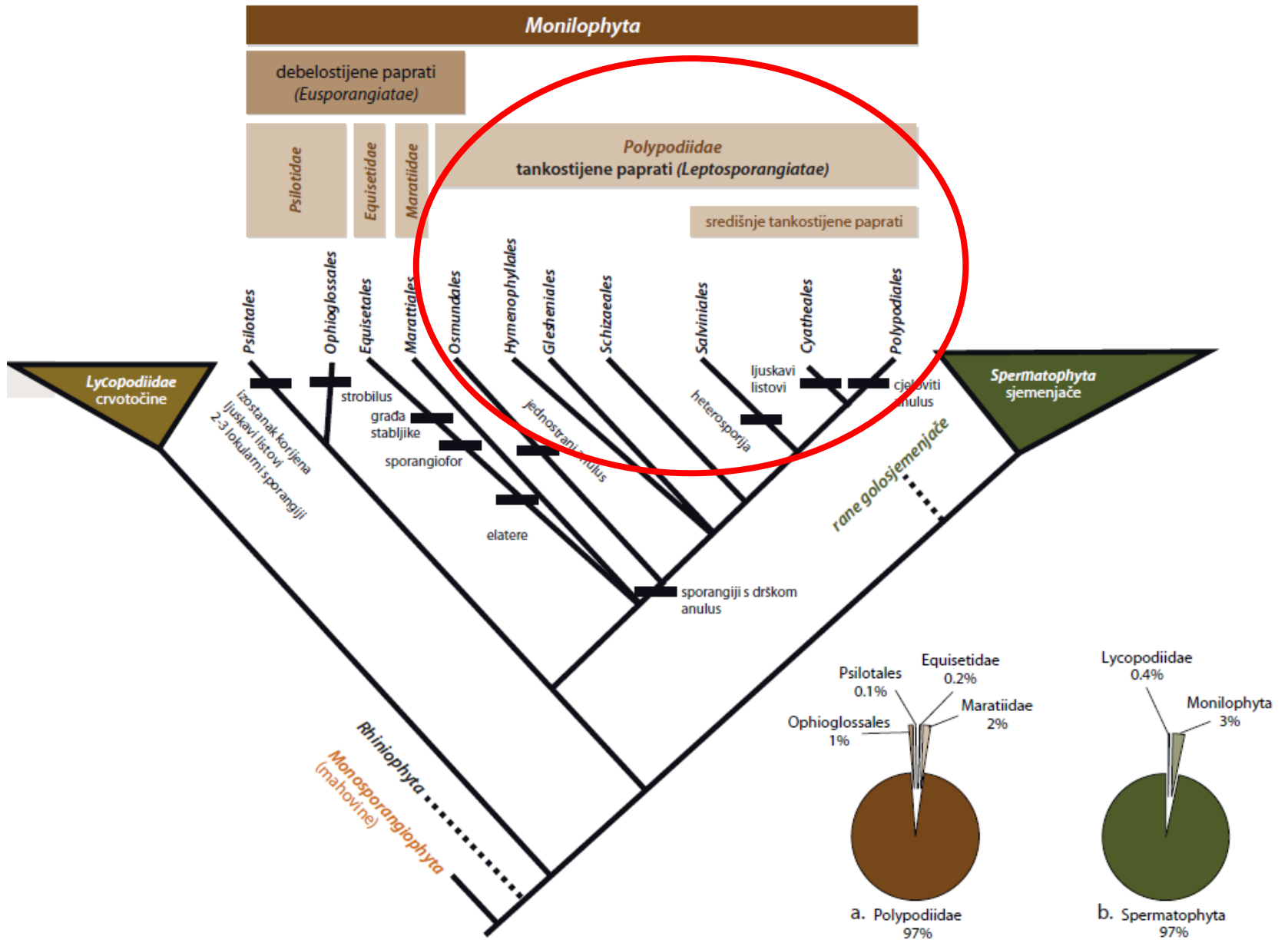


Pteridophyta

Podraz.: *Marratiidae, Psilotidae*
 paprati debelostjenih sporangija (A-E)
 (*Eusporangiatae*)

Podraz.: *Polyodiidae*
 paprati tankostjenih sporangija (A'-G')
 (*Leptosporangiatae*)

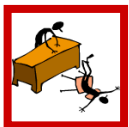




Pteridophyta

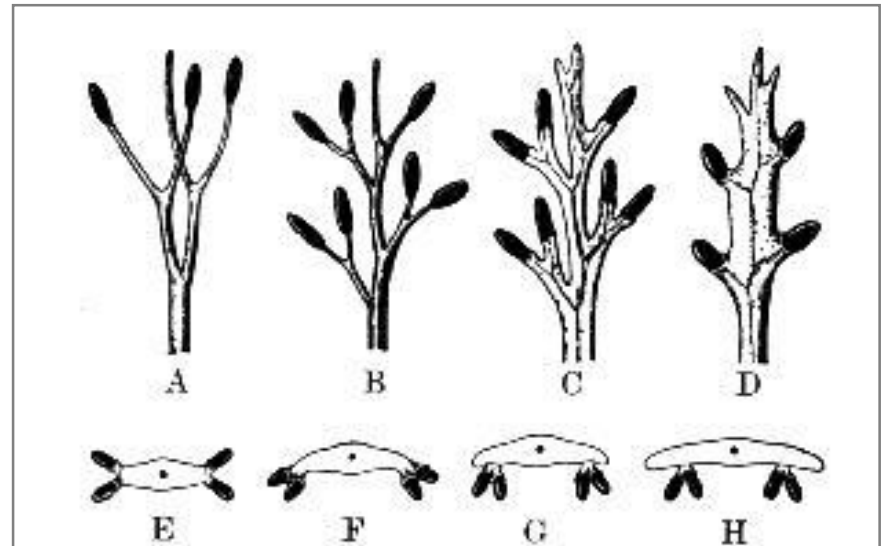
Red: *Polypodiales*

- veličina: oko 33 porodica s oko 9.000-11.000 vrsta
- cca 99% vrsta unutar skupine tankostjenih paprati (*Polypodiidae*)
- od endemičnih svojti do kozmopolita
- **zeljasti** oblici dominiraju
- najveća raznolikost u tropima (patuljasta *Didymoglossum*, do 6-12 m visoke, tzv. "drvenaste" paprati)
- velikom većinom **izosporne** (samo su tzv. vodene **heterosporne**)
- korijen - većinom **podanak**
- listovi **megafili**
- **zavojita vernacija** ([video!](#))
- bogata **sekundarna nervatura**
- česta perasta **sastavljenost**
- **sporo-trofofili**, većinom **nema strobilusa**
- rijetko sporofili i trofofili odvojeni (npr. *Blechnum*) FCD
- **filosporni** smještaj sporangija



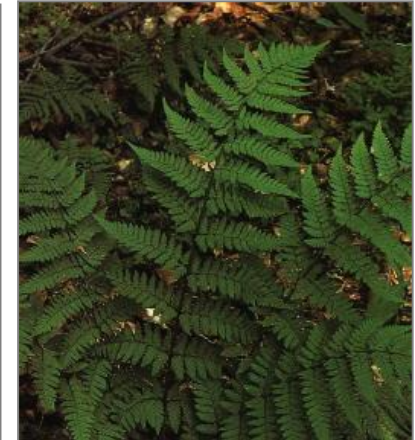
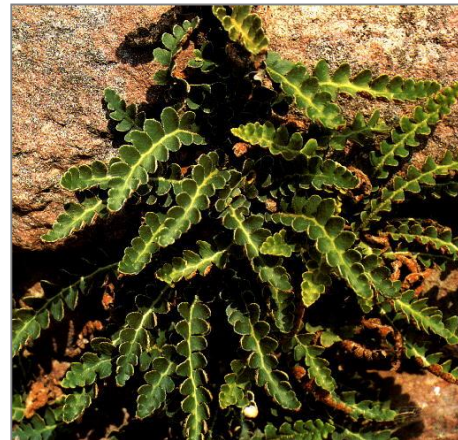
K: 247-262

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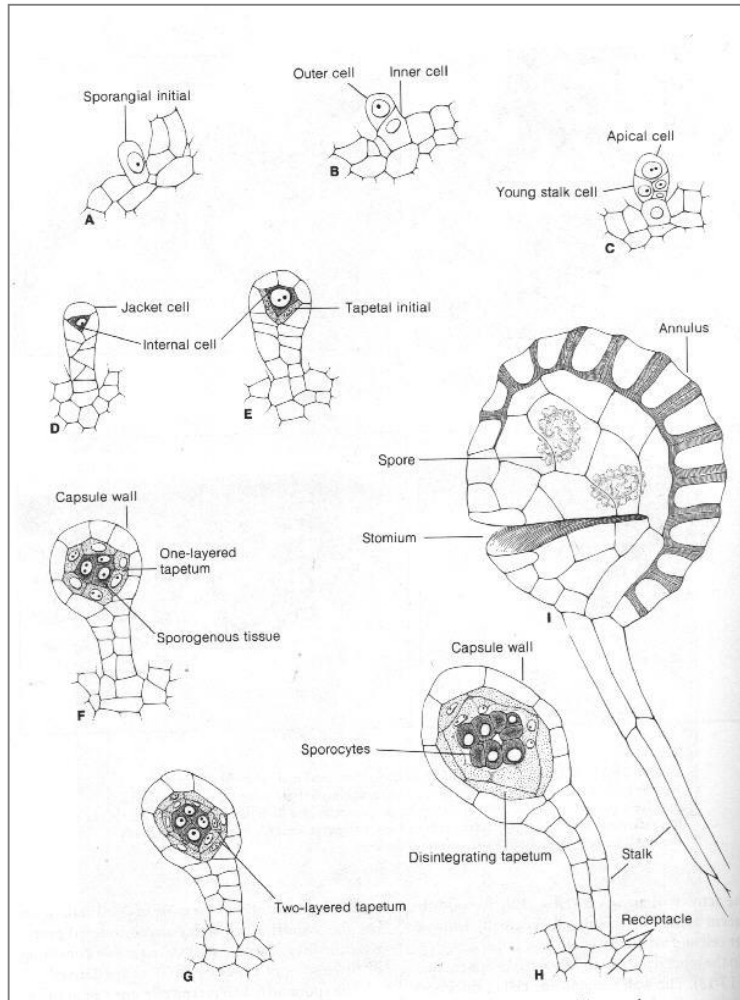


Telomna teorija - porijeklo filospornog položaja sporangija

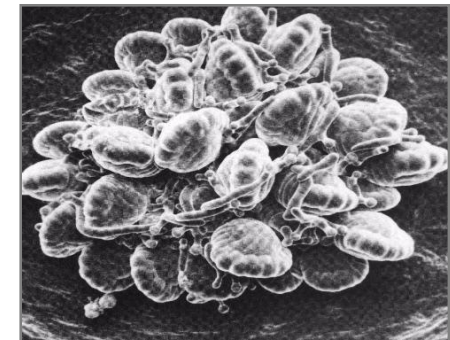
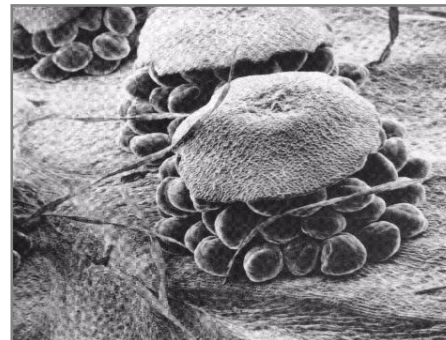
1. nadrašćavanje, 2. planacija, 3. srašćavanje, 4. redukcija, 5. presavijanje



Građa tankostijenog sporangija



- sporangiji rijetko pojedinačni
- **stomijum**, **anulus**, **držak**, otvaranje uz napetost
- asimetrično odebljale stjenke stanica anulusa ("U" oblik)
- nakupine sporangija - **sorusi**
- raznoliki prema obliku i položaju
- jedina redukcijska dioba u ciklusu
- zaštita sorsa - **induzij**
- raznoliki prema obliku, veličini i postanku
- **sporocita** - matična stanica spora
- uz redukcijsku diobu nastaje 150.000 do 1.000.000 spora po sporangiju
- spore se raznose vjetrom
- [video!](#) i također [video!](#)

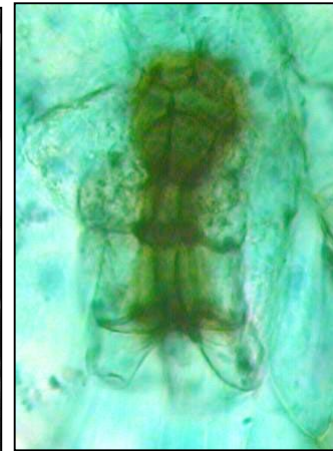
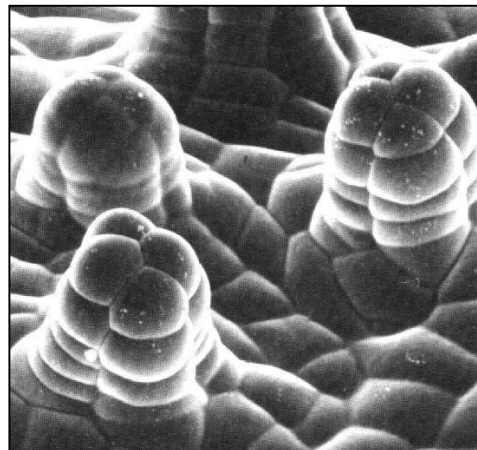
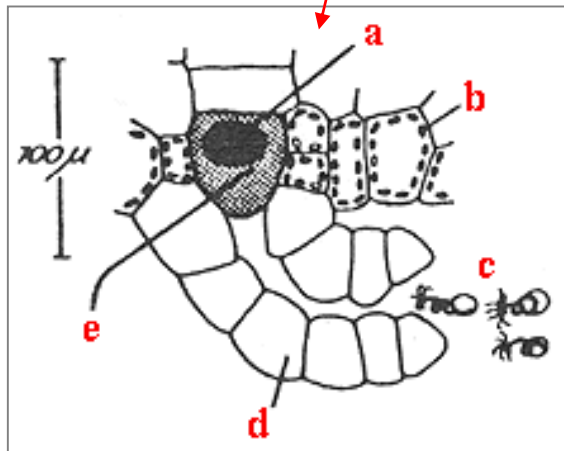
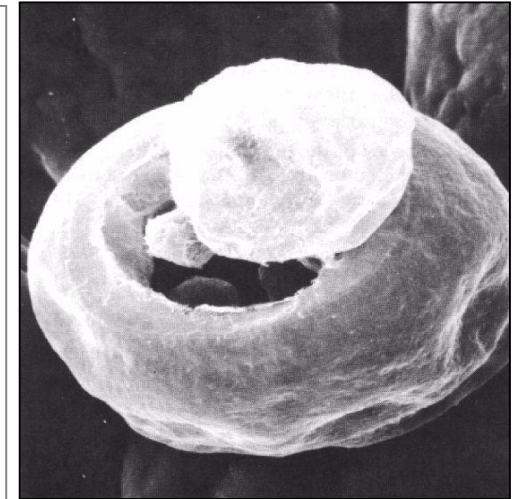
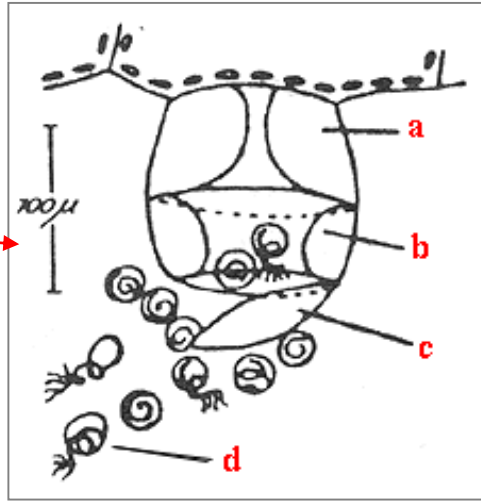
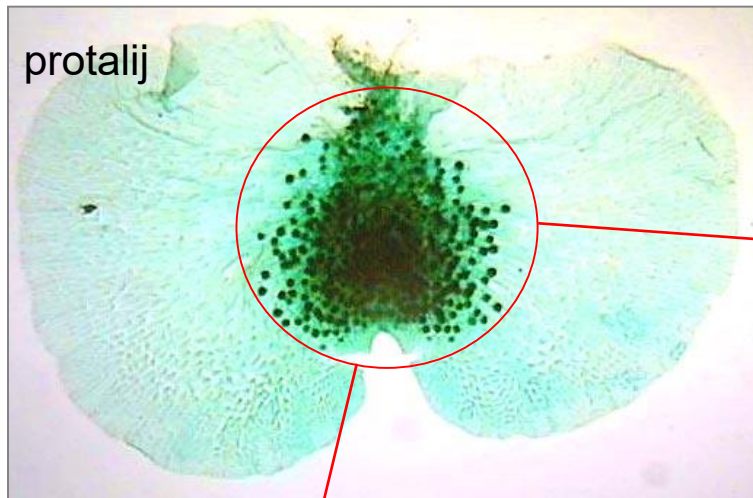


Pteridophyta

Red: *Polypodiales*

Građa gametofita (protalij):

Shematski prikaz anteridija i SEM snimka

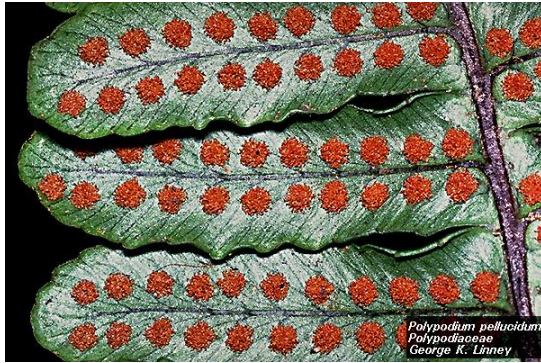


Shematski prikaz arhegonija i SEM snimka neotvorenih arhegonija



Pteridophyta

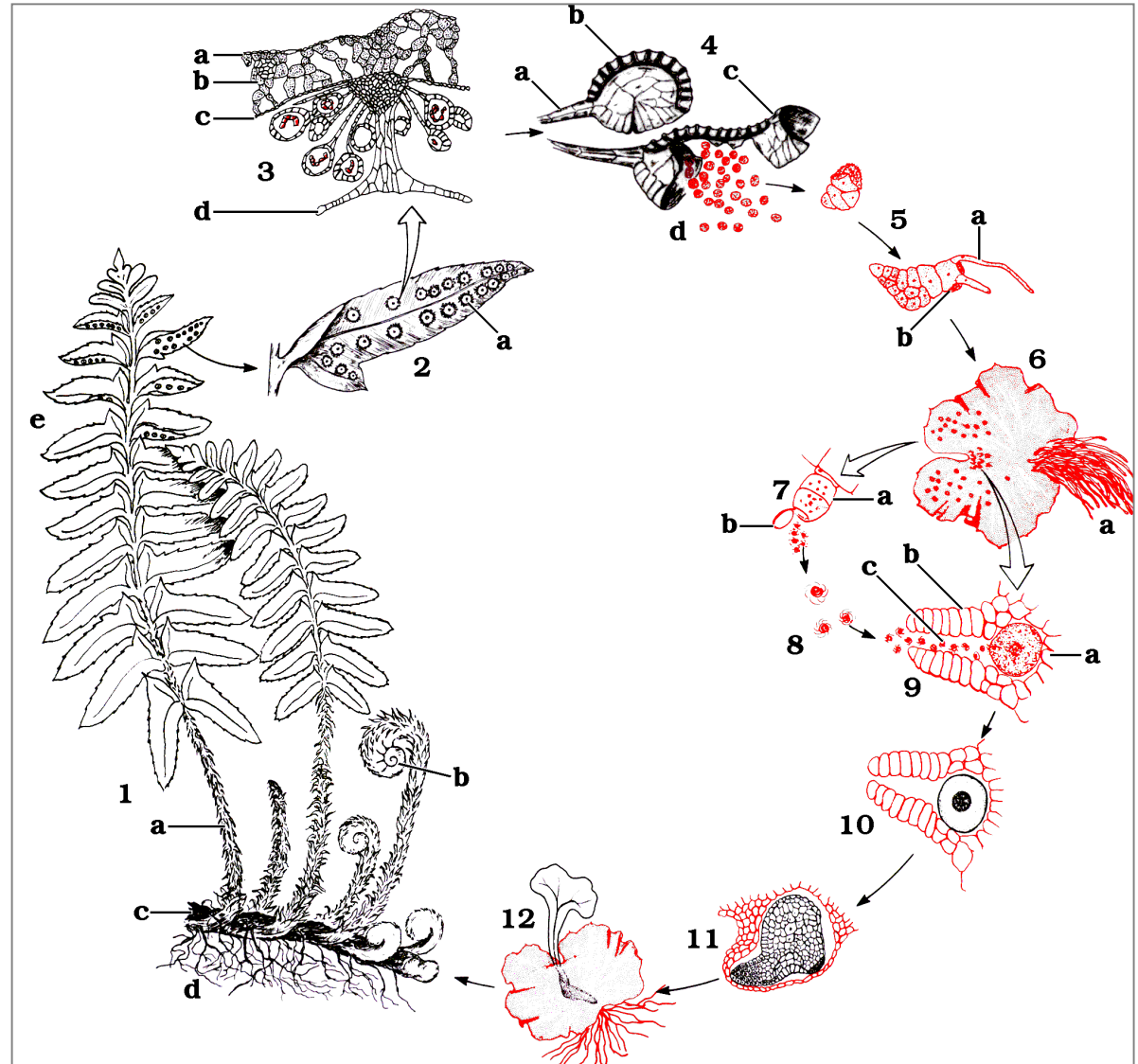
Red: *Polypodiales*



Životni ciklus:

crvena boja - haplo faza
crna boja - diplofaza

- gametofit je egzosporan
- protalij
- anteridiji i arhegoniji
- jajna stanica i spermatozoidi
- oplodnja uz prisustvo vode



Pteridophyta

Red: *Polypodiales*

1. por. **Salviniaceae** (rodovi *Salvinia* (1), *Azolla* (2))
2. por. **Marsileaceae** (rodovi *Marsilea* (3), *Pilularia*)

- ➔ maleni broj vrsta
- ➔ zeljaste svojte **vodenih** i **močvarnih** staništa
- ➔ plutajuće ili ukorjenjene
- ➔ po građi sporangija - **tankostjene**
- ➔ sporangiji **bez anulusa**
- ➔ sporangiji u posebnim nakupinama – **sporokarpi**
- ➔ jedine **heterosporne Monilophyta**
- ➔ vrlo **složen reproduktivni ciklus i pripadni organi**



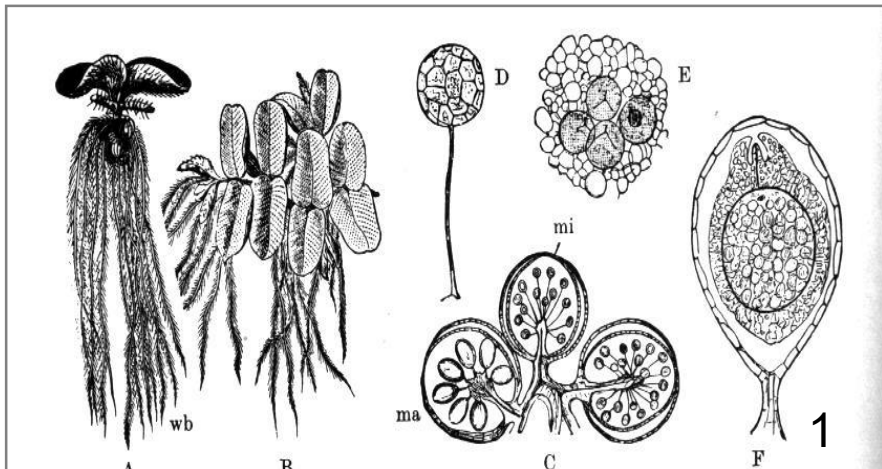
1



2

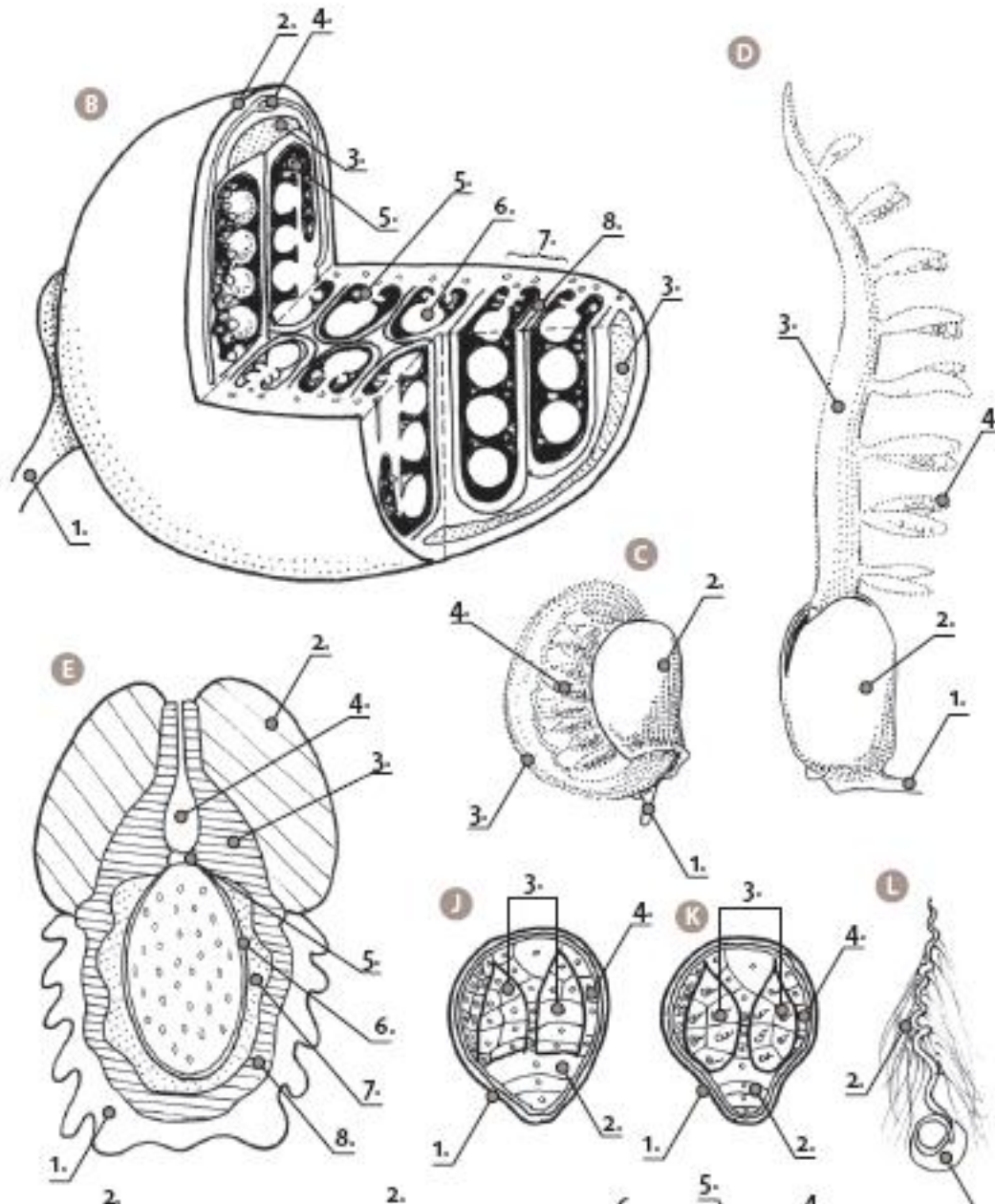
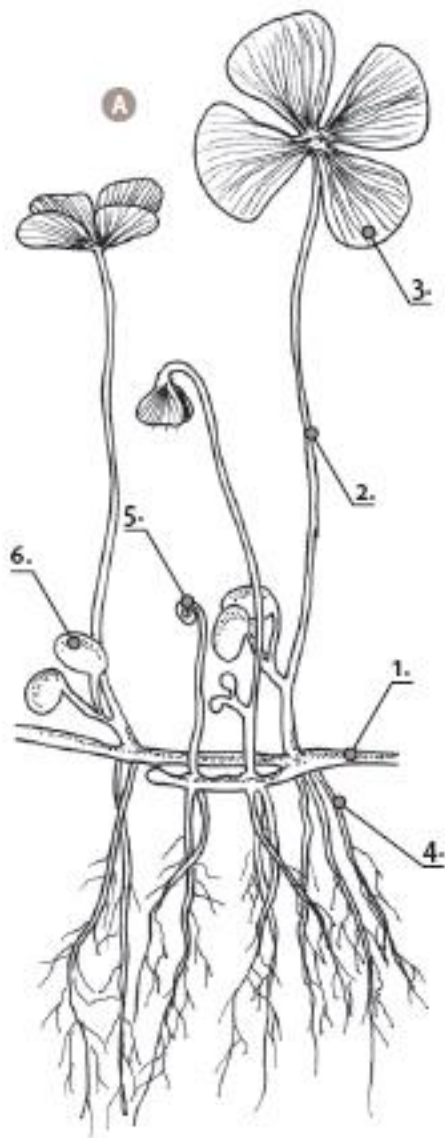


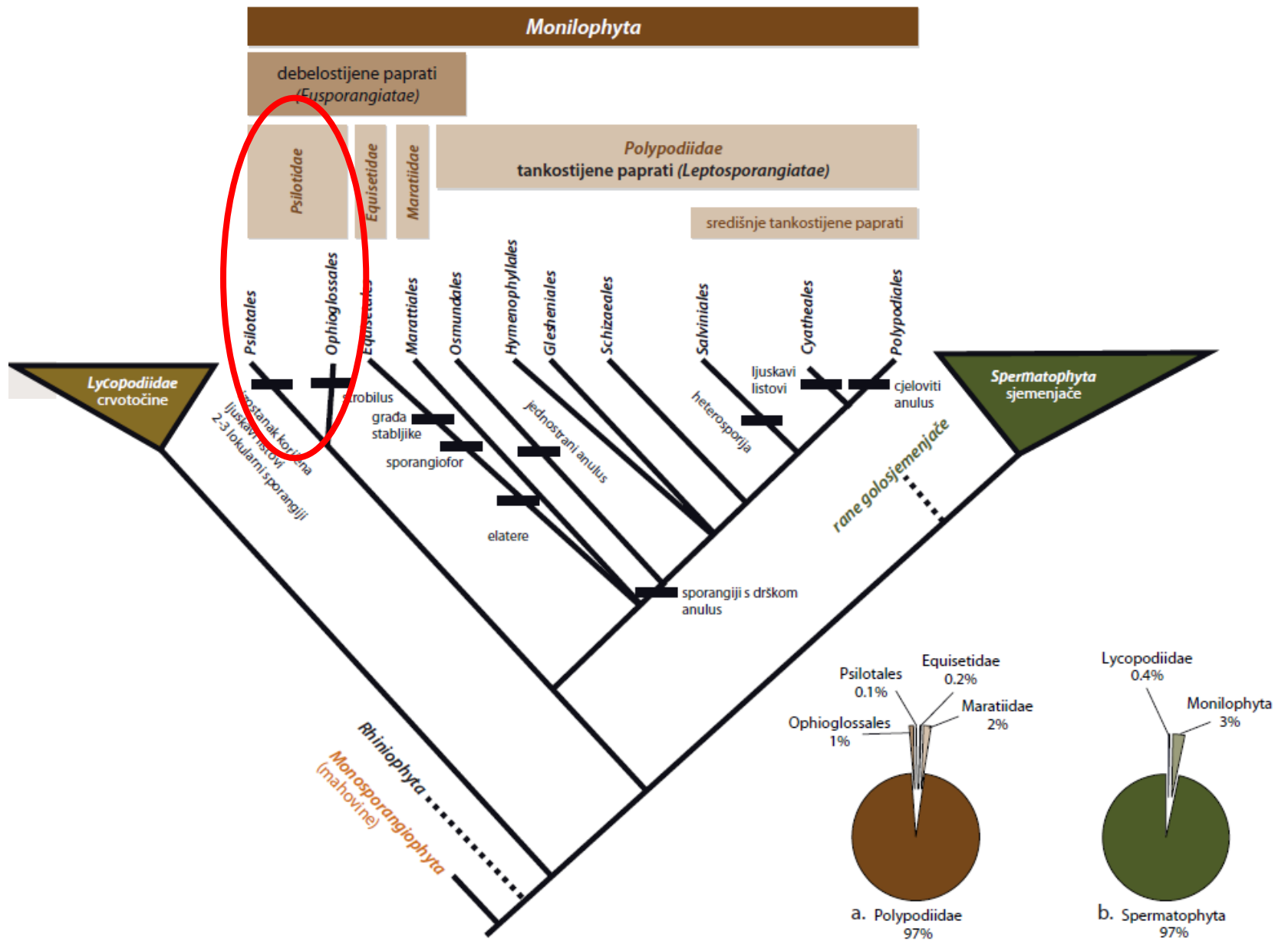
3



K: 253-255

➔ Marsilea ([video](#))





Pteridophyta

Red: *Ophioglossales*

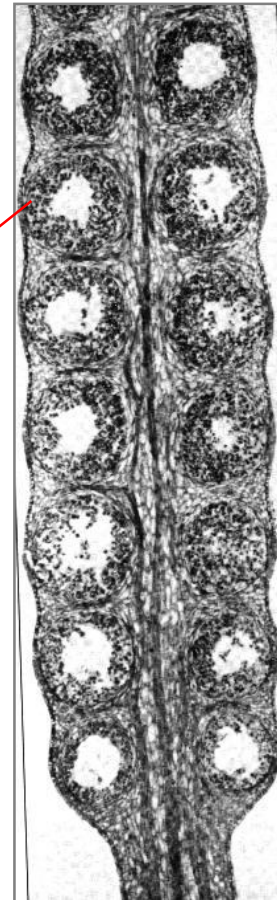
maleni broj predstavnika
neobična građa

paprati debelostjenih sporangija!

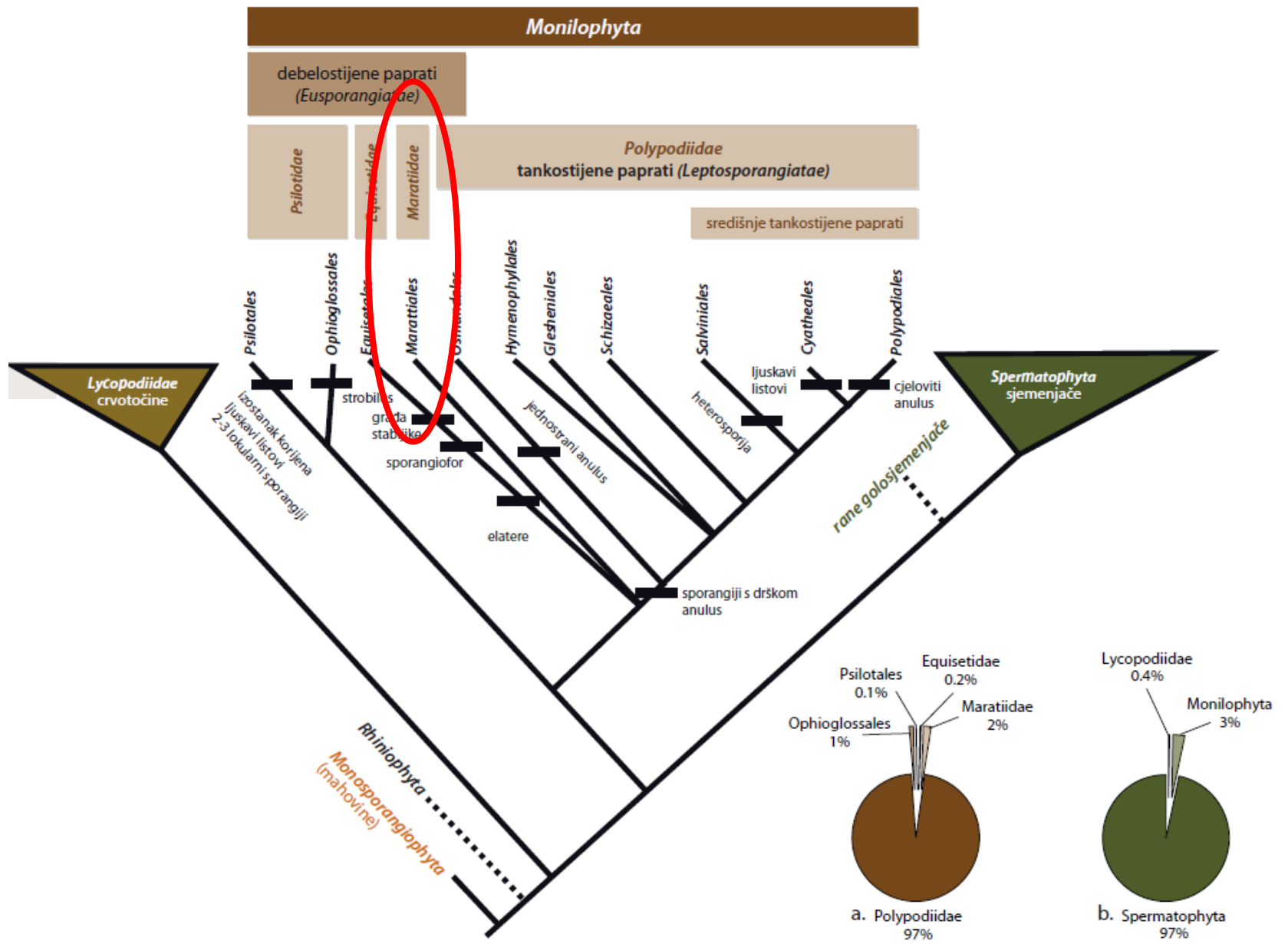


Ophioglossum vulgatum

terminalni sporangiji (strobilus)
debelostijeni sporangiji
fertilni dio lista
asimilacijski dio lista (bez palisadnog parenhima)



Botrychium matricarifolium



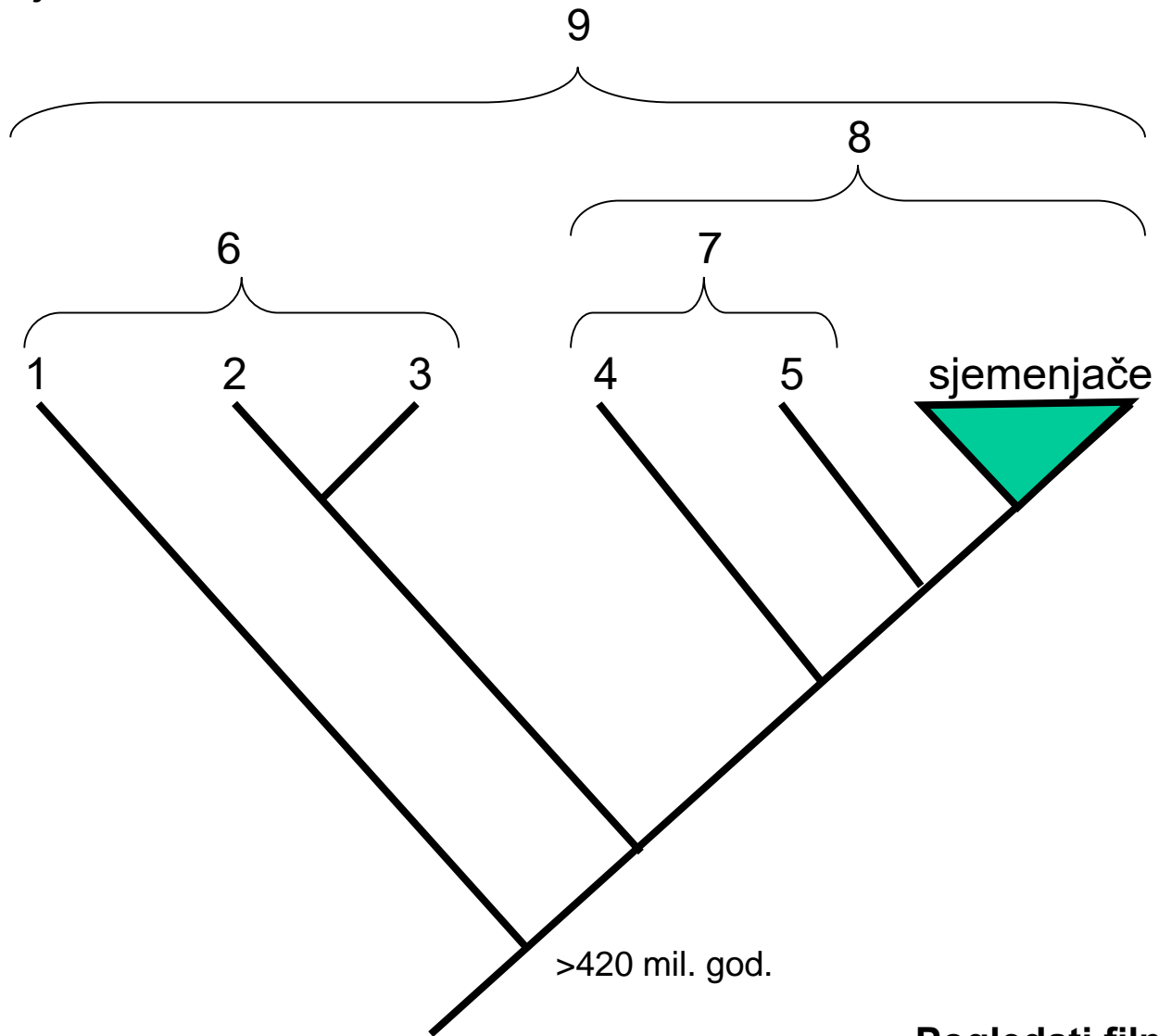
Pteridophyta

Red: *Marratiales*

- samo porodica *Marratiaceae*
- sadrži 5 rodova (*Angiopteris*, *Christensenia*, *Danaea*, *Marattia*, *Archangiopteris*) s ~150 vrsta
- istočna i jugoistočna Aziju, Australaziju i Polineziju, dok je rod *Marattia* pantropski



Ispitno pitanje



Pogledati film na webu!