

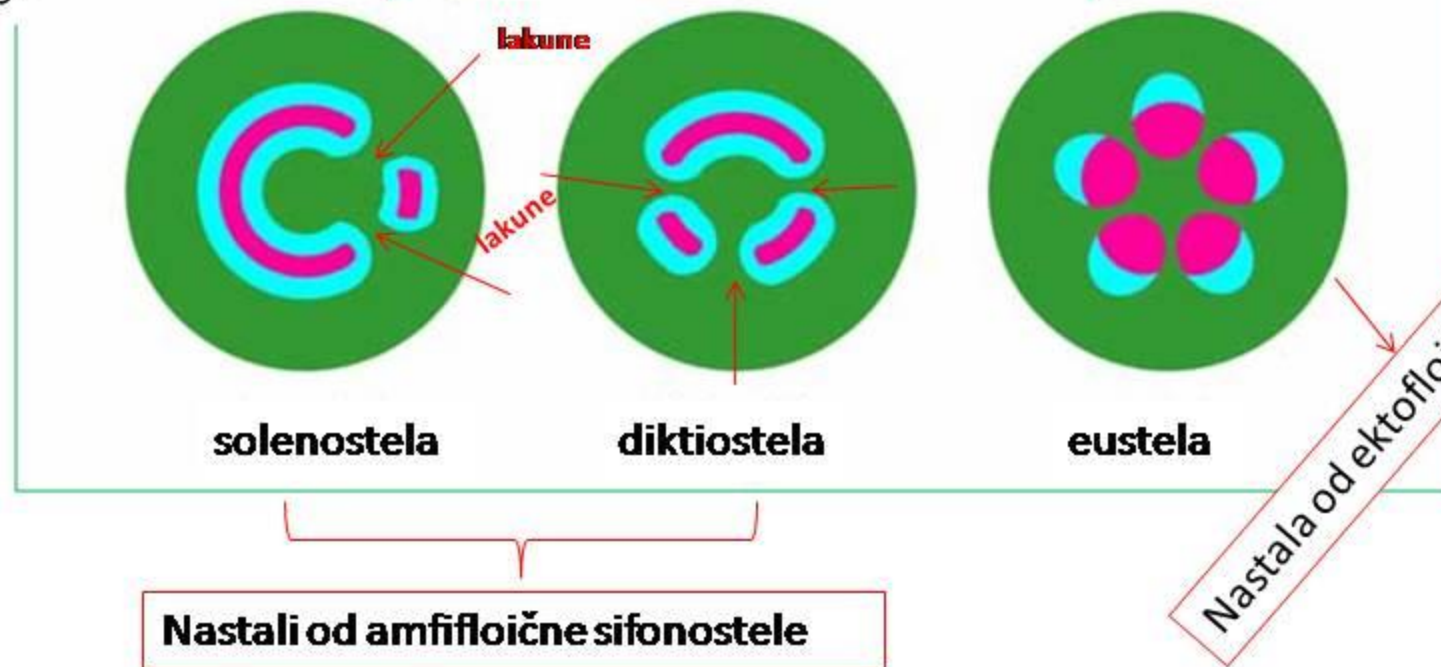
Euphyllphyta

Monilophyta

Spermatophyta

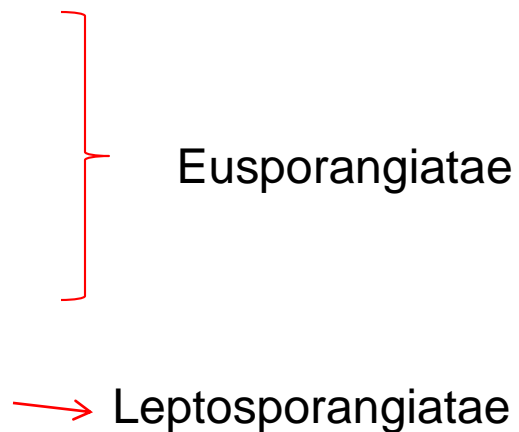
Protostela
Sifonostela

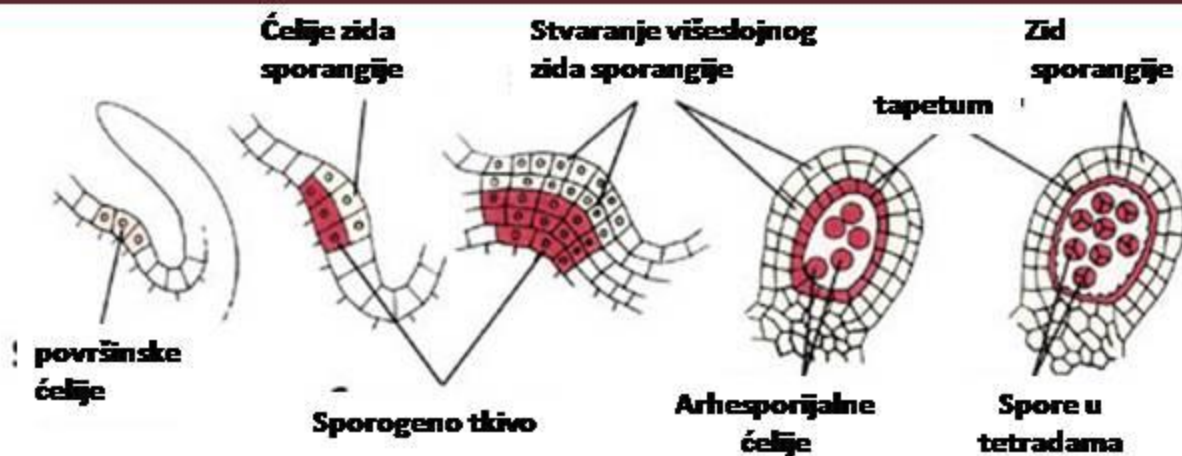
Tipovi sifonostele



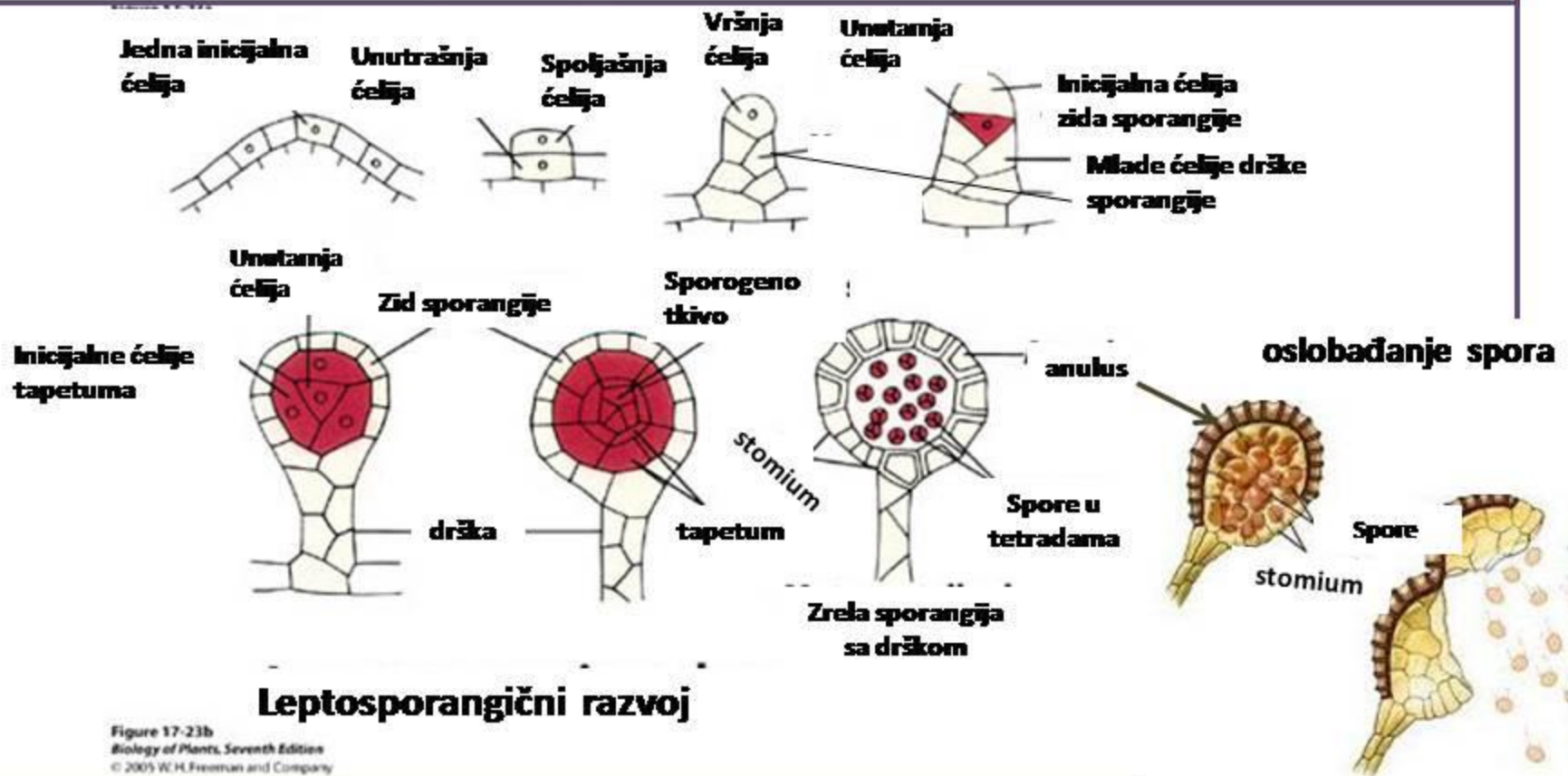
- **solenostela** – najprimitivniji tip sifonostele, u kojoj se javlja srž koja je okružena floemom i ksilemom (tipična za neke primitivne paprati).
- **diktiostela** – slična solenosteli, ali sa više lakuna u prstenu od floema u ksilema, na mjesti kojih se javljaju listovi (sreće se samo kod paprati).
- **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
- Eusporangiatae
- Leptosporangiatae
- 



Eusporangični razvoj



Leptosporangični razvoj

Psilotidae

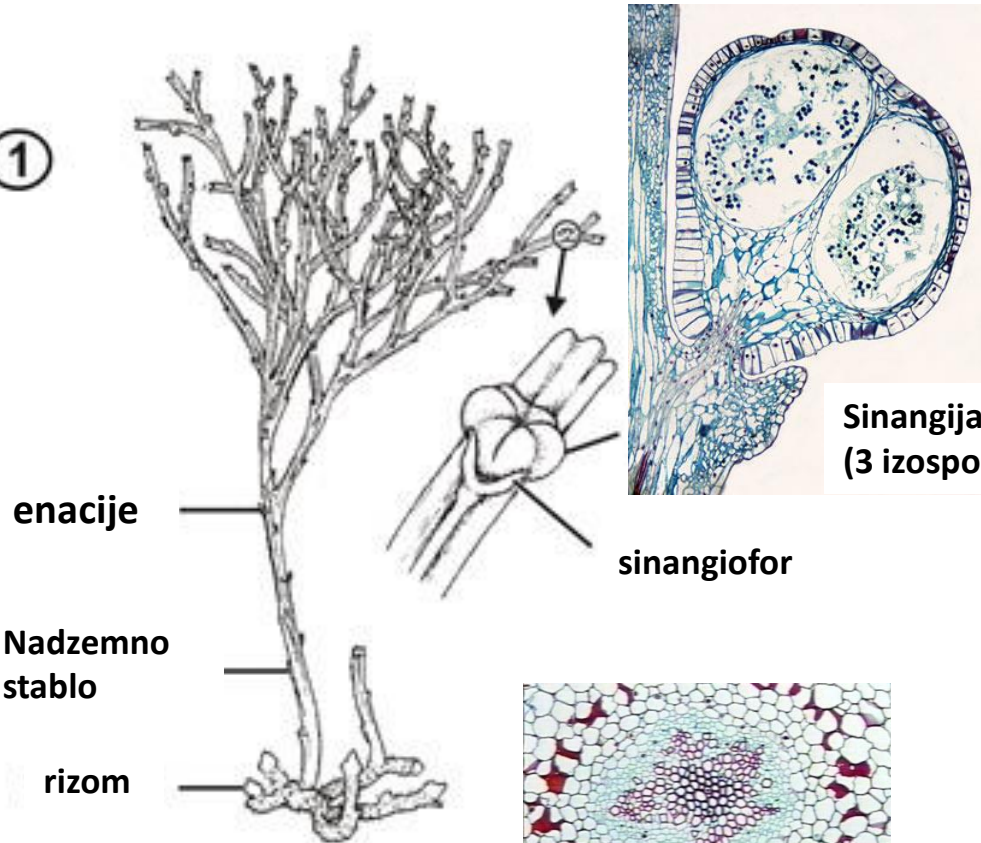
(Divisio: Psilotophyta)

- Psilotales
- Ophioglossales

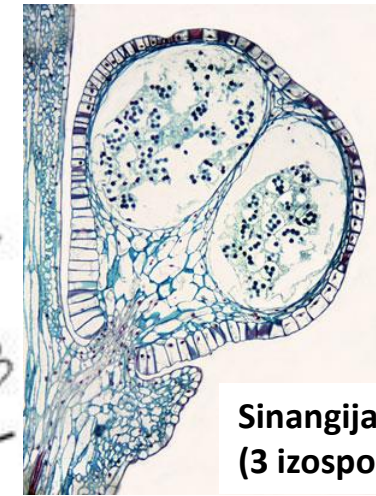
Psilotales

Potpuno odsustvo korjena!!!

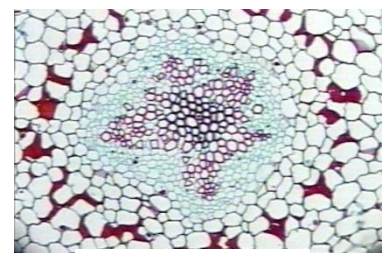
①



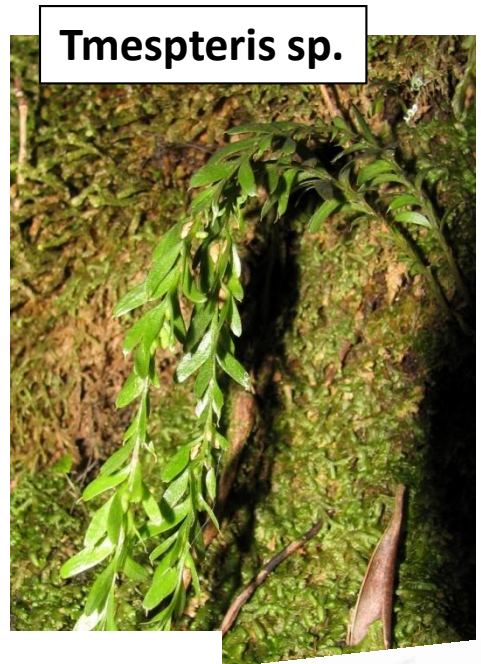
Psilotum sp.



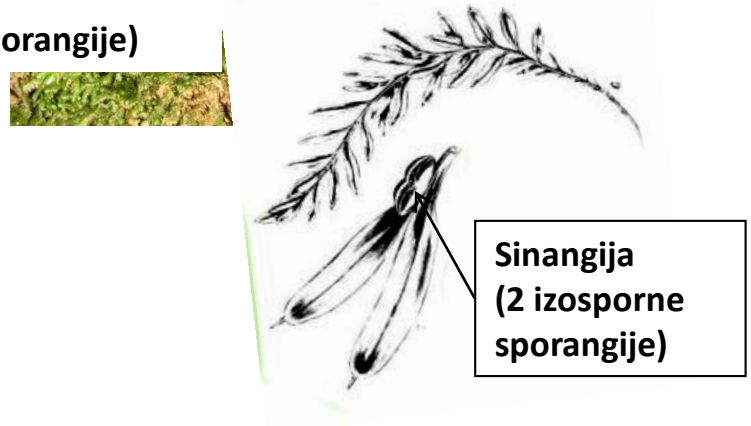
**Sinangija
(3 izosporne sporangije)**



aktinostela

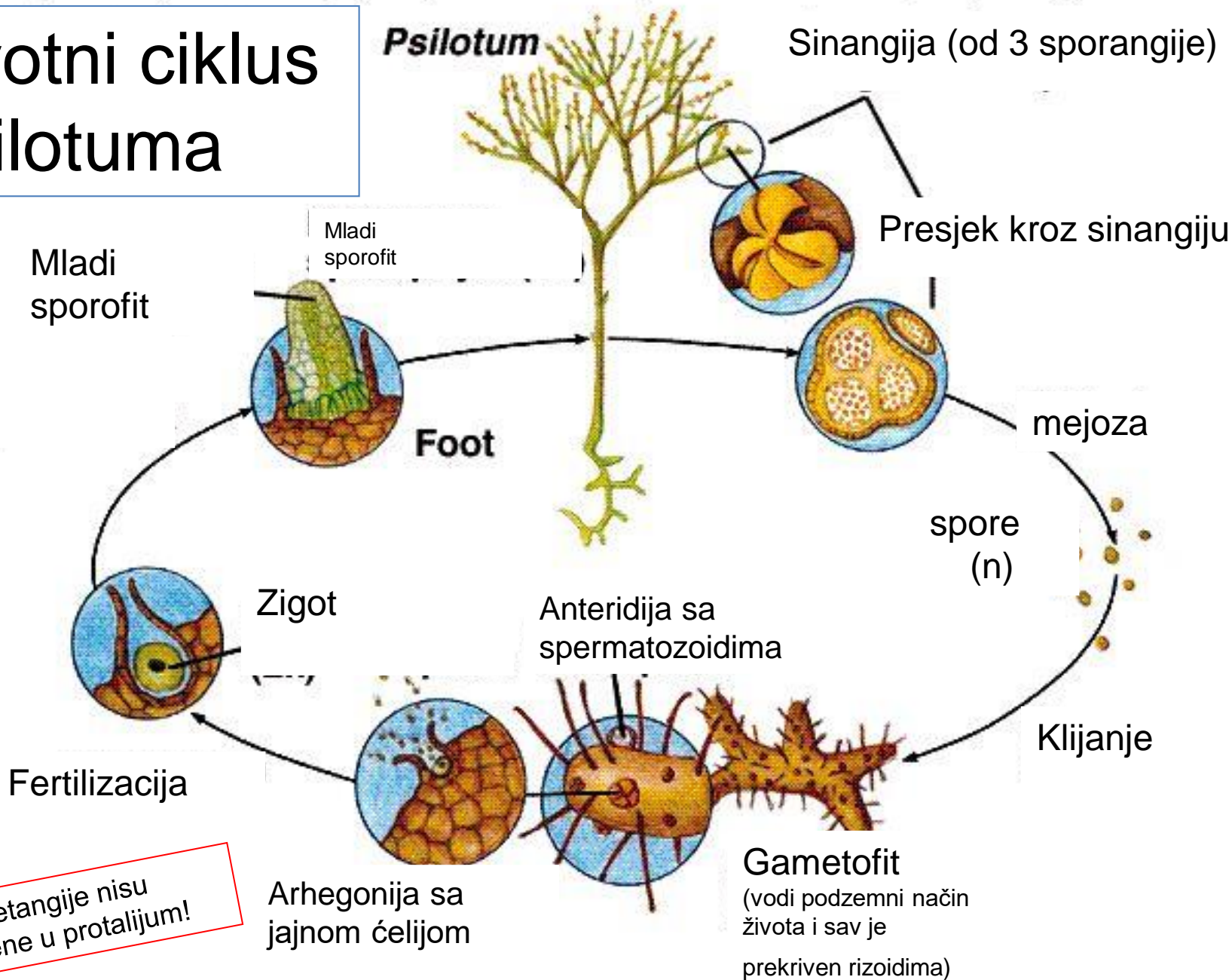


Tmespteris sp.



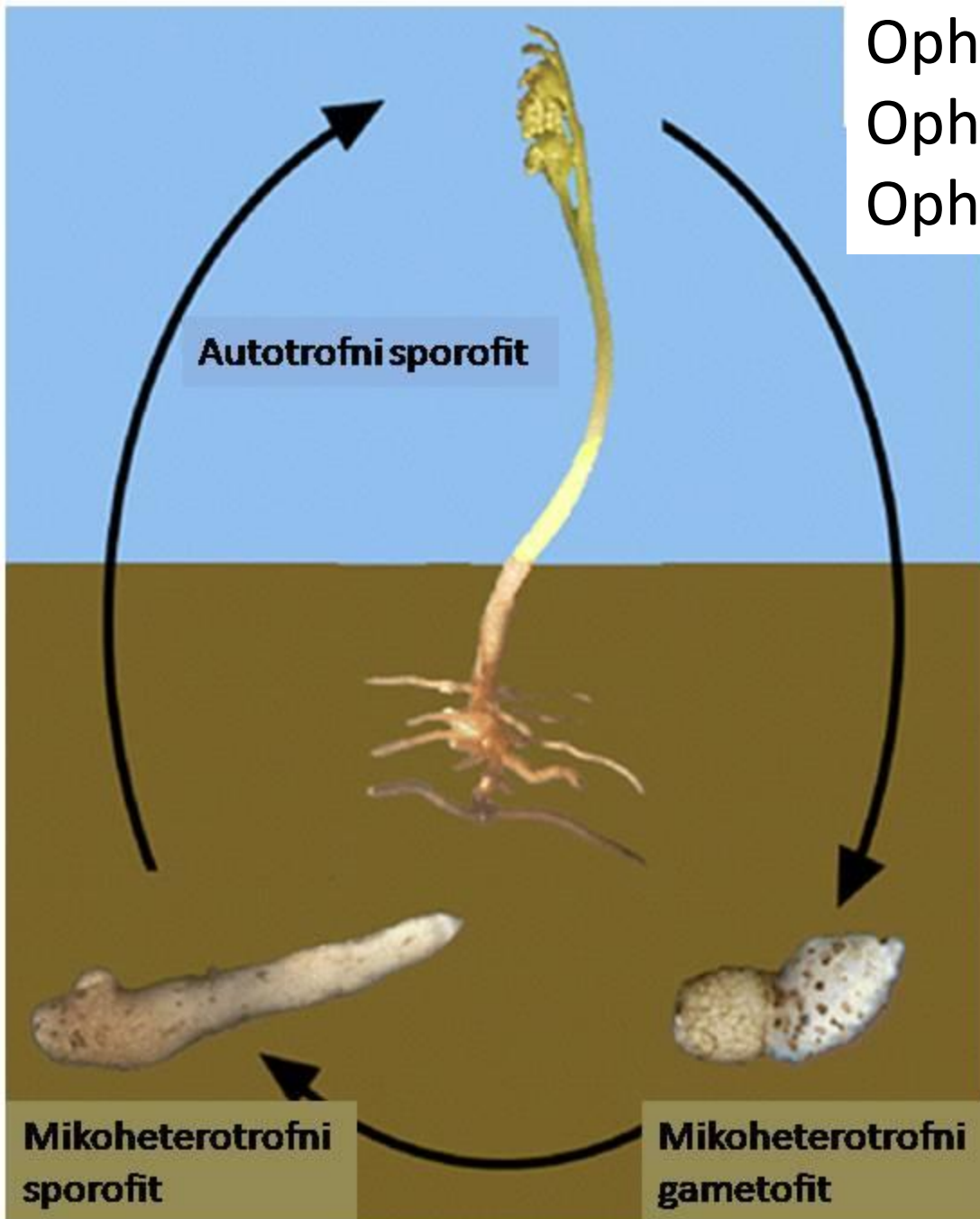
**Sinangija
(2 izosporne sporangije)**

Životni ciklus Psilotuma



*Gametangije nisu uvučene u protalijum!

Ophioglossales
Ophioglossaceae
Ophioglossum vulgatum



Fam. Ophioglossaceae



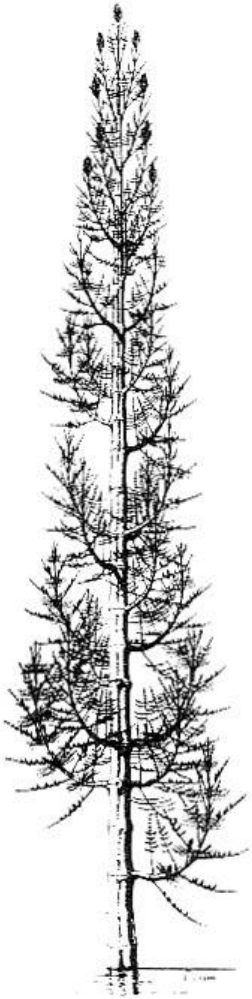
Ophioglossum ssp.
Sporofil i trofofil jednostavni!



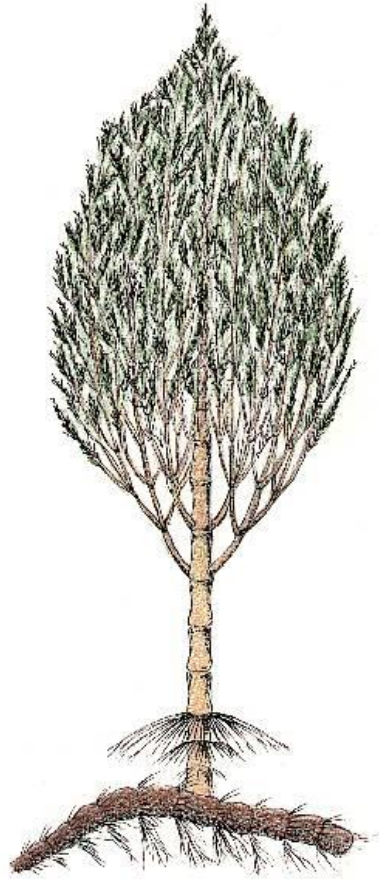
Botrychium lunaria
Sporofil i trofofil granati!

Equisetidae

(Div. Equisetophyta)



Pseudobornia ursina



Calamites spp.



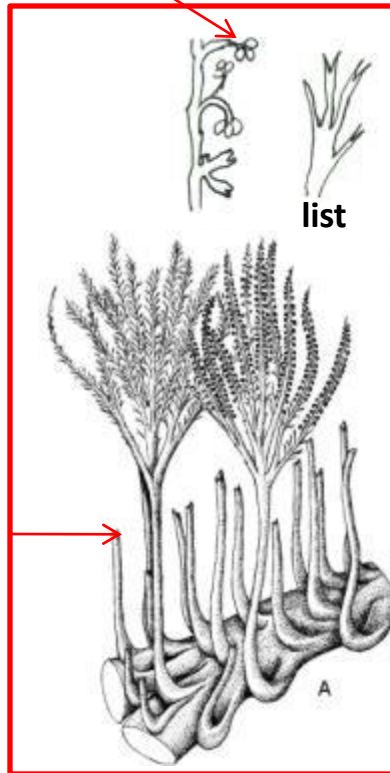
Equisetum arvense

Podjela na redove

- Hyeniales (†)
- Sphenophyllales (†)
- Calamitales (†)
- Equisetales

o. Hyeniales fam. Hyeniaceae

Tri sporangije na
dihotomo granatom
sporangioforu



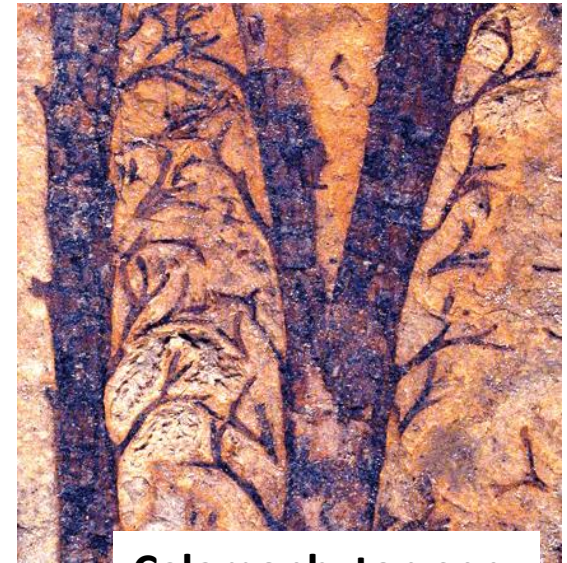
Hyenia spp.

Člankovitost
stabla nije
izrazena

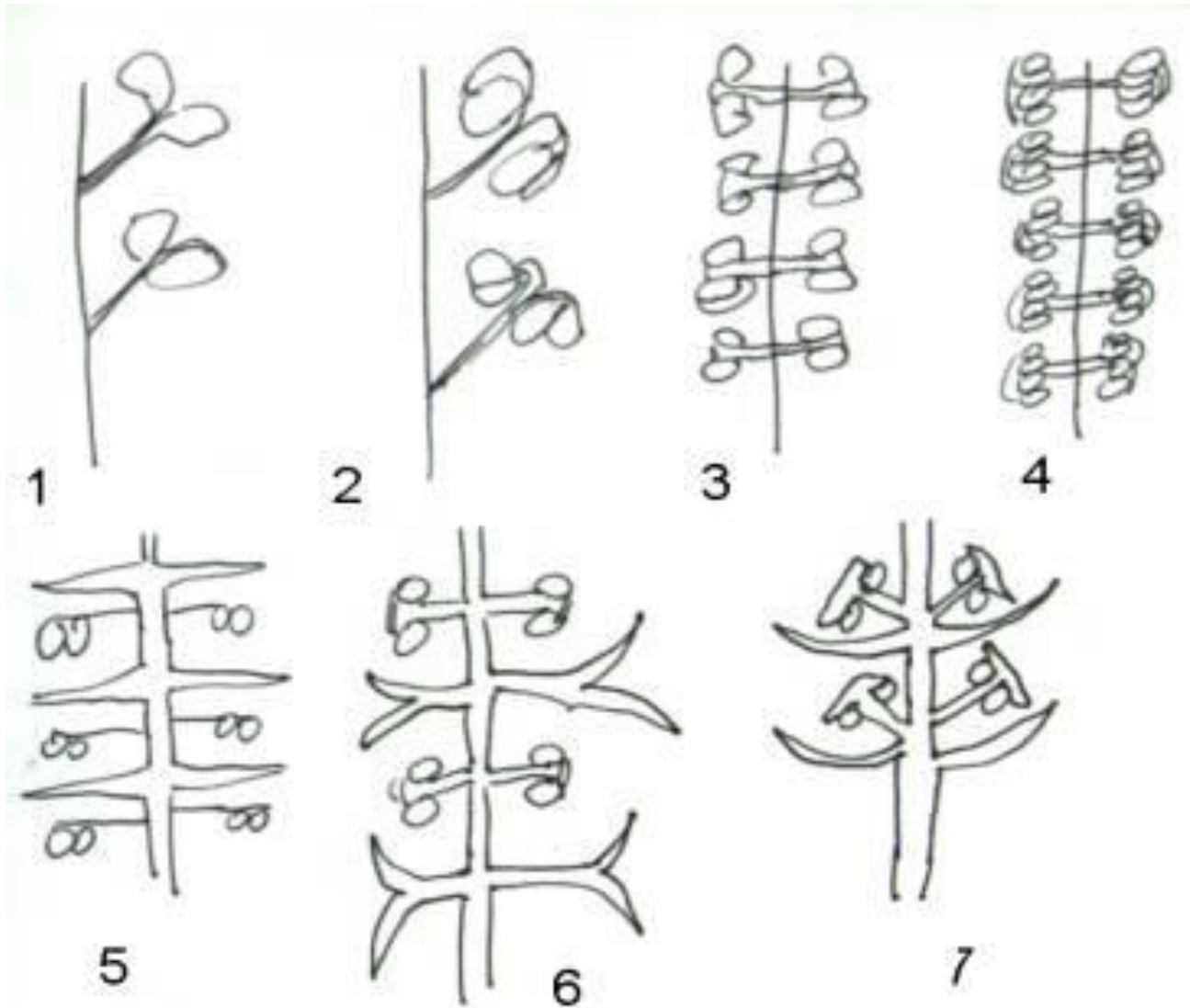


Calamophyton spp.

Sporangije
pojedinačne



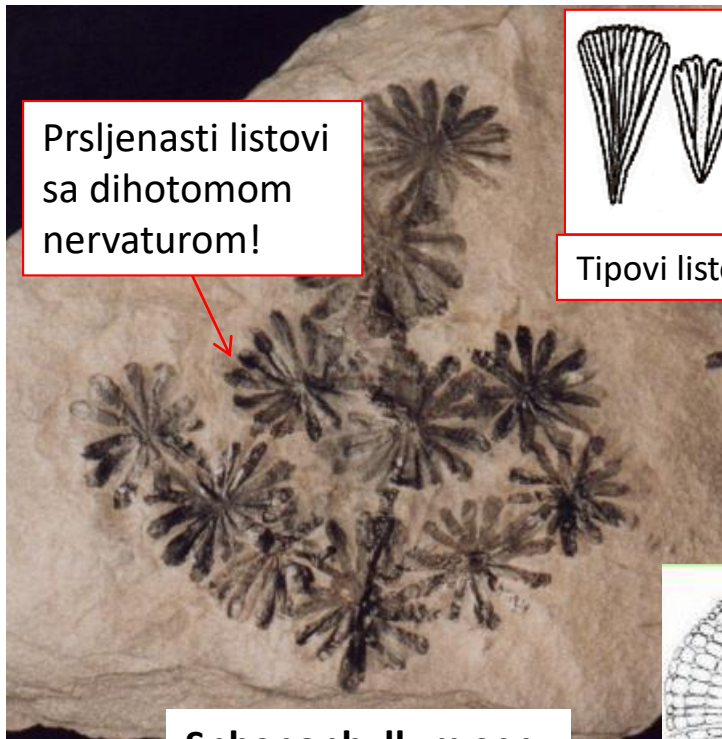
**Calamophyton spp.
fosilni nalaz**



1 – Calamophyton 2 – Hyenia 3- Archaeocalamites 4- Equisetum
5 – Lingularia 6 – Calamostachys 7 – Paleostachys

o. Sphenopyllales

fam. Sphenophyllaceae



Prsljenasti listovi
sa dihotomom
nervaturom!

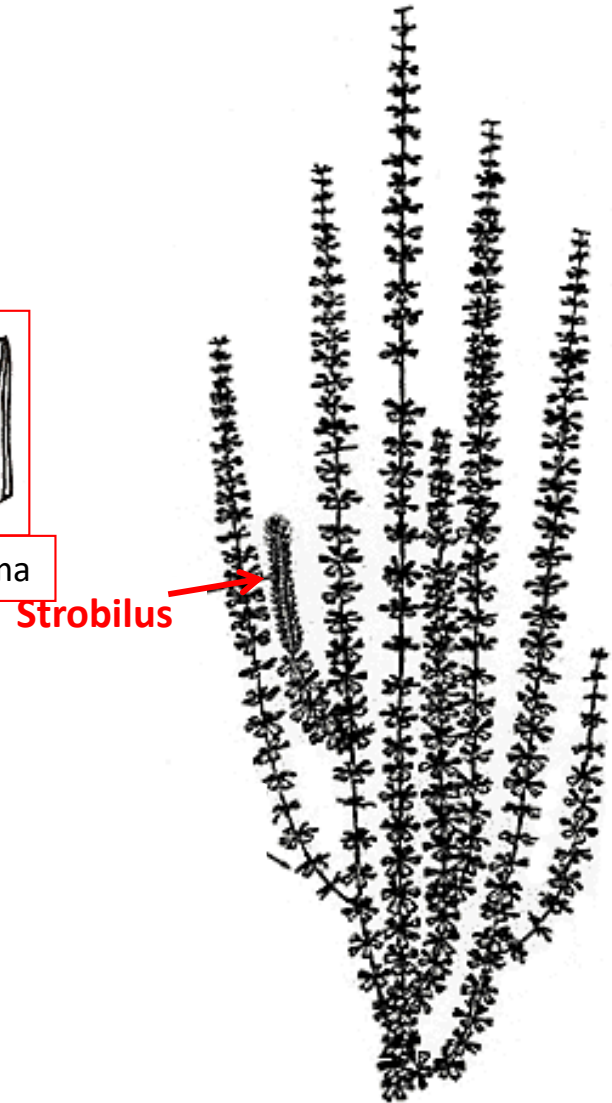
Sphenophyllum spp.
fossilni ostaci



Tipovi listova kod Sphenophylluma



Aktinostela
(triarhna)

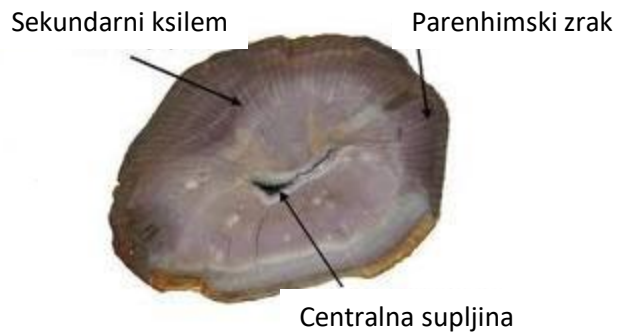


Sphenophyllum spp.
rekonstrukcija

o. Calamitales fam. Calamitaceae

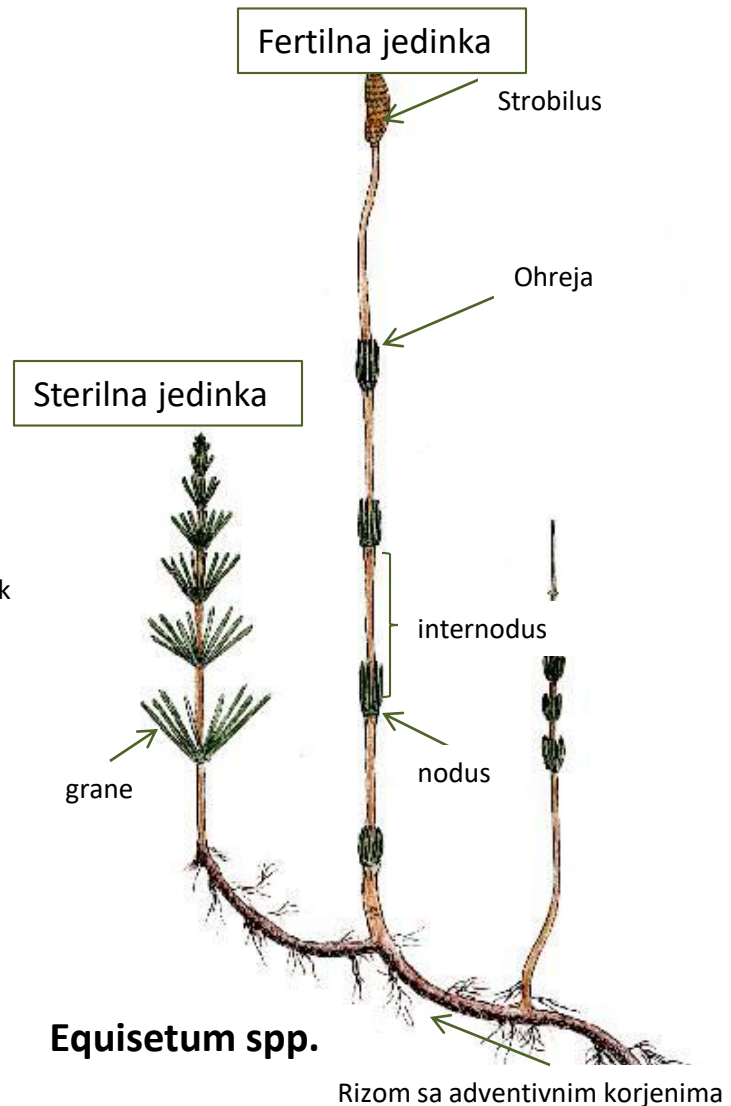


Prsljenovi sa
sporonosnim i
vegetativnim listovima
su se naizmjenicno
smjenjivali.



Calamites spp.

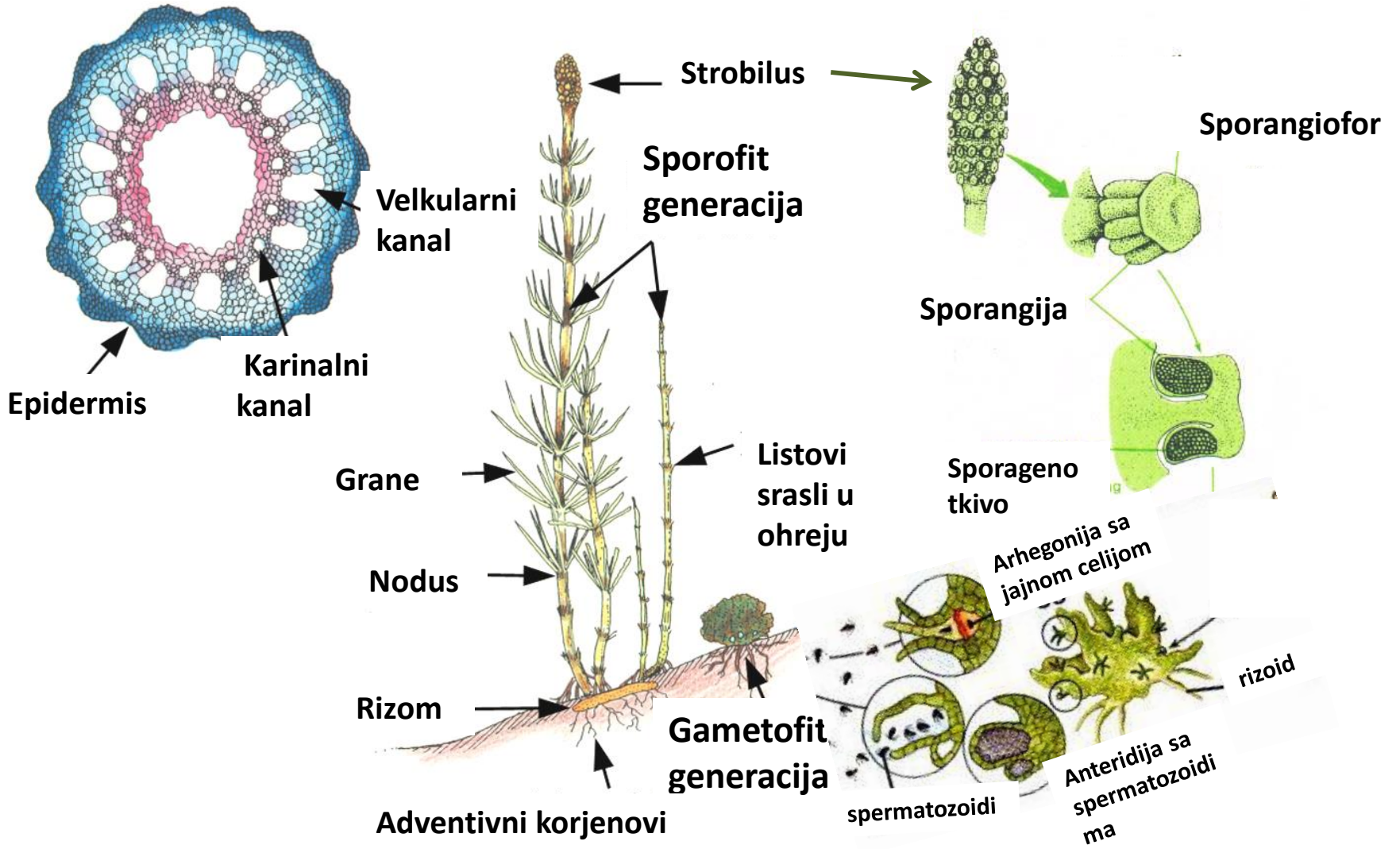
o. Equisetales fam. Equisetaceae



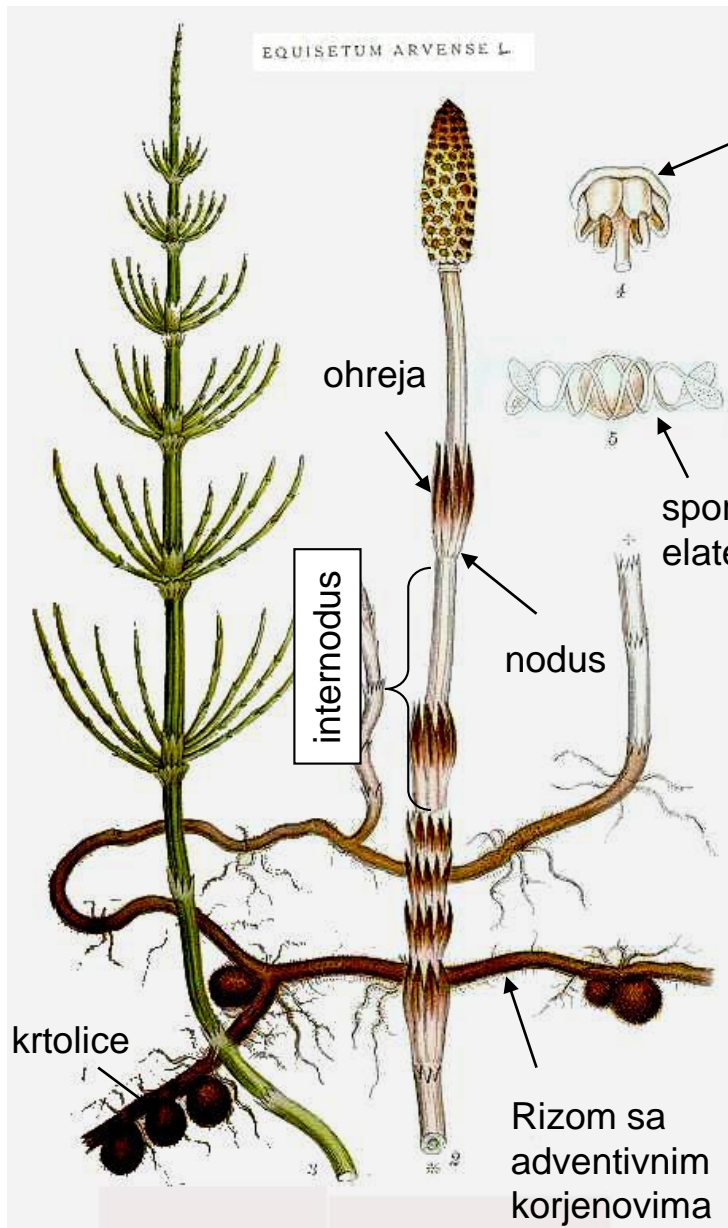
Equisetum spp.

Presjek kroz stablo

Equisetum - ciklus razvica



Morfološke odlike vrste *Equisetum arvense*



sporangiofor

Člankovitost građe

Odsustvo trajnog primarnog korjena

Redukovani listovi

Ohreje

Elatere

Izosporija

spora sa elaterama

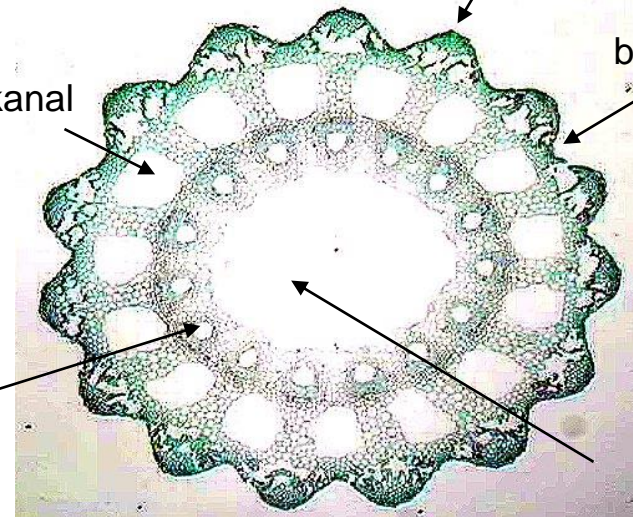
rebra

brazde

valekularni kanal

karinalni kanal

centralna šupljina



Taksonomski markeri

- Dimorfizam fertilne i sterilne jedinke
- Broj zubaca u ohreji
- Broj rebara ili brazda na stablu i vaskularnih šupljina
- Oblik vrha klasića

Izražen dimorfizam fertilne i sterilne jedinke

Equisetum arvense



6-12 zubaca u ohreji



Equisetum telmateia



20-30 zubaca u ohreji

Equisetum sylvaticum



Grane pršljenasto granate

Equisetum pratense



Grane jednostavne



Dimorfizam fertilne i sterilne jedinke nije izražen

STROBILUSI TUPI



Equisetum palustre



Zubići bez brazde i sa širokim obrubom



Equisetum fluviatile

STROBILUSI ŠILJATI



Zubići ,ohreje opadaju

Equisetum hiemale



Zubići ,ohreje trajni

Equisetum variegatum