

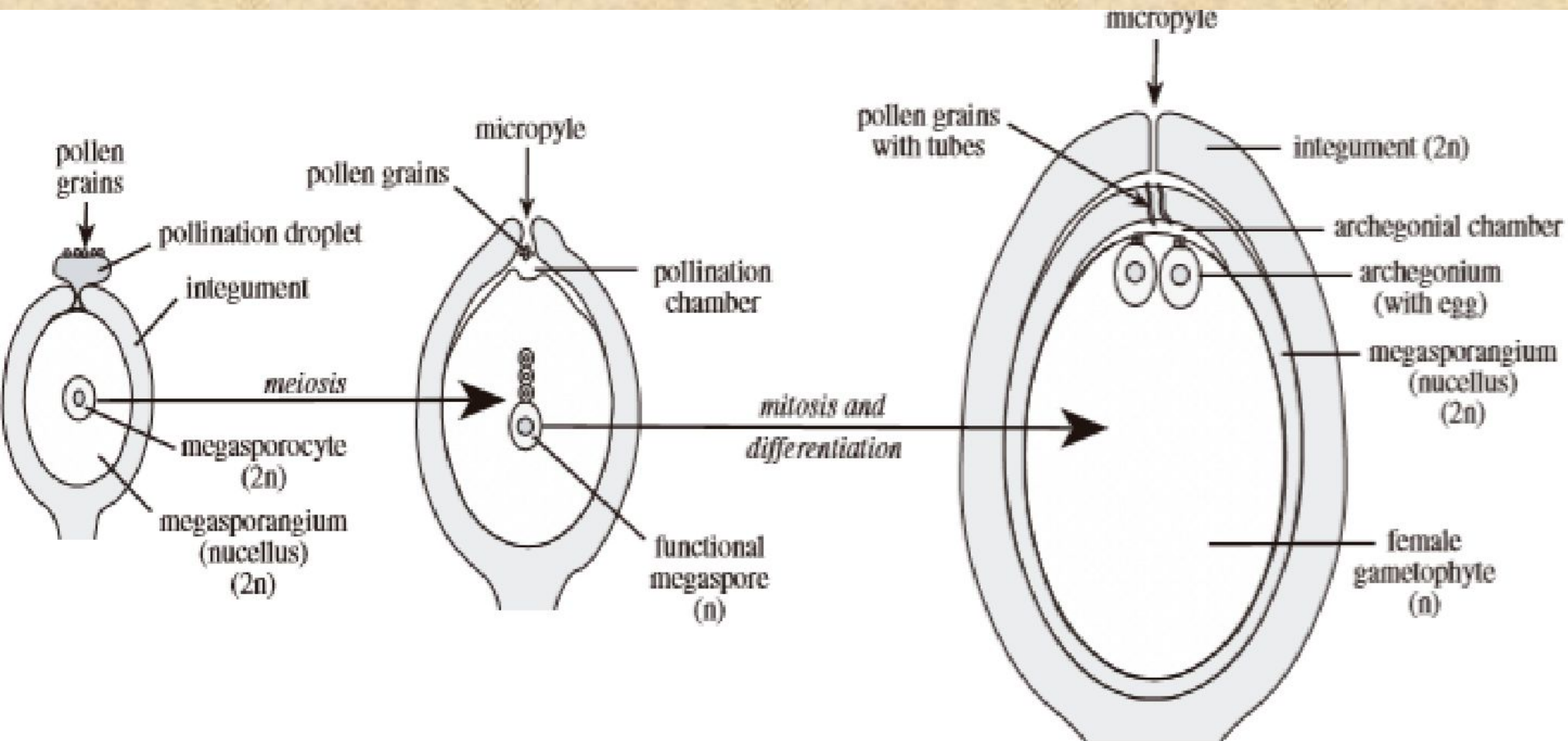


Голосеменные

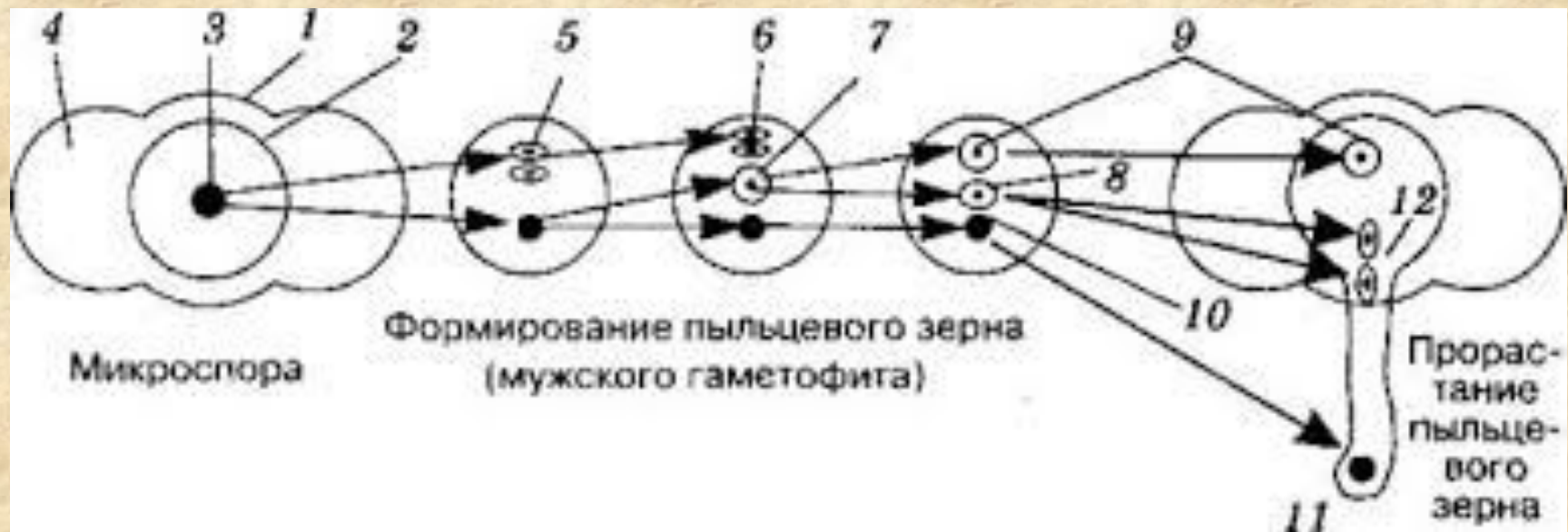
Задания (слайды 1-4):

1. Используя учебники, разобраться с циклом развития сосны разобраться

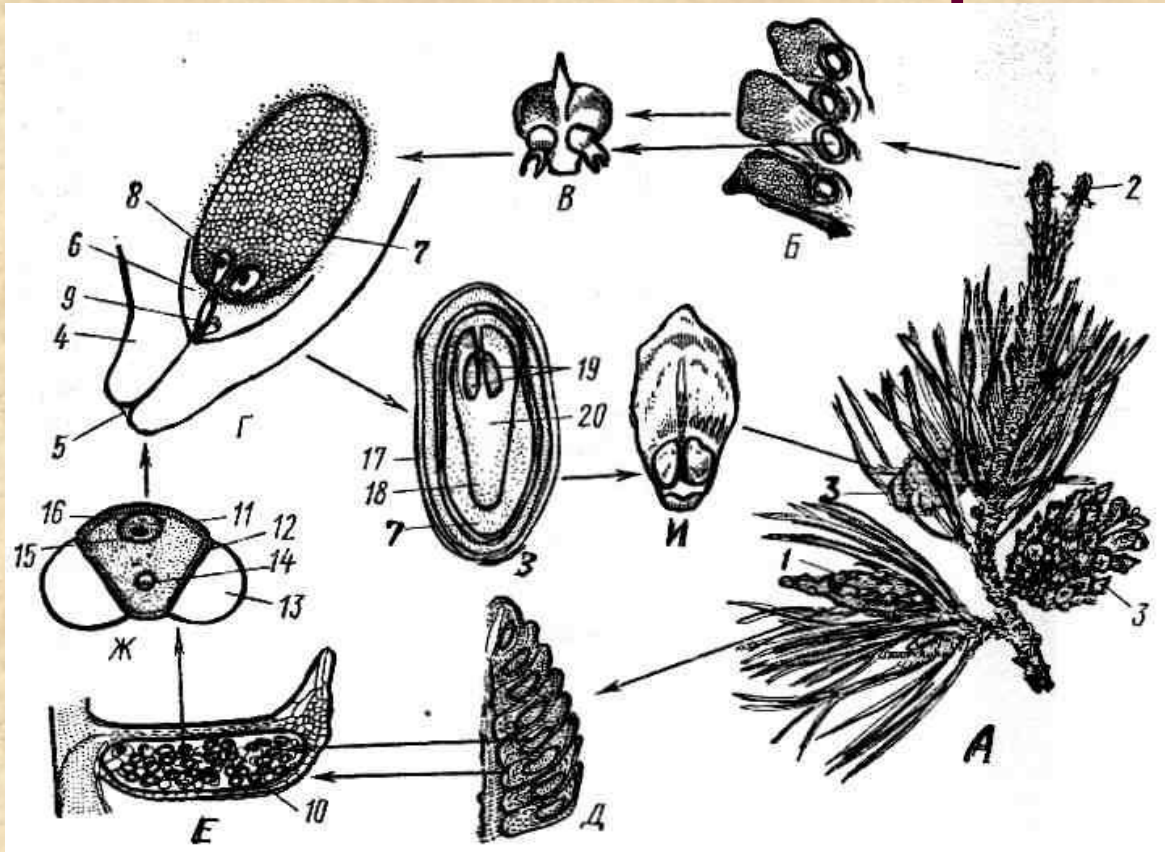
2. Зарисовать и подписать стадии мегаспорогенеза и мегаметпгенеза



3. Зарисовать и подписать стадии микроспорогенеза и микрогаметогенеза



4. Зарисовать цикл развития сосны в целом, подписать стадии спорофита и гаметофита.



Cycad diversity (Zamiaceae)



A. *Macrozamia moorei*

B. *Bowenia spectabilis*

C. *Lepidozamia peroffskyana*

D. *Stangeria eriopus*

E. *Encephalartos ebomboensis*

Ginkgophyta— Ginkgo



• Male



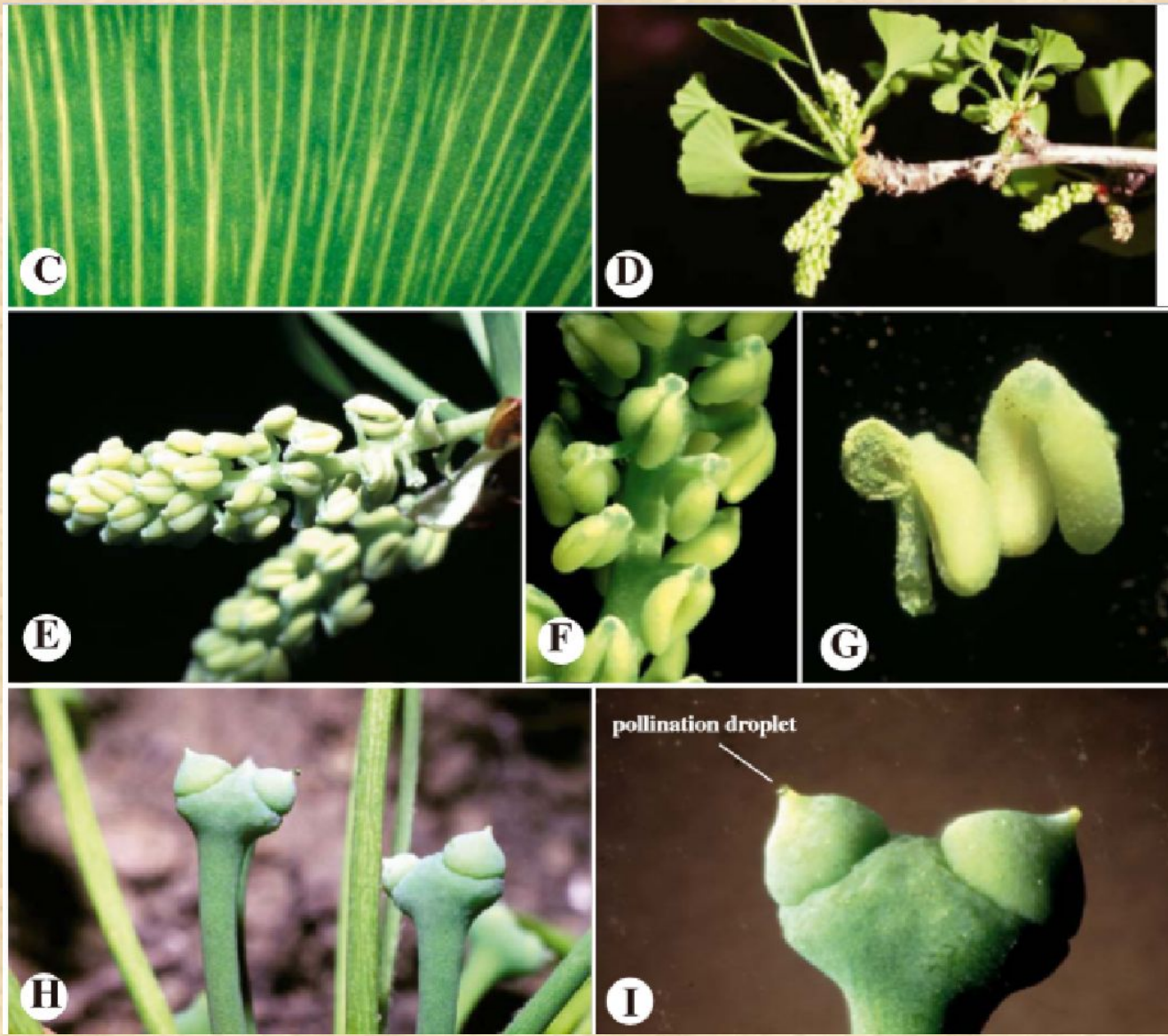
• Female

Ginkgo biloba. A,B. Vegetative growth. Note fan-shaped leaves, clustered into short shoots. C.

Leaf close-up, showing dichotomous venation. D. Male tree bearing male cones.

E. Male cone. F,G. Close-up of male sporangia, born in pairs on stalk arising from central axis of male cone.

H. Female plant bearing stalk with pair of ovules. I. Close-up of ovule pair. Note pollination droplet from micropyle.



Conifers diversity



Needle-like leaves



Scale-like leaves

In some conifers the leaves are clustered into short shoots, in which adjacent internodes are very short in length.



Male and female cones of pine





A. Shoot with young fascicles.

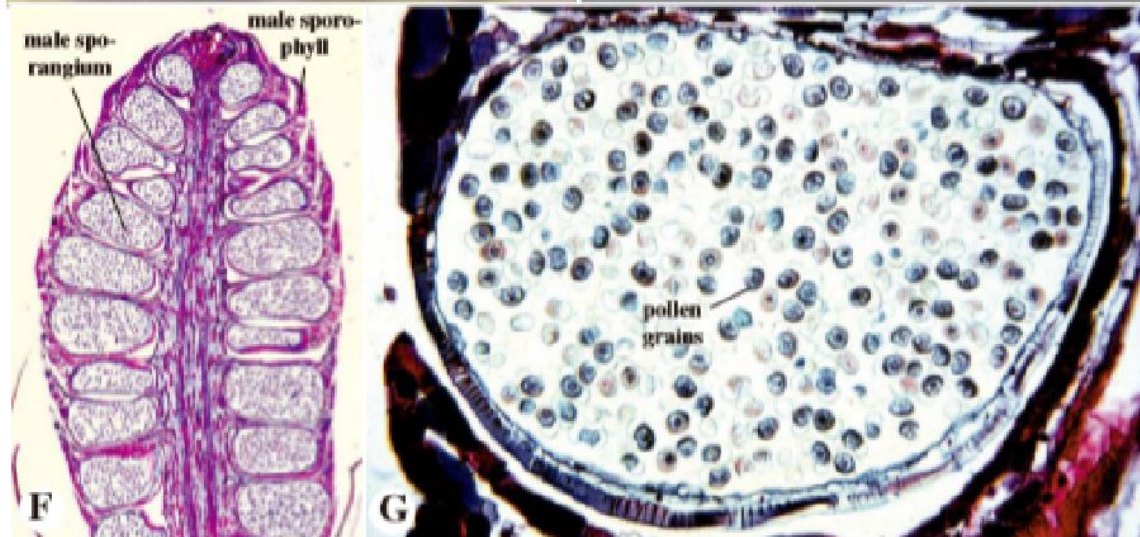
B. Branch, showing scale leaves and fascicles.

C. Apex of branch with fascicles and male cones.



D. Male cones, close-up.

E. Male sporophylls of male cones, each with two male sporangia.



F. Male strobilus, longitudinal section, showing microsporangia and subtending micro-sporophylls.

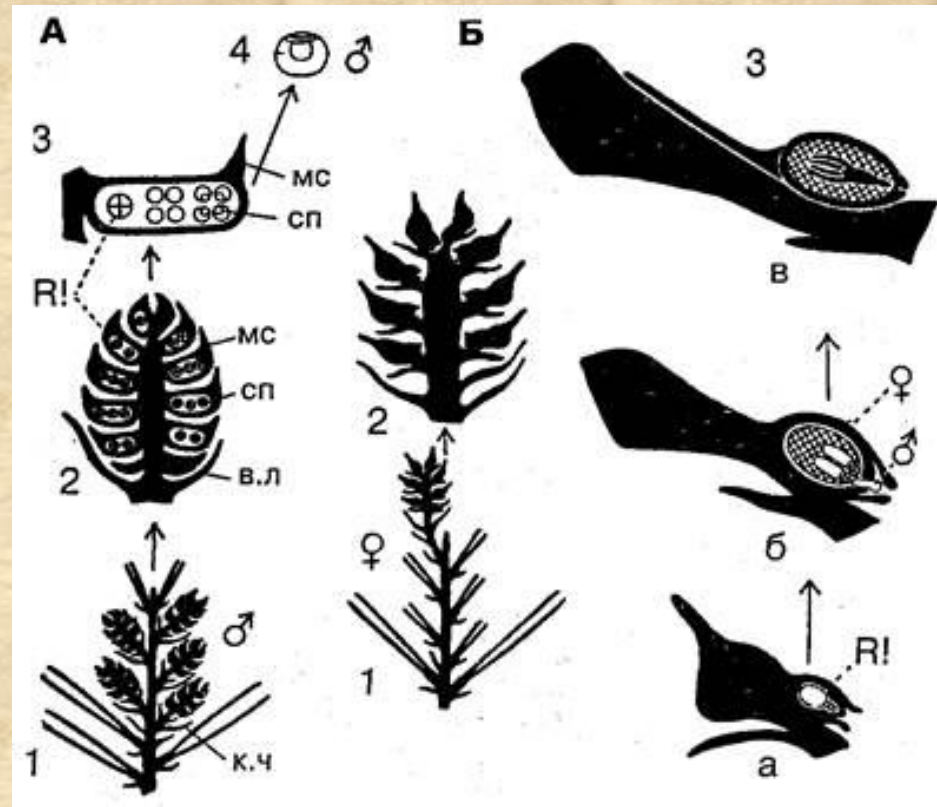
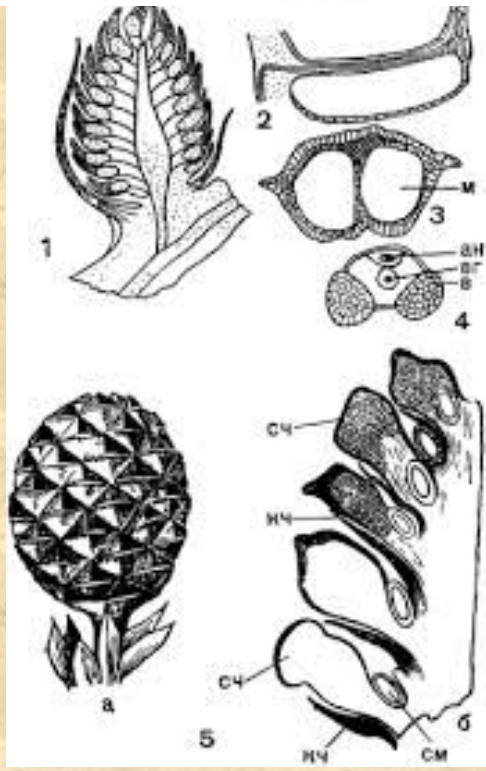
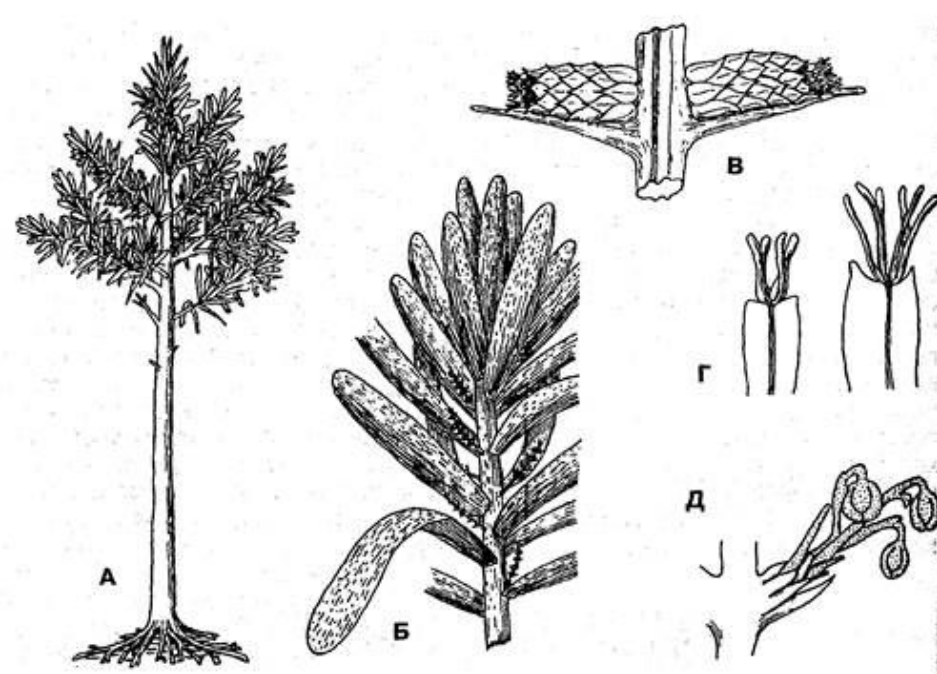
G. Close-up of microsporangium, full of mature pollen grains.

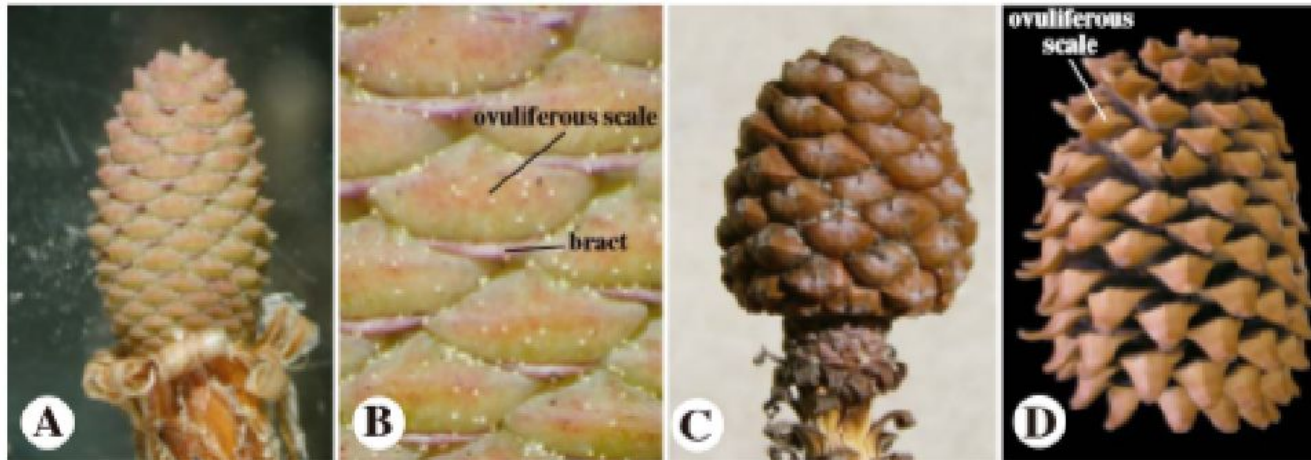
← Cordaits

Pine



Araucaria



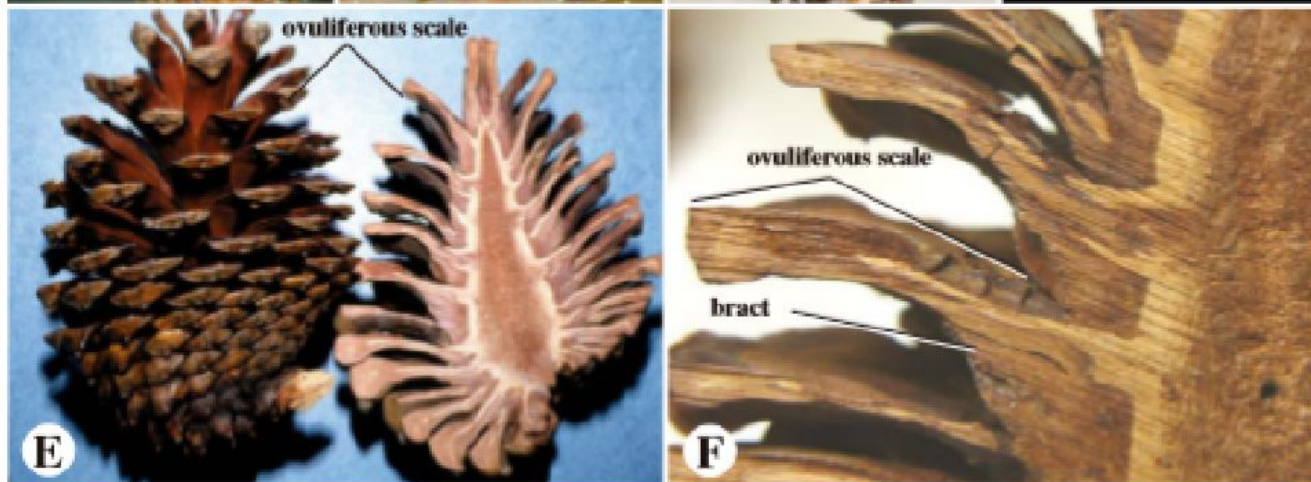


A. Young female cone, at time of pollination.

B. Close-up, showing ovuliferous scales and bracts. Note pollen grains.

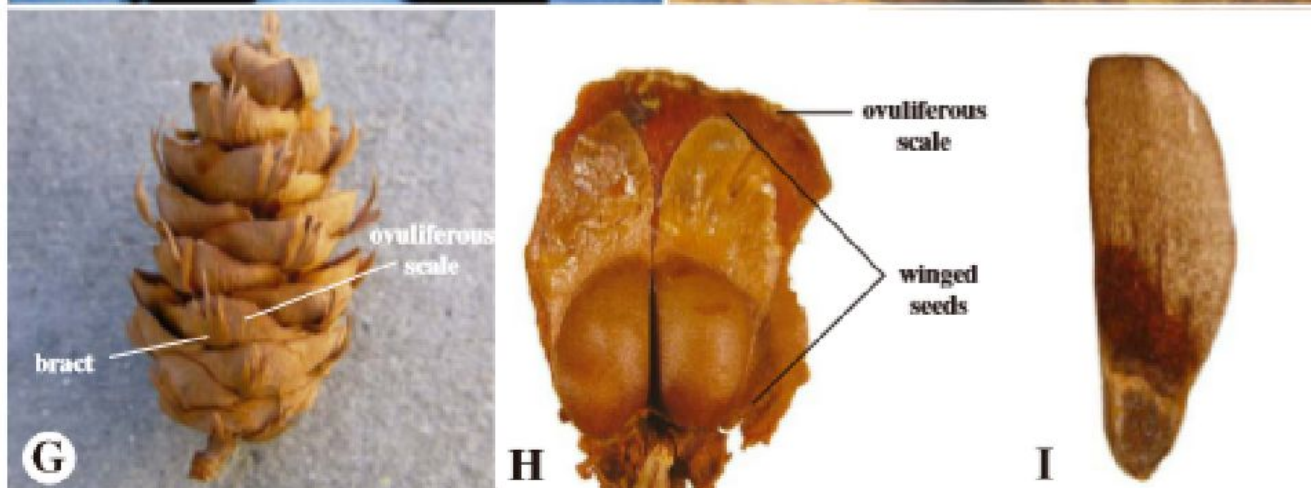
C. One-year-old female cone.

D. *Pinus coulteri*, coulter pine, mature female cone (most massive of any species).



E. Female pine cones, right in section.

F. Close-up of longitudinal section, showing bract and ovuliferous scale.



G. *Pseudotsuga* sp. female cone. Note elongate bracts and wide ovuliferous scales.

H. Immature ovuliferous scale, top view, showing two winged seeds.

I. *Pinus*, mature winged seed.



ATHROTAXIS



ATHROTAXIS and **CUNNINGHAMIA** has prevailing bracts in cones. Ovuliferous scales are reduced very much.



CUNNINGHAMIA



Araucariaceae



Cupressaceae



Podocarpaceae



Taxaceae

- *Taxus baccata*



Pinaceae





Gnetales:

- Gnetaceae
- Welwitschiaceae
- Ephedraceae

Ephedra

Gnetales



Ephedra

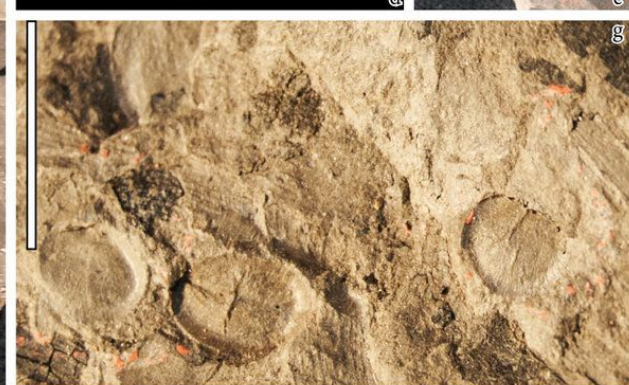
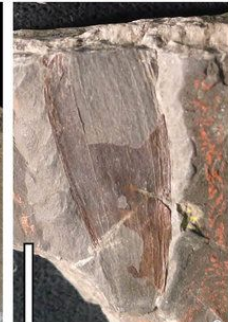
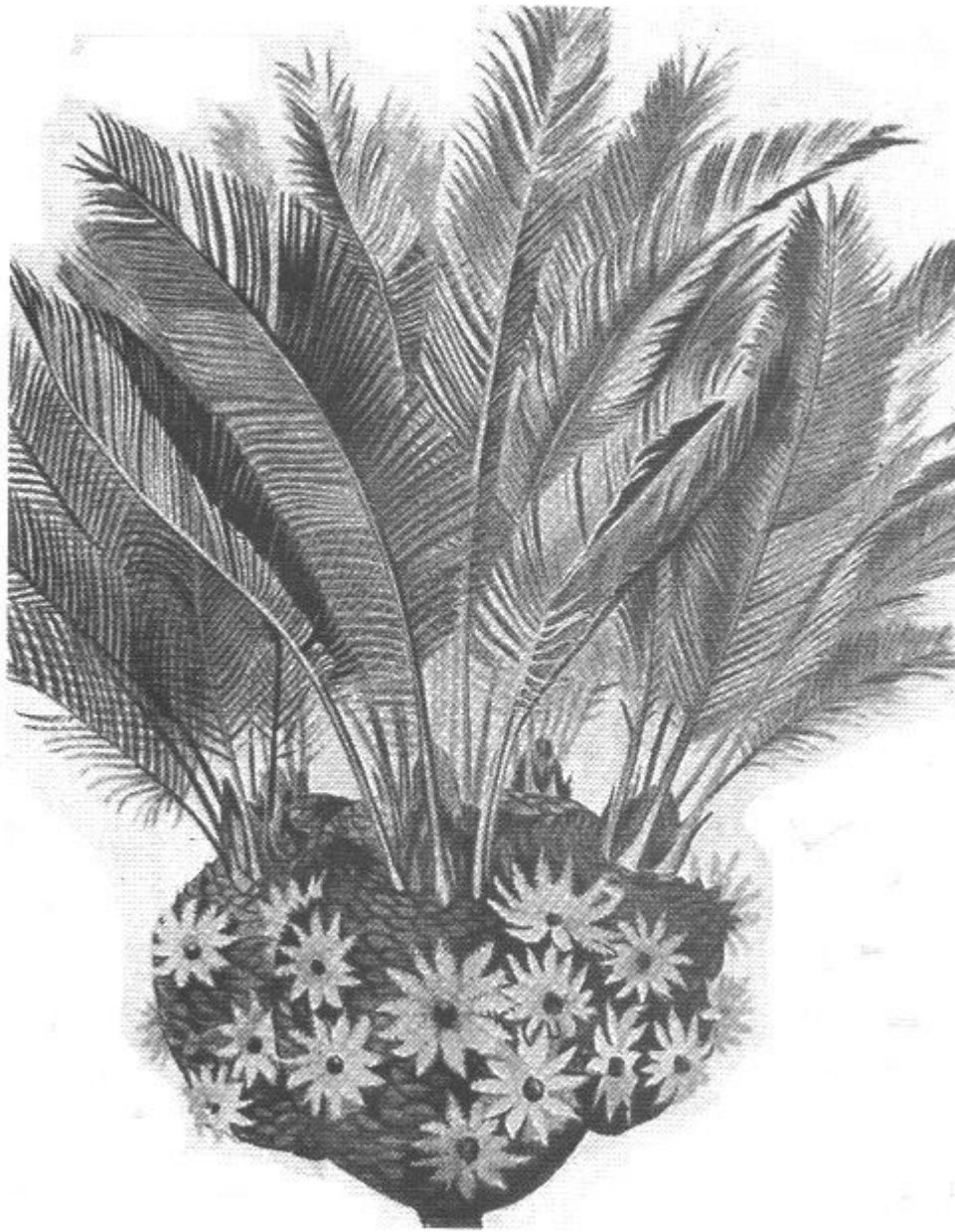
Gnetaceae



**Welwitschiaceae,
Welwitschia mirabilis**



Bennettitales



Cordaitales



Cordaites



Fossil



Reconstruct