GYMNOSPERMS

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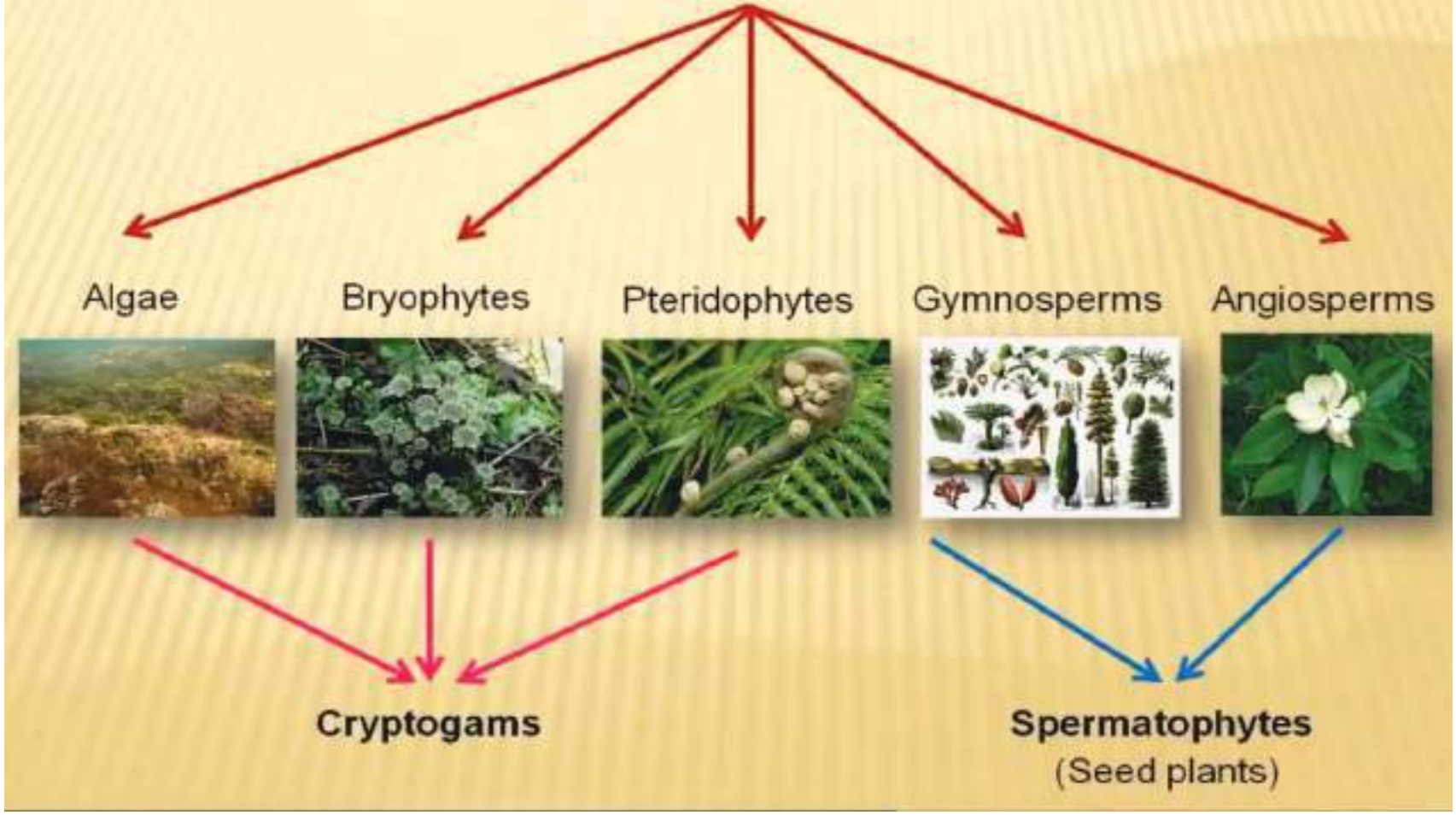
Plant kingdom



Gymnosperms

- They **DO NOT** produce flowers or fruits.
- They produce only seeds.

cone

seed

Gymnosperms

General characteristics

- They are the primitive vascular seed plants.
- They form naked seeds.
- The main plant body is diploid and sporophyte.
- Their leaves have thick cuticle and sunken stomata which are adaptations to withstand extreme temperatures, wind and humidity.
- They have tap root system.
- They are heterosporous.
- They have male and female cones.
- They show polyembryony.

Gymnosperms

- They are the primitive seed plants.


Pinus sp. (Pine tree)


Cycas sp


Ginkgo biloba


Gnetum sp.

Gymnosperms

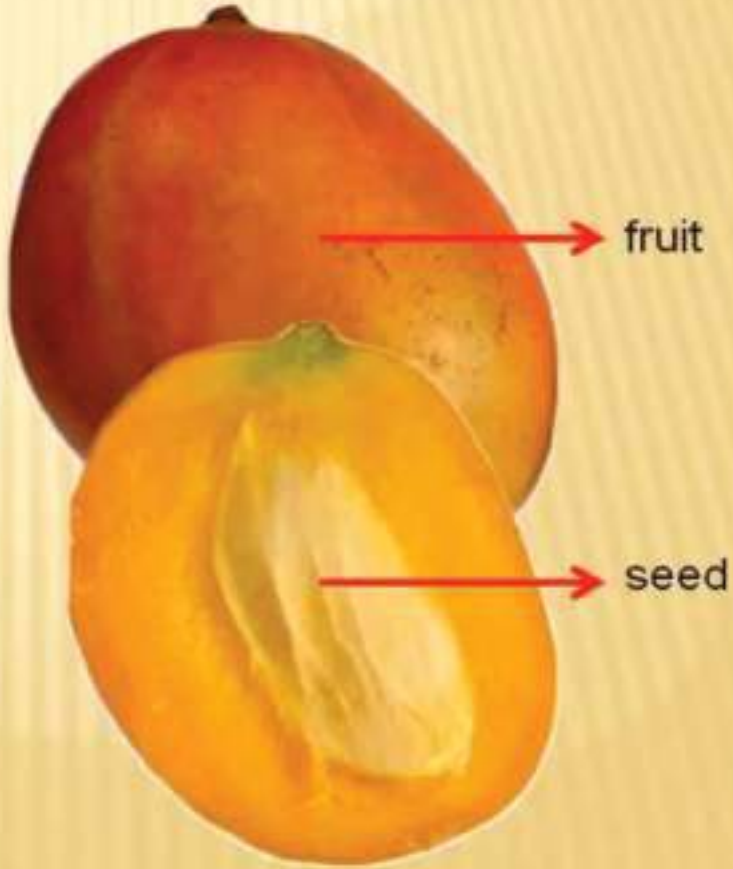
https://pixabay.com/en/snow-pine-trees-winter-snow-covered-1209587/

Suggested: Ar

- Gymnosperm seeds are naked.

Gymnosperm

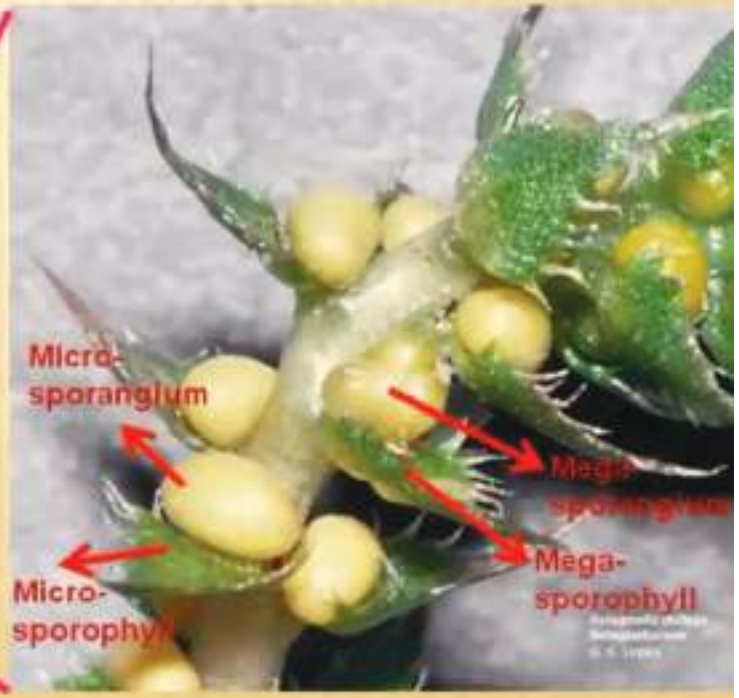
Angiosperm



Pteridophytes

- Selaginella is heterosporous.
  - -Produces microspores and megaspores
- Microsporangia and megasporangia are in the same strobilus.

Selaginella planum



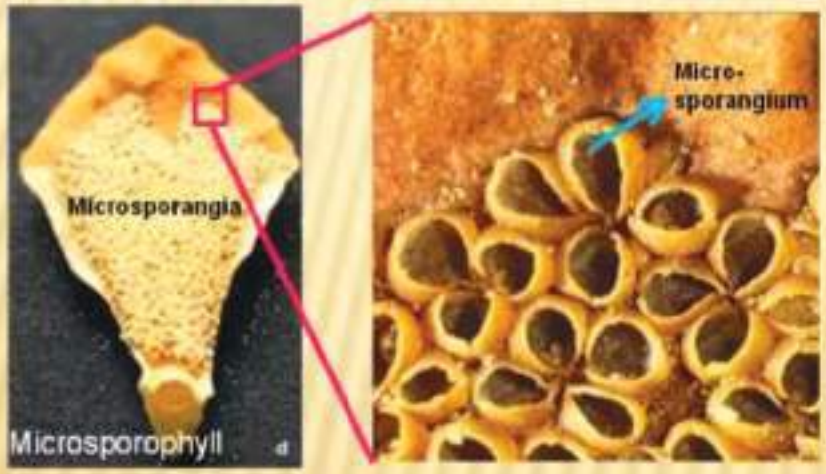
Gymnosperms

- All gymnosperms are heterosporous.

microspores

-produced in microsporangia

-sporophylls bearing microsporangia are called microsporophylls



-microsporangiate strobili or male strobili or male cones.

megaspores

-produced in megasporangia

-sporophylls bearing megasporangia are called megasporophylls

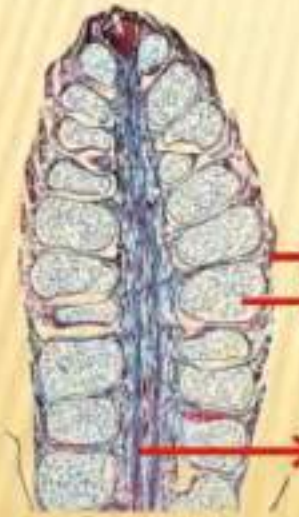
megasporangium + integuments = **Ovule**

-megasporangiate strobili or female strobili or female cones.

Gymnosperms

Pinus

- Female cones are bigger.



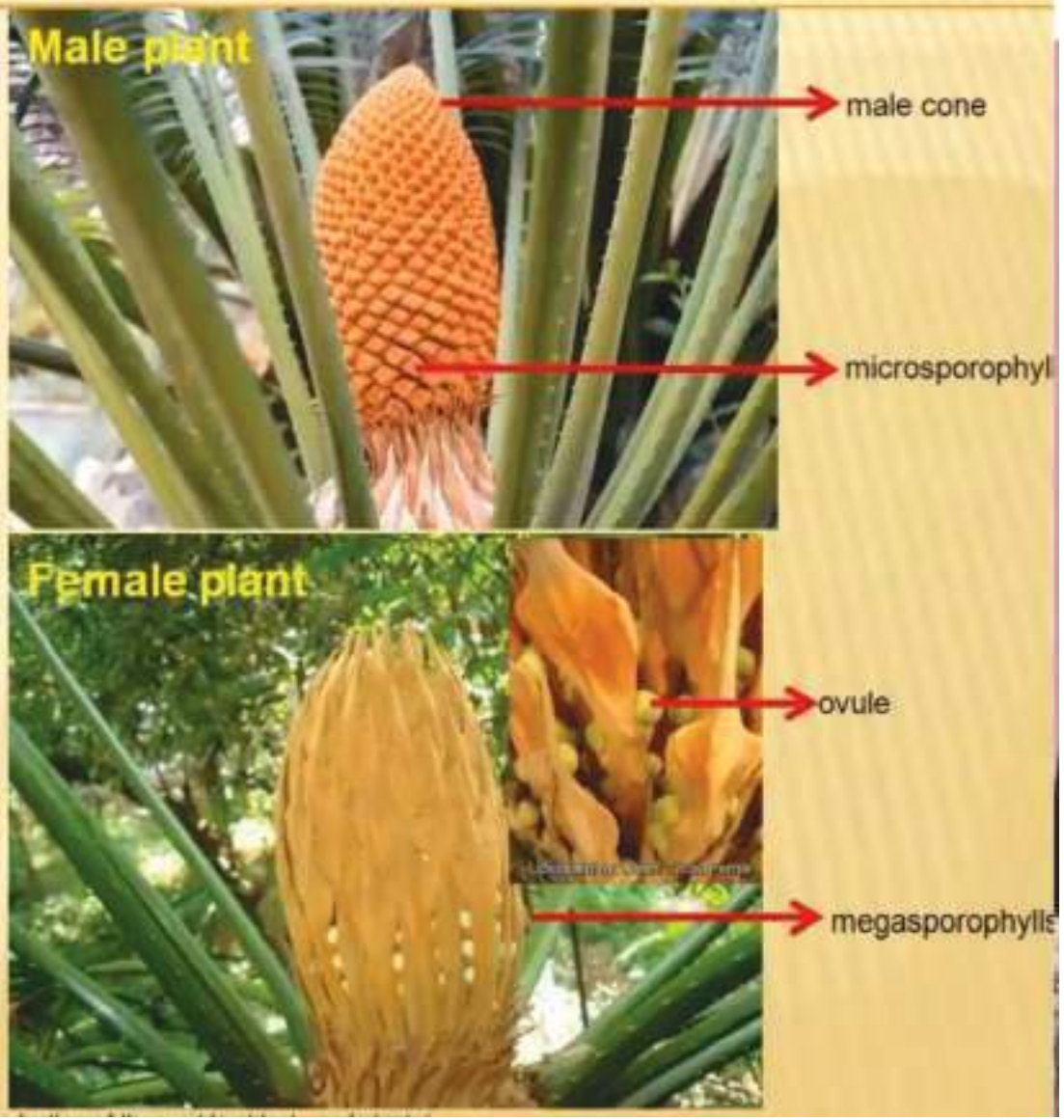
L.S. of a male cone

L.S. of a female cone

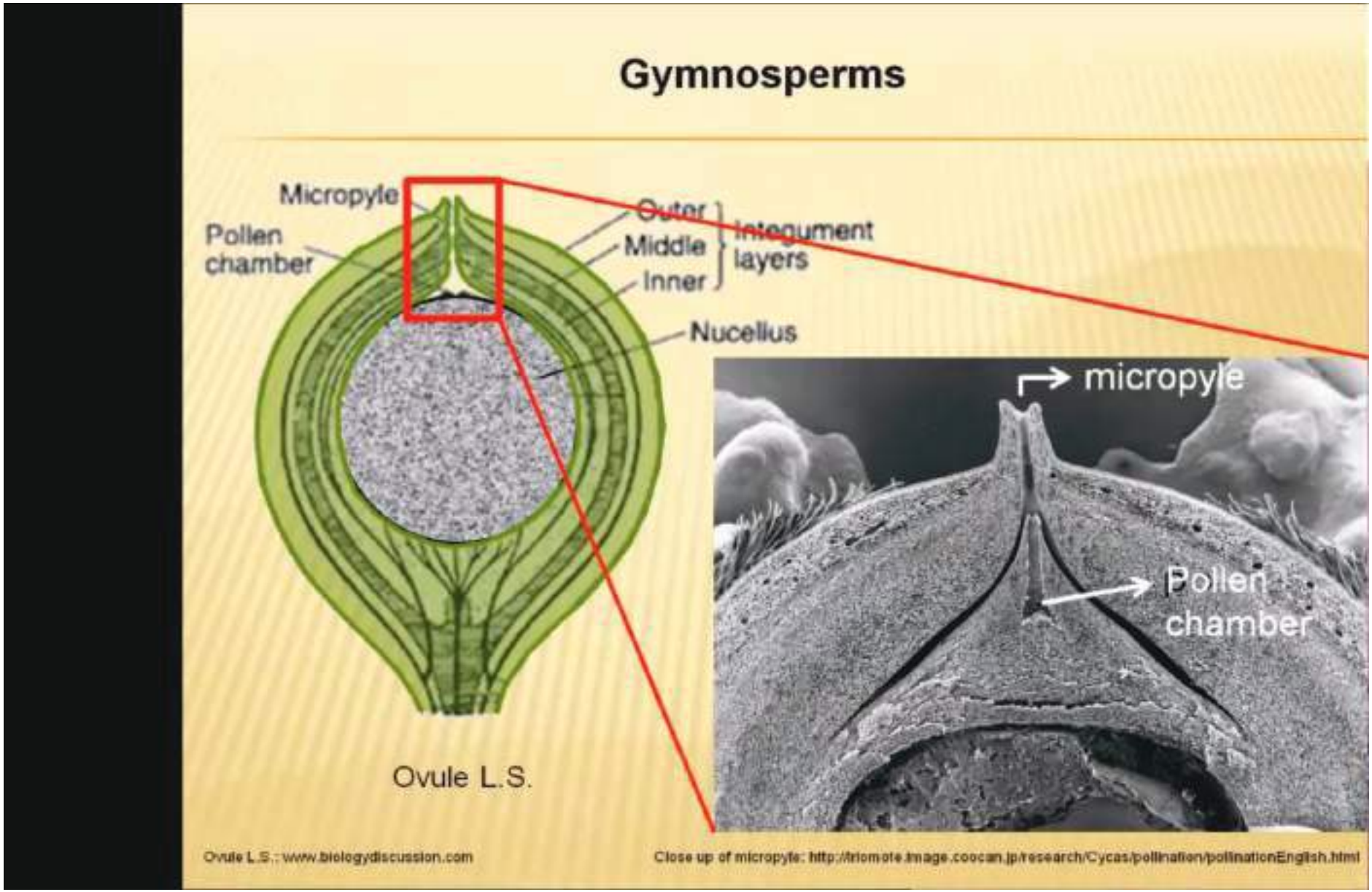
Gymnosperms

Cycas

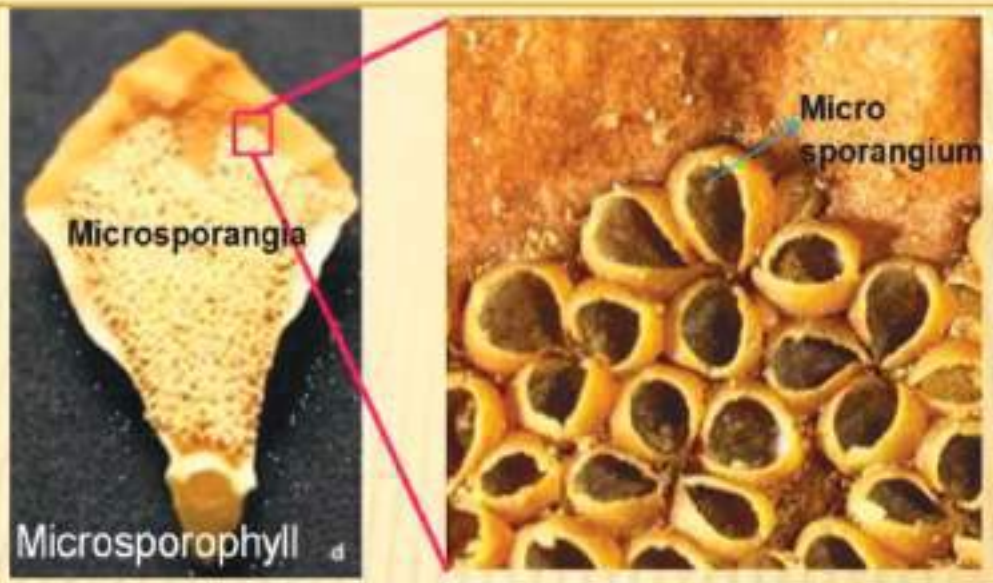
- A true female cone is absent in Cycas
- Cycas have the largest ovules of the plant kingdom



Cycas ovule

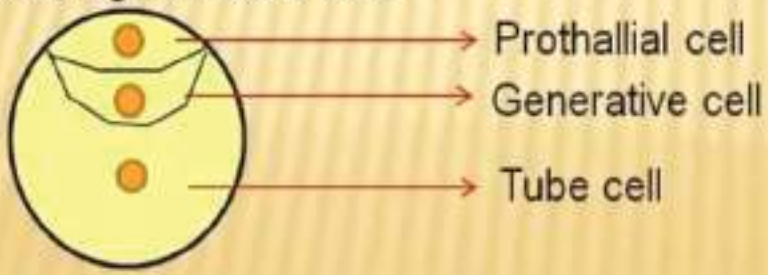

Gymnosperms
Micropyle
Pollen chamber
Outer
Middle
Inner
Integument layers
Nucellus
Ovule L.S.
micropyle
Pollen chamber
Ovule L.S.: www.biologydiscussion.com
Close up of micropyle: http://triomote.image.coocan.jp/research/Cycas/pollination/pollinationEnglish.html

Gymnosperms



Inside the microsporangia:

- Each microspore germinate into a male gametophyte called pollen grain.
- A pollen grain has 3 cells



Gymnosperms

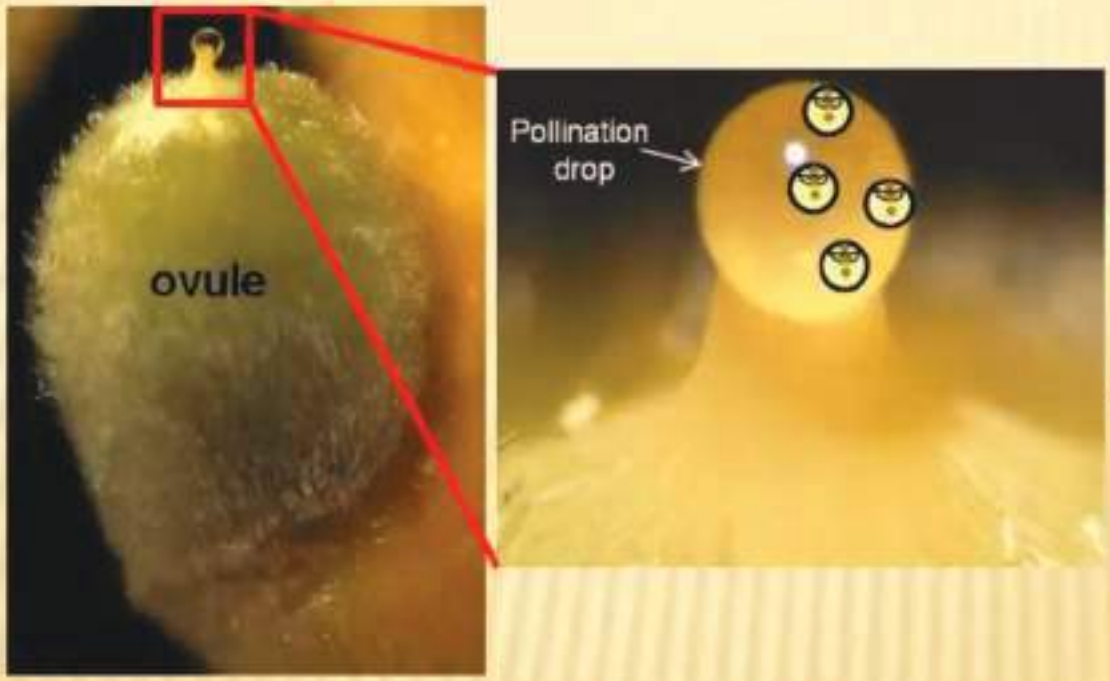
Pollen dispersal

https://www.youtube.com/watch?v=bNLstGdTCSI

Gymnosperms

- Pollen dispersal occurs during the spring season.

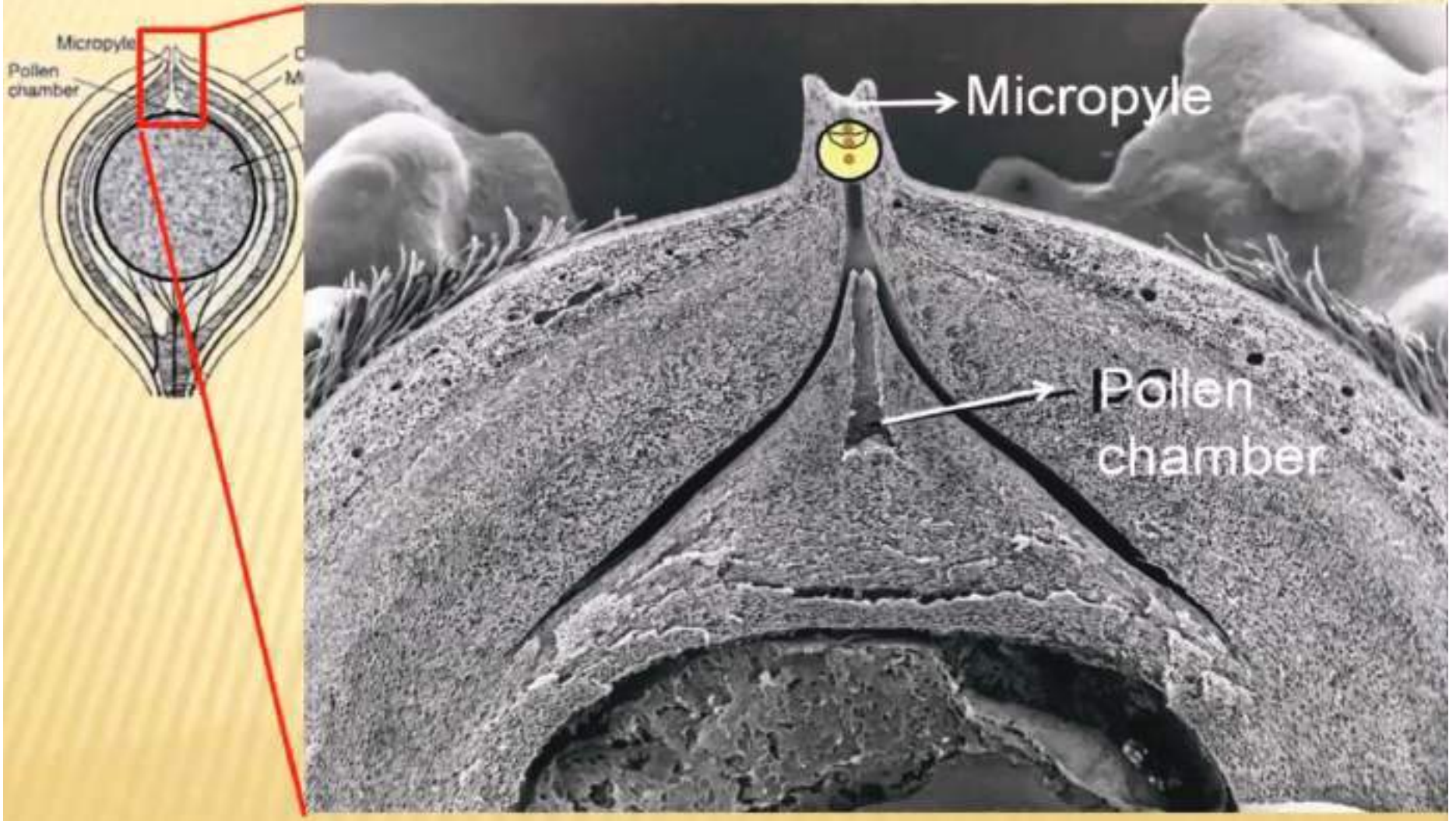
  -This may cause allergic rhinitis (hay fever).



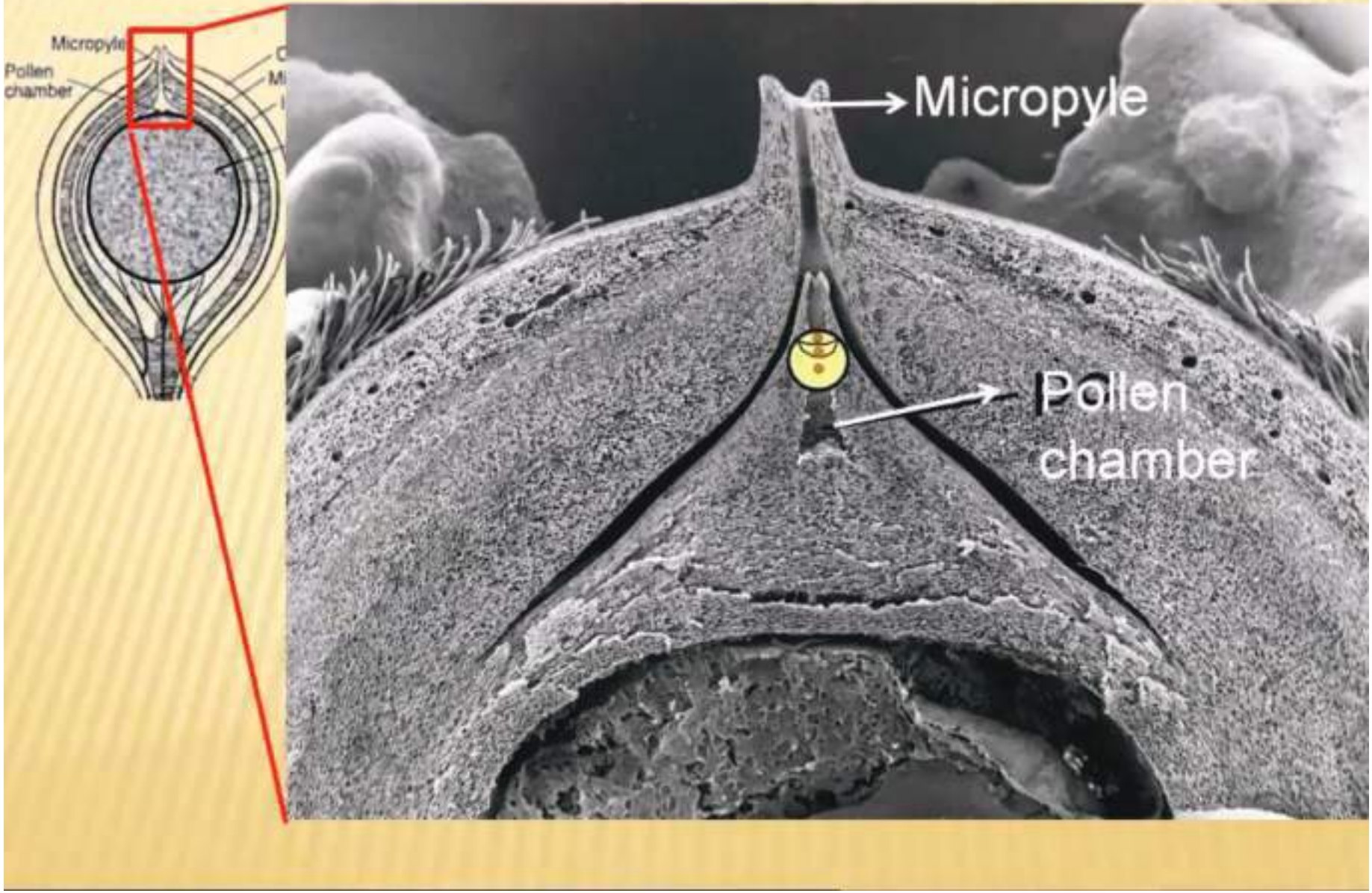
Pollination by wind- Anemophily

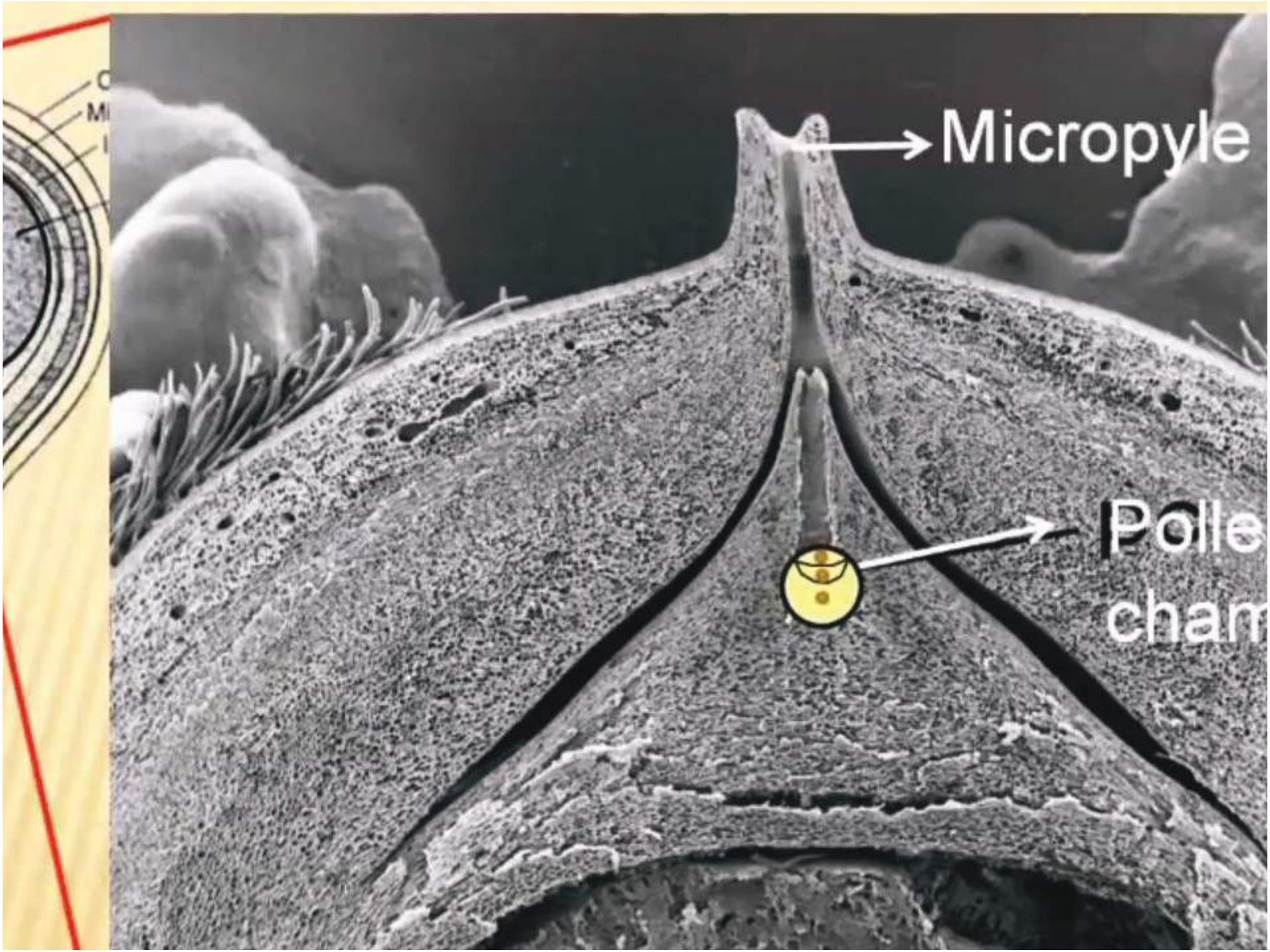
- The transfer of pollen from the male part of a plant to the female part of the same plant or another plant- Pollination.

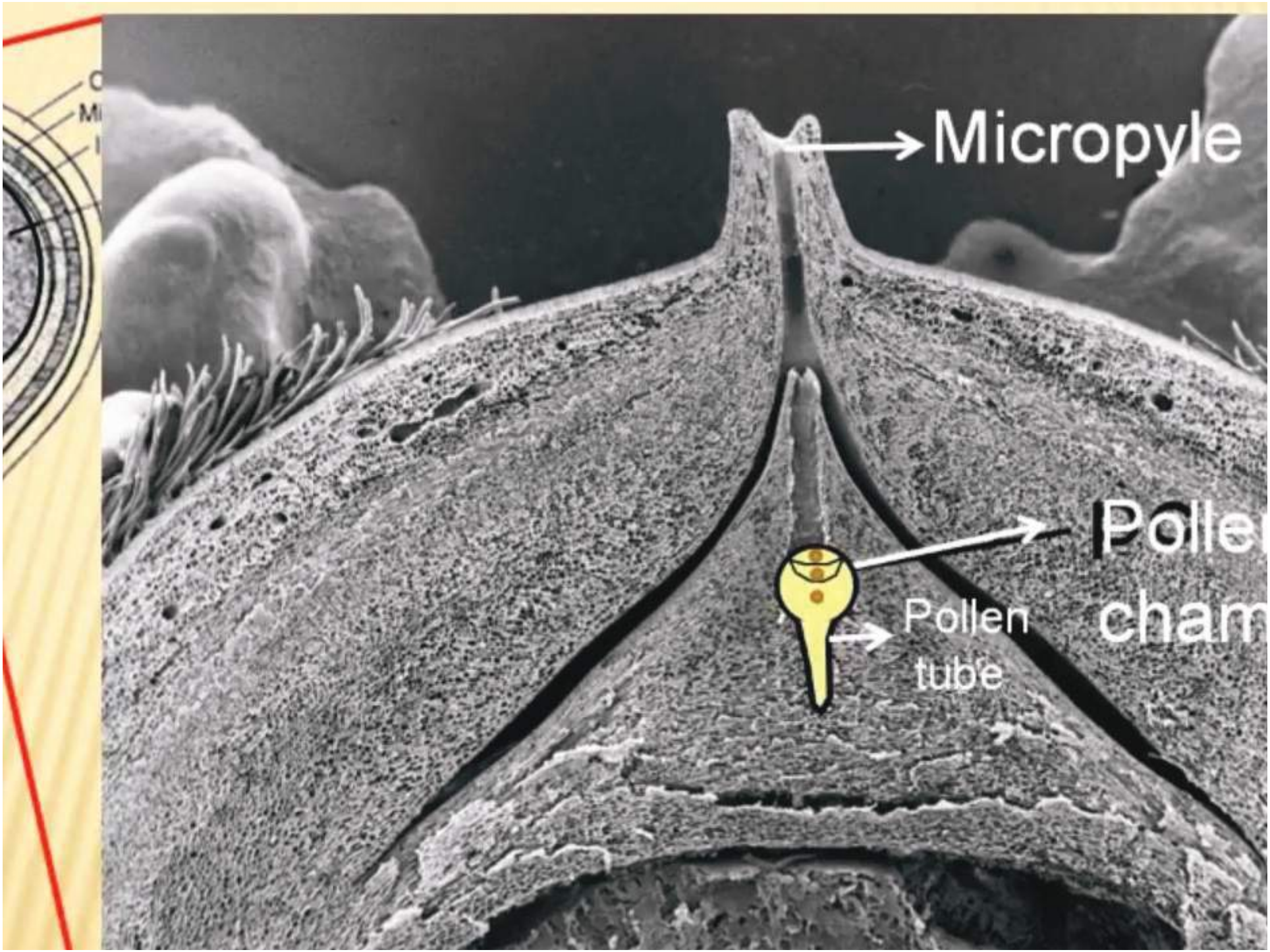
Gymnosperms



Gymnosperms

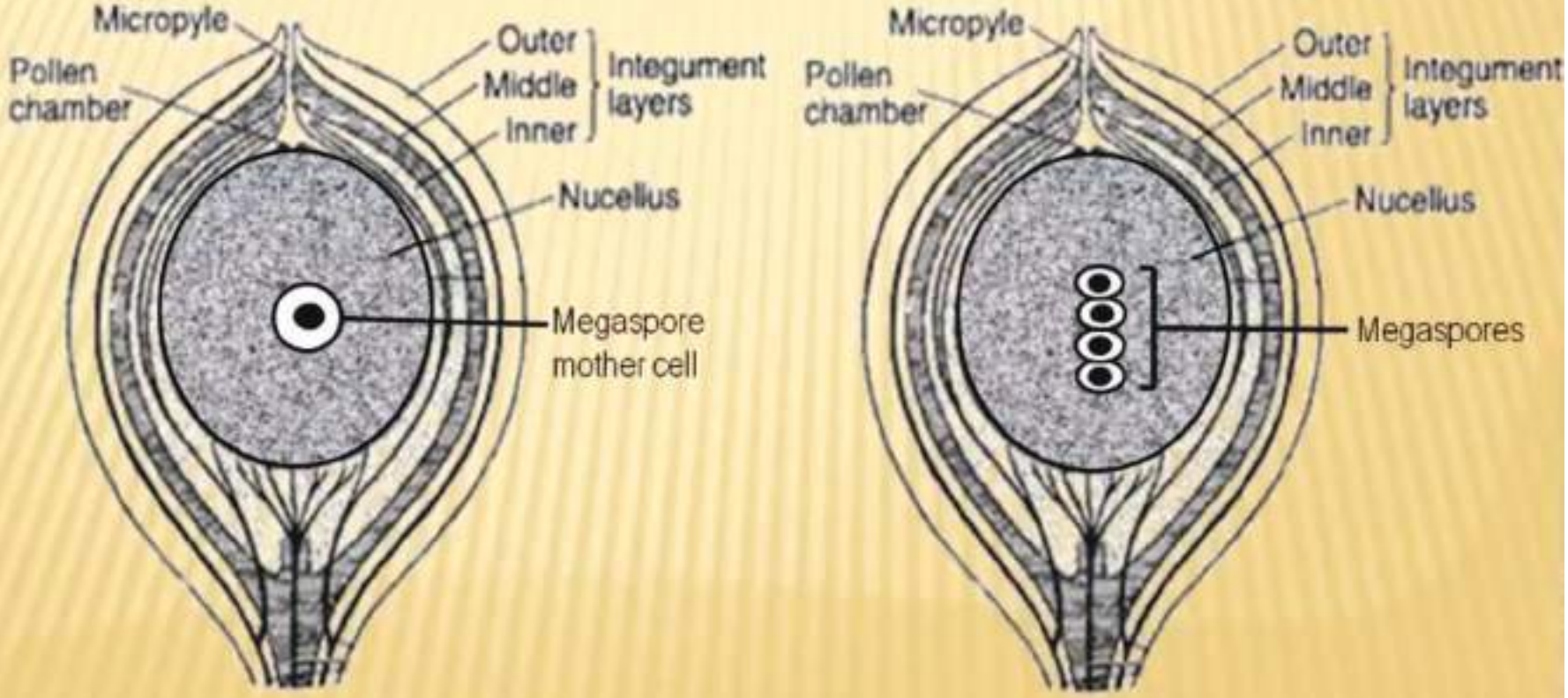



Micropyle
Polle
cham


Micropyle
Pollen
cham
Pollen
tube

Gymnosperms

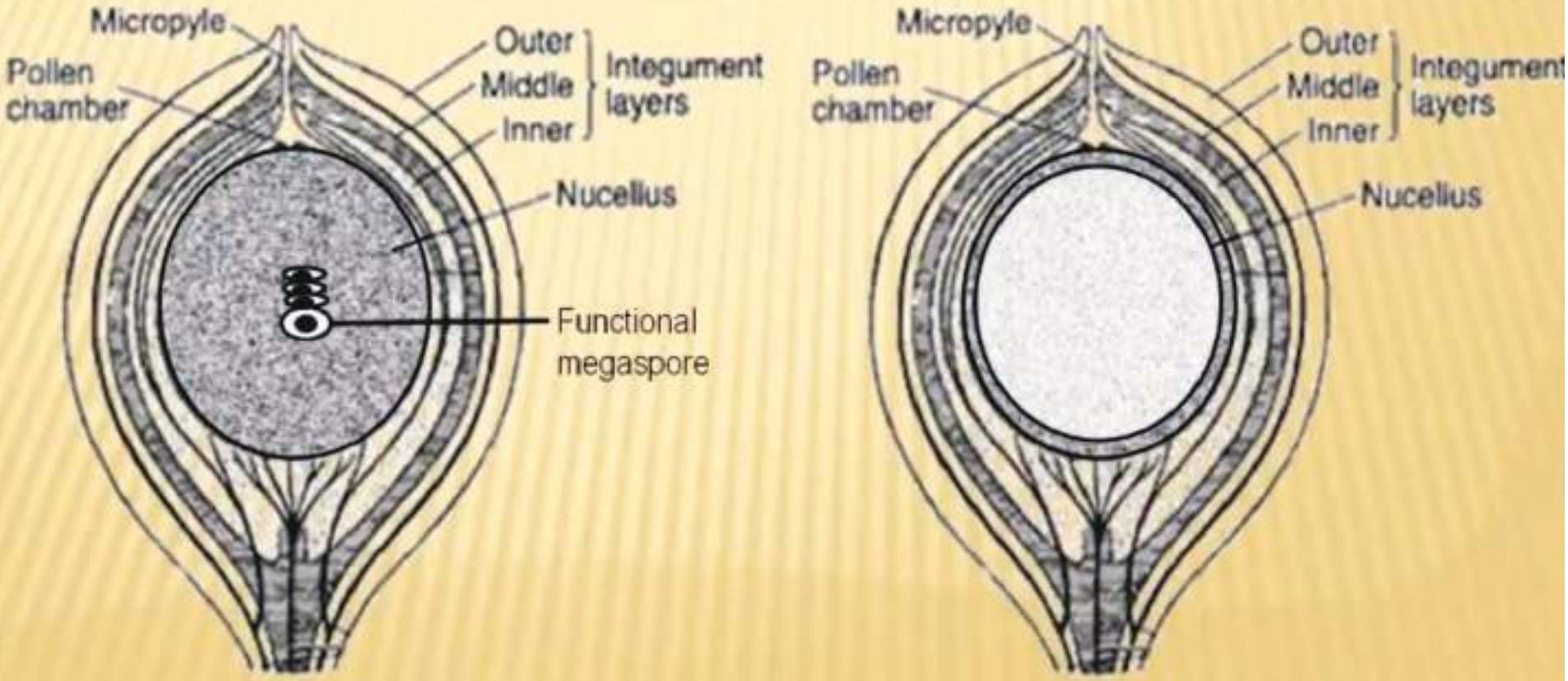
Megaspore mother cell —meiosis→ 4 haploid megaspores



Gymnosperms

- Only 1 megaspore becomes functional.

Functional megaspore → (mitosis) female gametophyte



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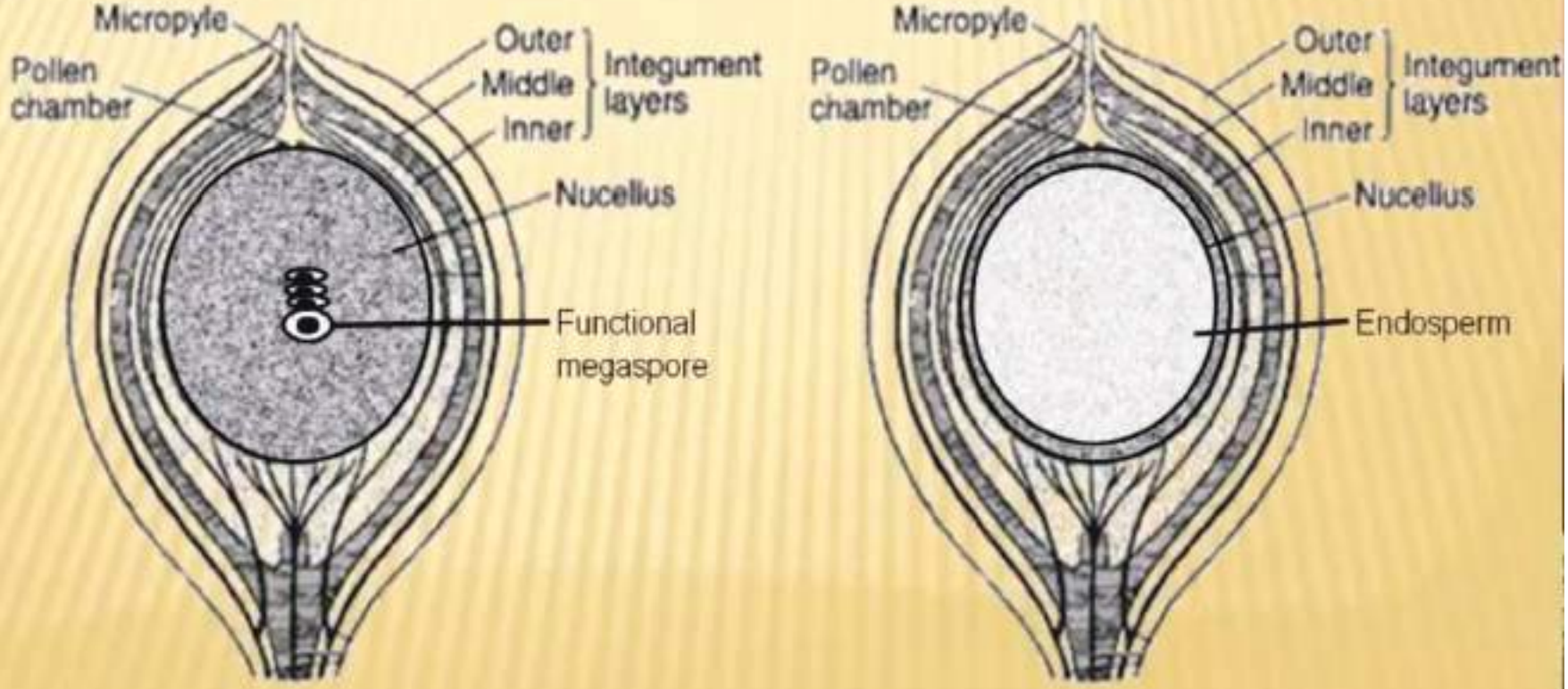

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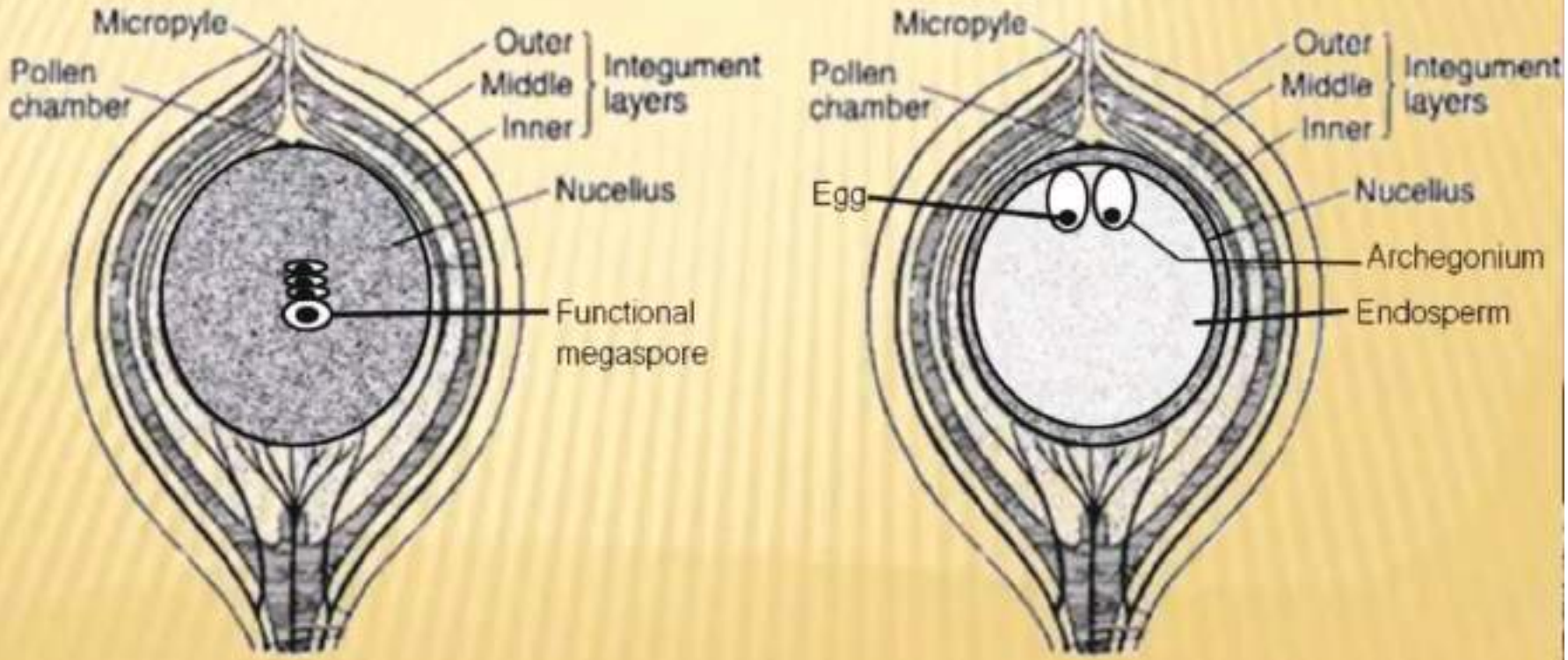
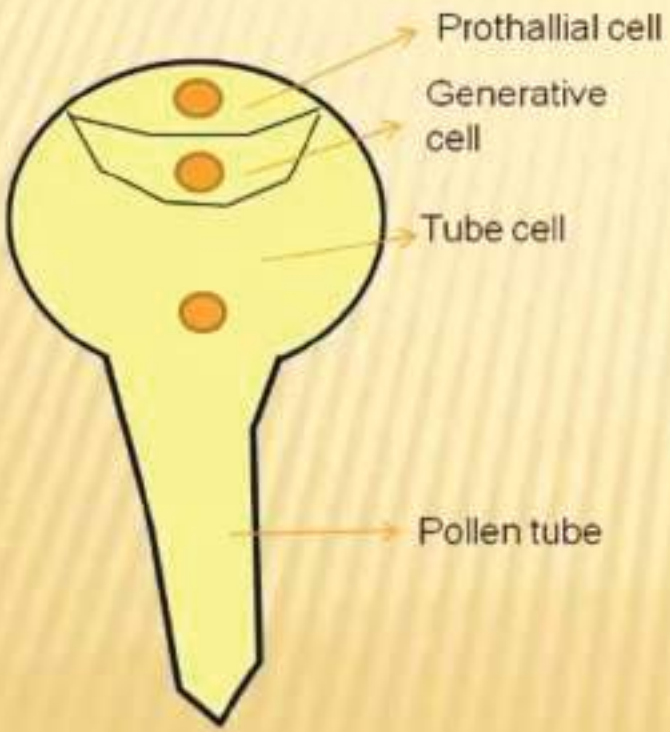


Gymnosperms

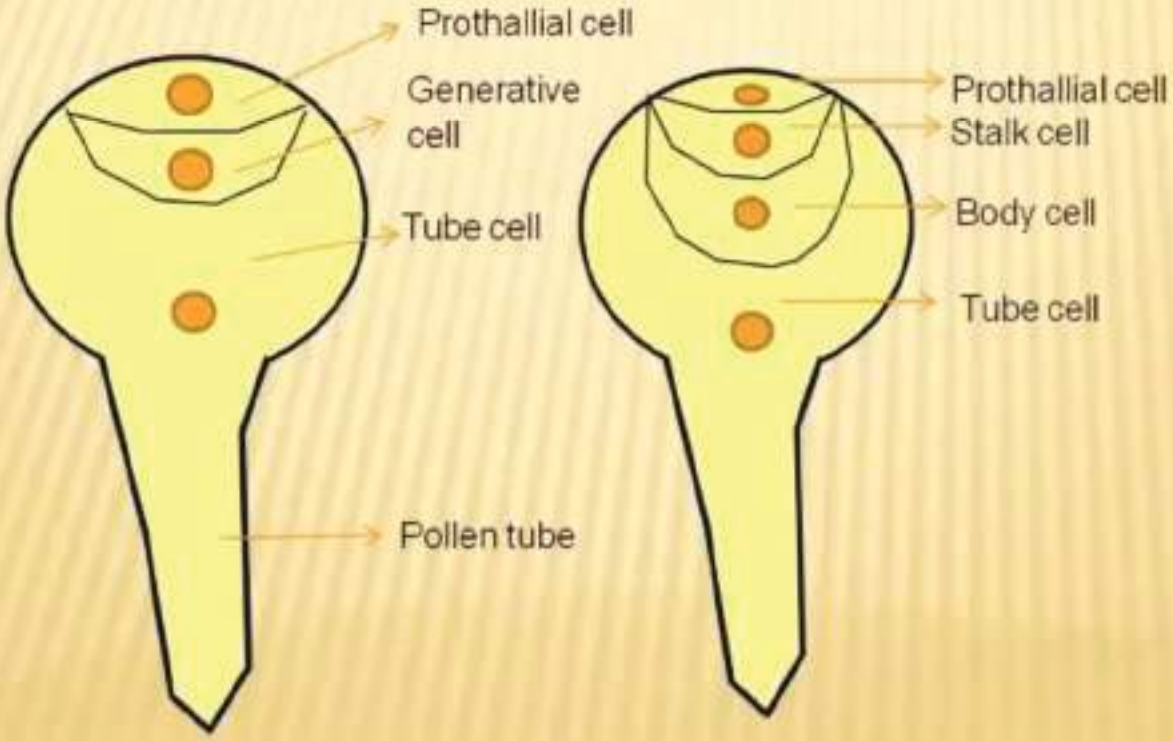
Inside the pollen chamber:



Gymnosperms

Inside the pollen chamber:

Generative cell → Stalk cell
Generative cell → Body cell



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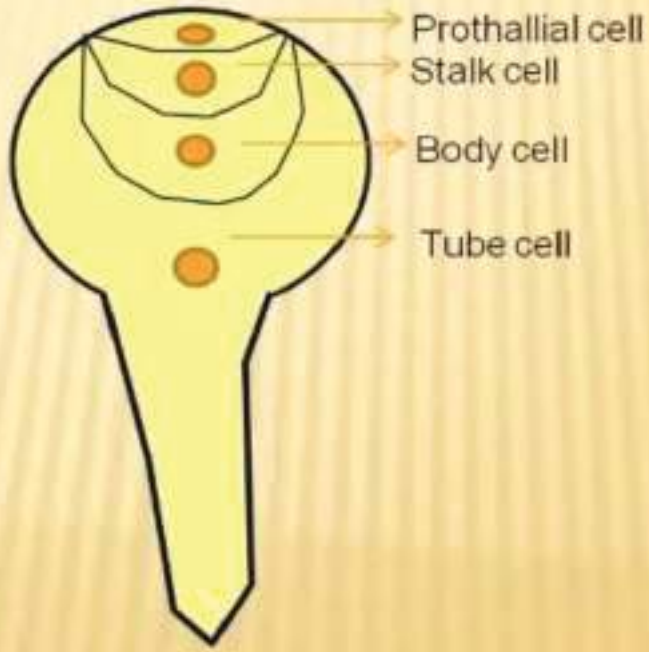

Gymnosperms

Inside the pollen chamber:

Generative cell → Stalk cell
Generative cell → Body cell → divides → 2 sperms (male gametes)