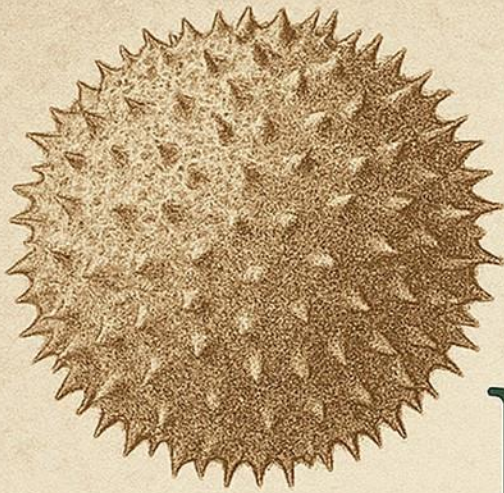


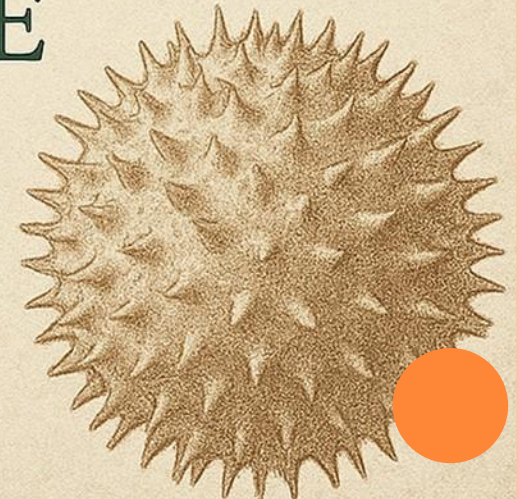
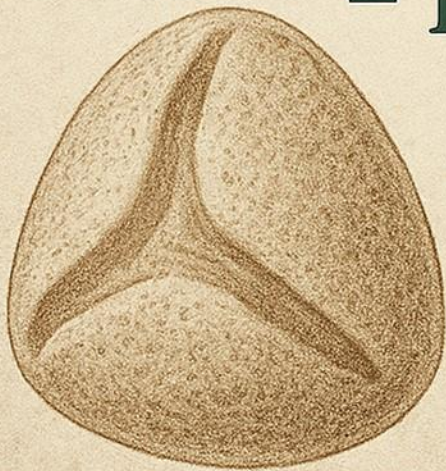
A.D. 1308
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DIPARTIMENTO
DI SCIENZE AGRARIE,
ALIMENTARI E AMBIENTALI



POLLEN MORPHOLOGY

- BASIC COURSE



Emma
Tedeschini



Pollen grouped by: number of apertures, 3-porated

The reason is the close similarity between the pollen grains coming from different families of plant which often makes pollen identification difficult

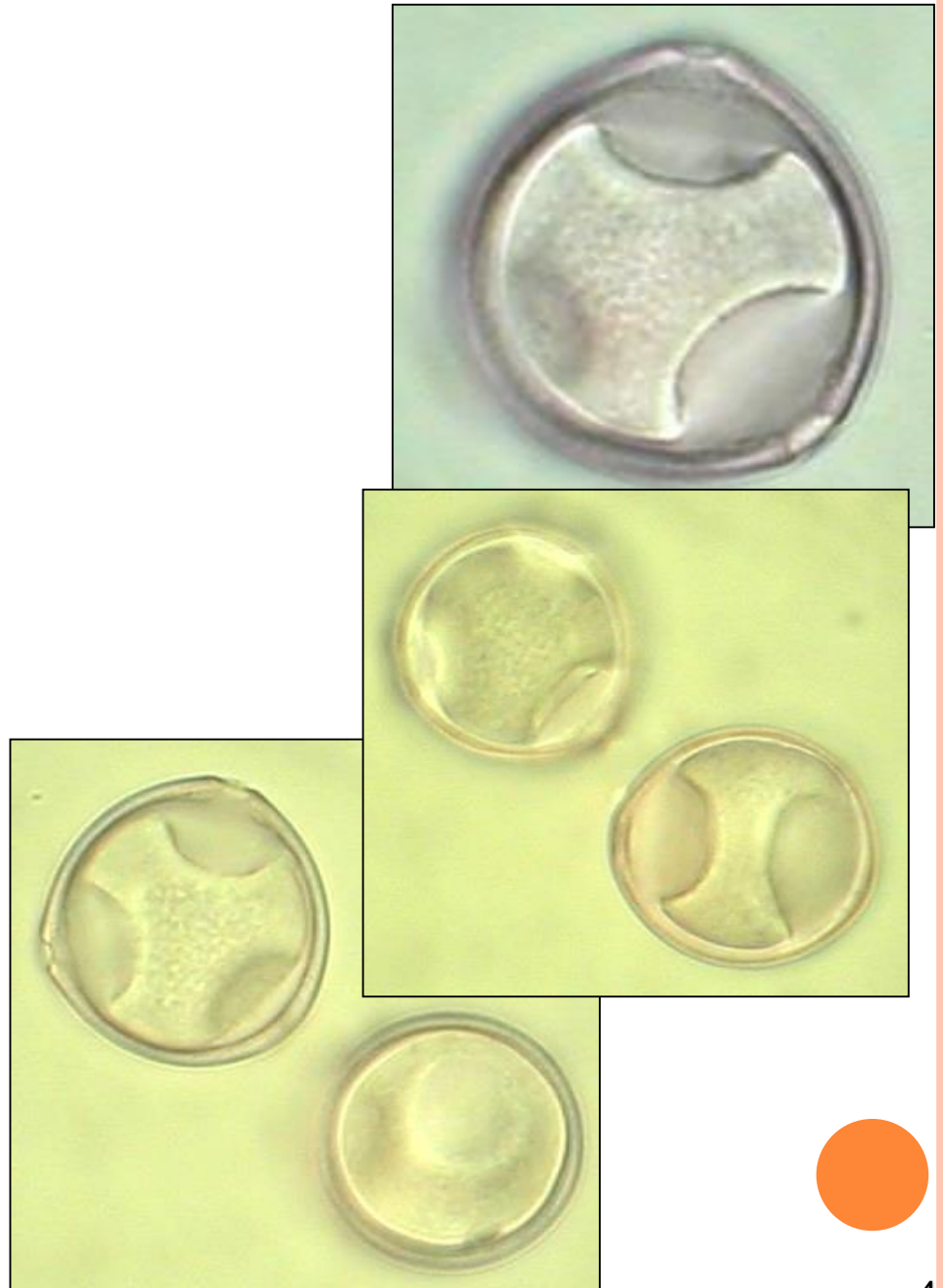


CORYLUS

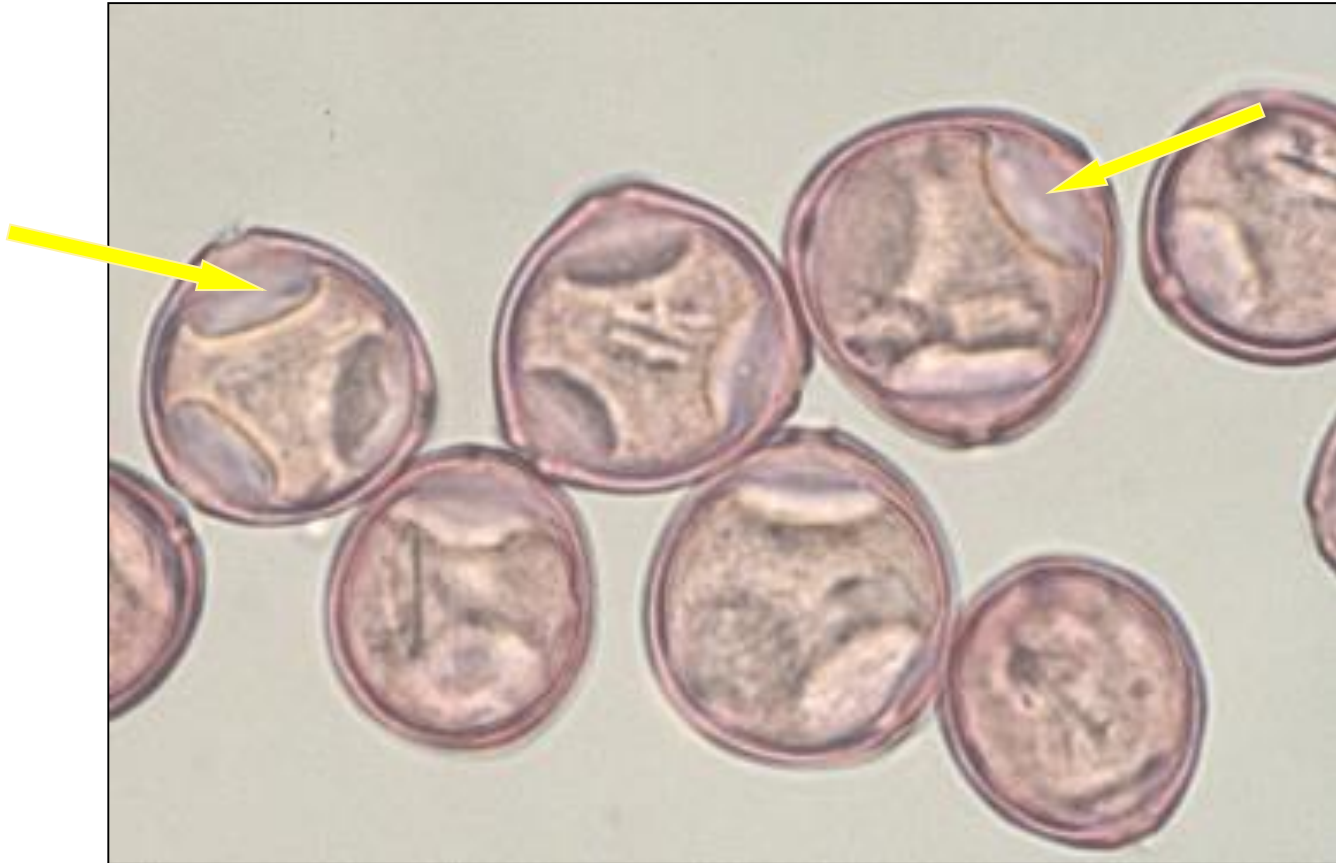


Corylus avellana (BETULACEAE)

- Grains - tri-zonoporate, isopolar, suboblate, subtriangular in polar view, rarely aspidate, **small (20-26 μm)**;
 - Exine - thin, smooth or granular;
 - Pores - circular or slightly elliptical;
 - Intine - thin, swelling beneath the pores to form convex ONCI.
- **Pollination period:
January – March**



Oncus (pl. onci)



Thickened portion of intine underlying a pore (or furrow).



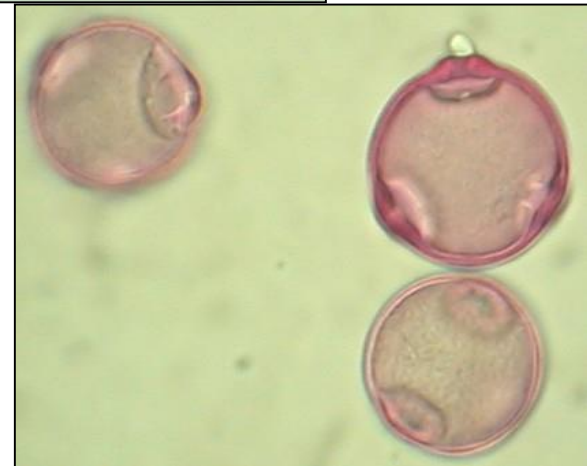


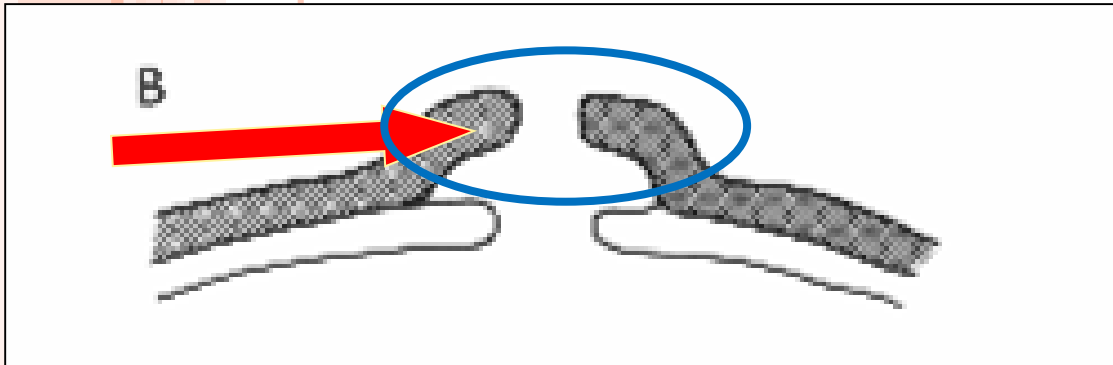
BETULA



Betula sp (BETULACEAE)

- Grains - tri (tetra)-zonoporate, isopolar, suboblate, small (18-24 μm);
- Exine - thin, smooth or very slightly granular;
- Pores - circular, surrounded by a shield-shaped area forming an aspidian (aspidate); the two layers of the exine divide near the pore forming a cavity, **i.e., the vestibule.**
- Intine - rather thin, thicker under the pores forming **slightly** convex onci.
- **Pollination period: March**



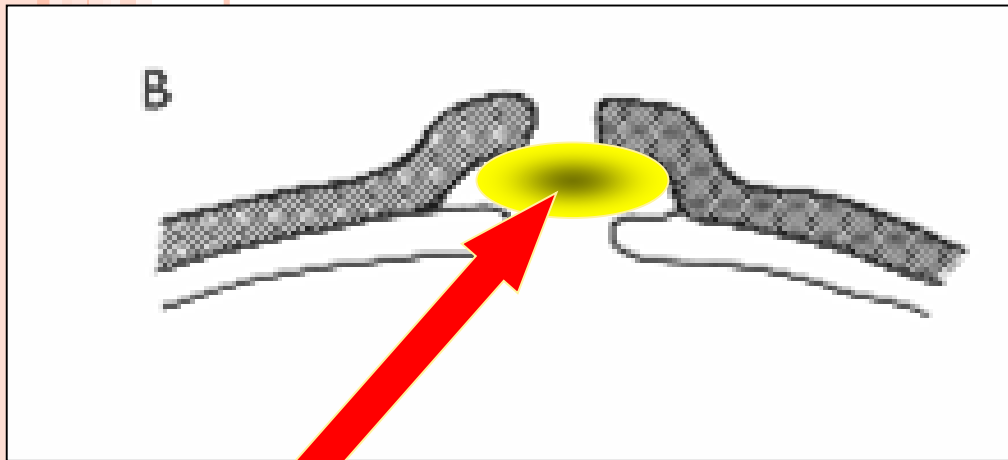


ASPIS



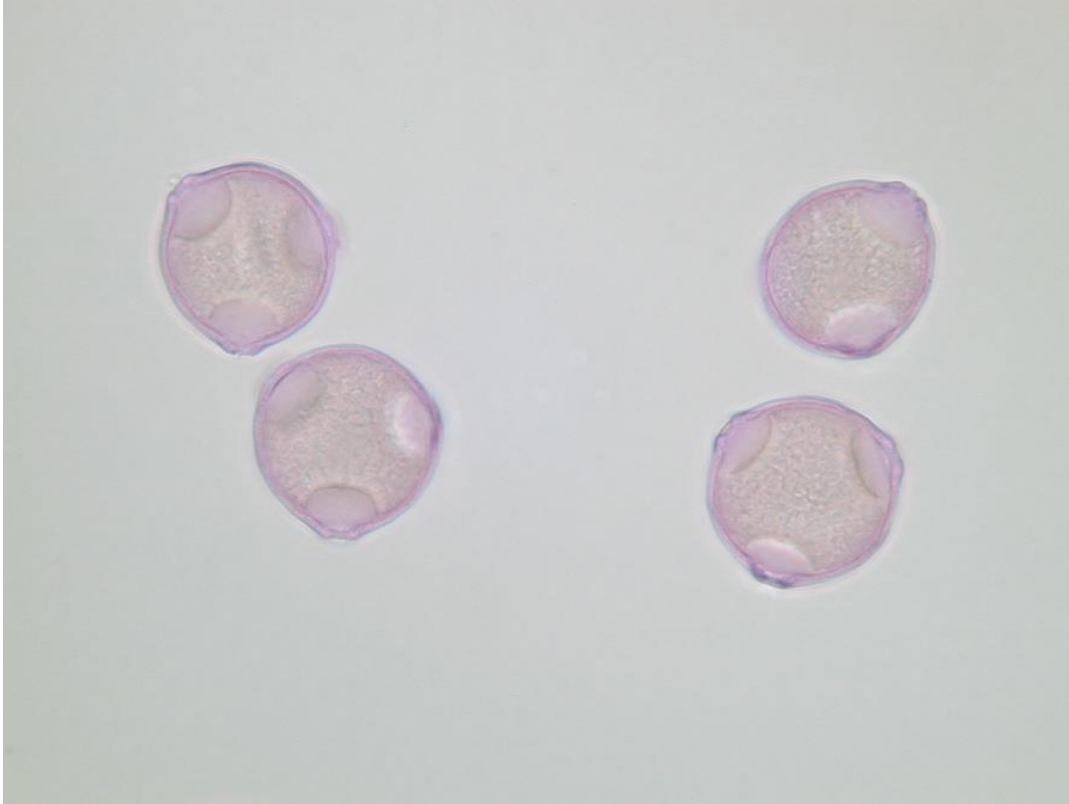
Small, more or less circular, **shield-shaped area** surrounding the pore that protrudes like a rounded dome from the grain surface (or granule outline). The granule is called aspidate.

VESTIBULUM



Cavity resulting from the **disconnection**
of the two layers of the EXINE near the
porus..

Ostrya carpinifolia (BETULACEAE)



Pollen grains are mostly triporate (sometimes 4) suboblate; **small (18-26 μm);**

Exine is slightly rugulate under SEM;

Intine - rather thin, swelling beneath the pores to form convex ONCI.

Often an exine residue (**operculum**) can be seen on the pore membrane.

○ Pollination period: April



OSTRYA - BETULA



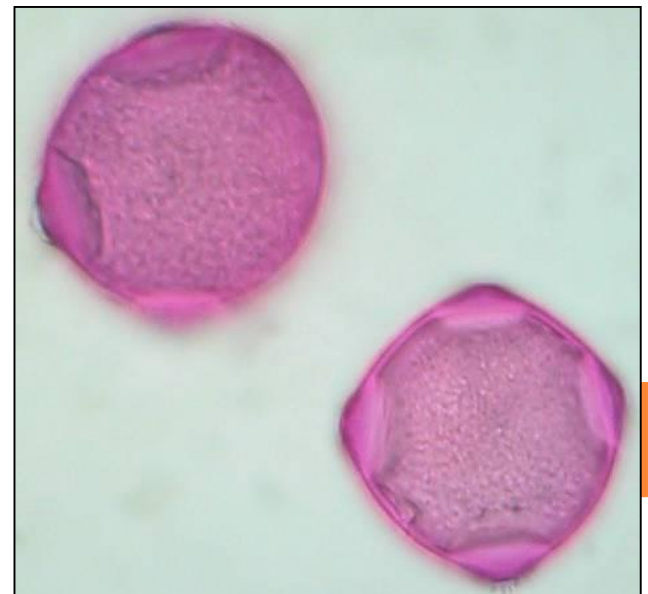
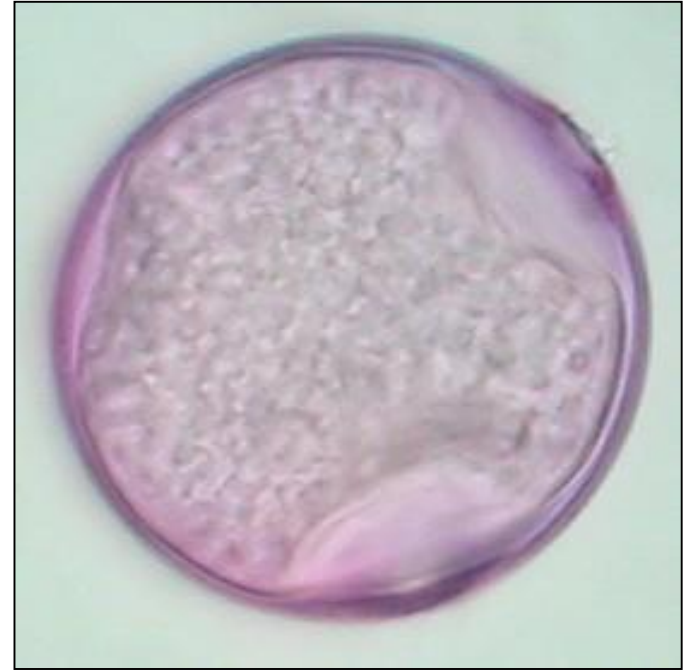
CARPINUS



Carpinus sp. BETULACEAE)

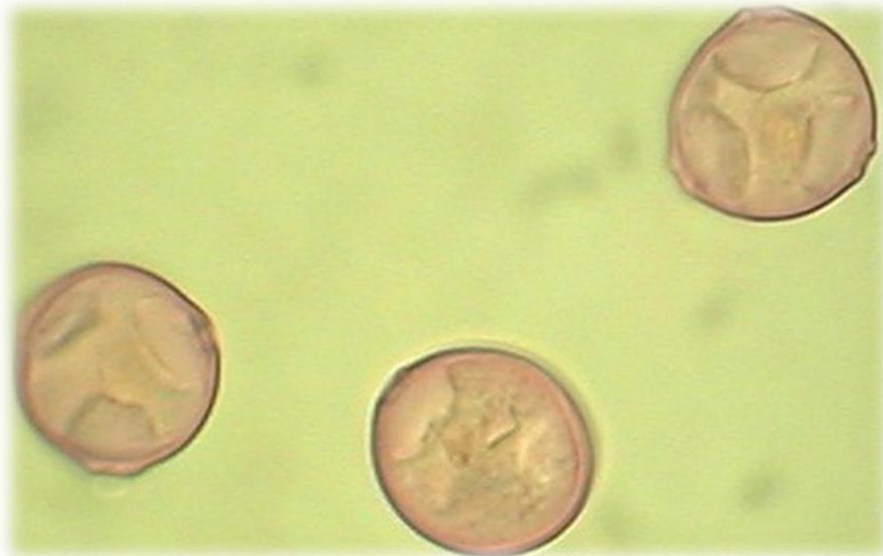
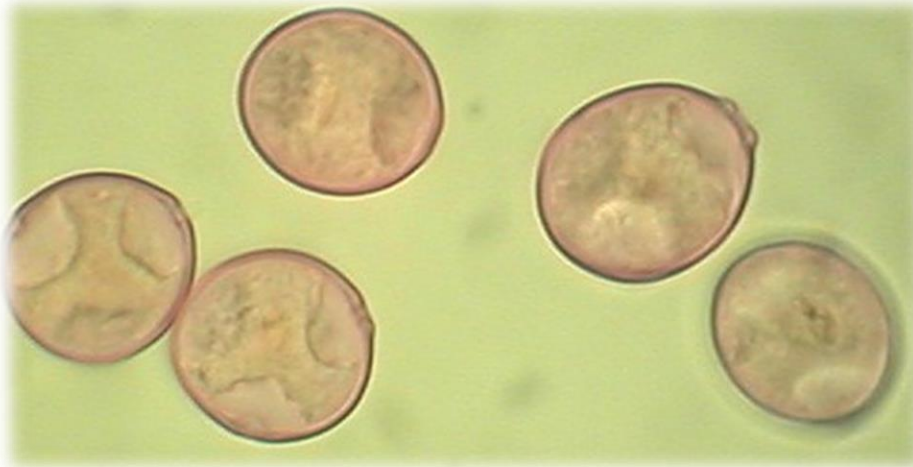
- Grains - (tri) tetra (penta)-zonoporate, isopolar, suboblate, **medium-large sized (30-36 μm)**;
- Exine - rather thin, somewhat thickened around the pores to form a shallow aspis; smooth;
- Pores - circular, with a thin and inconspicuous operculum;
- Intine - rather thin, swelling beneath the pores to form large convex ONCI.

Pollination period: April – May



CANNABACEACE

Humulus lupulus- Cannabis sp



Pollen grains are tri-porate.
Exine smooth, slightly thickened near of the apertures.

Intine - thin swelling beneath the pores to form convex ONCI.

**Pollination period:
late July-August**



Corylus



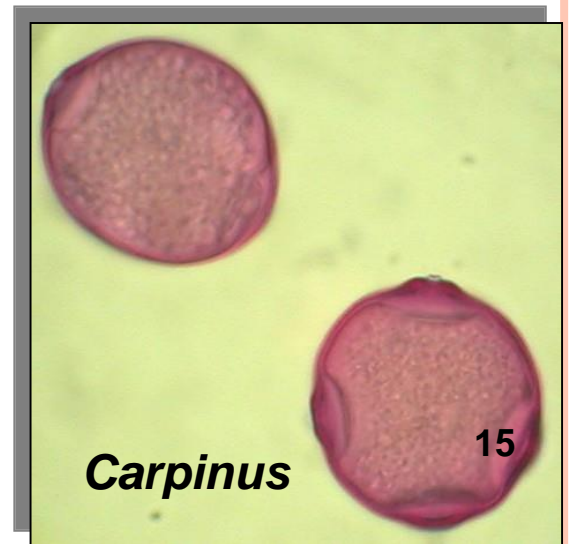
Betula



Ostrya



Humulus



Carpinus

**Pollen grouped by:
characteristic of the apertures,**

Pollen tri-colpates

**The reason is the close resemblance of
pollens that often makes their identification
difficult.**



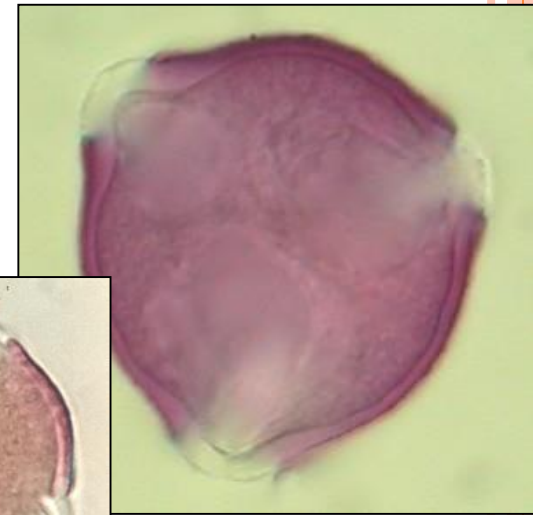
Quercus sp.
FAGACEAE



Quercus sp. (FAGACEAE)

- Grains - tri-zonocolpate, isopolar, oblate to oblate-spheroidal, small to medium (20-40 μm);
- Exine- thin, warty-granular;
- Furrows - elongated

- Pollination period:
April – June



Pollen grouped by: **exine morphology- pollen reticulated**

Pollens in this group share a reticulate exine sculpture and the number and characteristic of apertures. Pollen identification is sometimes ambiguous.



OLEA EUROPAEA



Spontaneous tree of the Mediterranean flora, intensively cultivated throughout the Mediterranean basin for the production of oil.

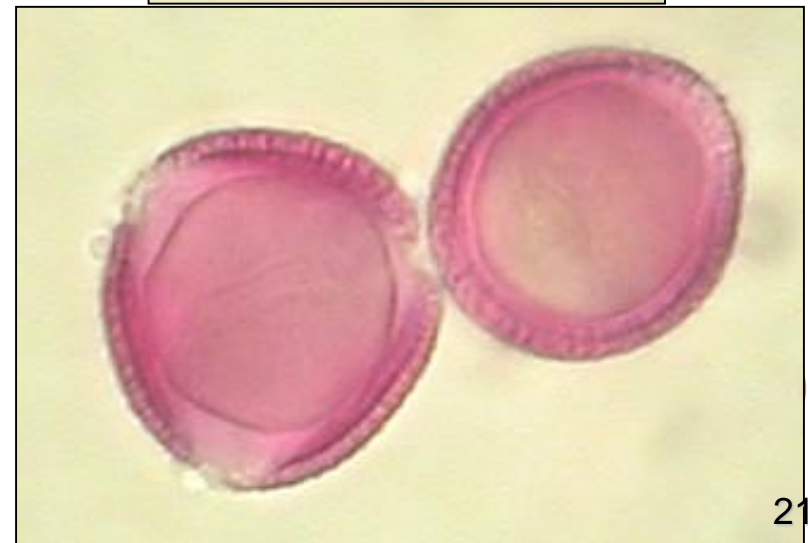
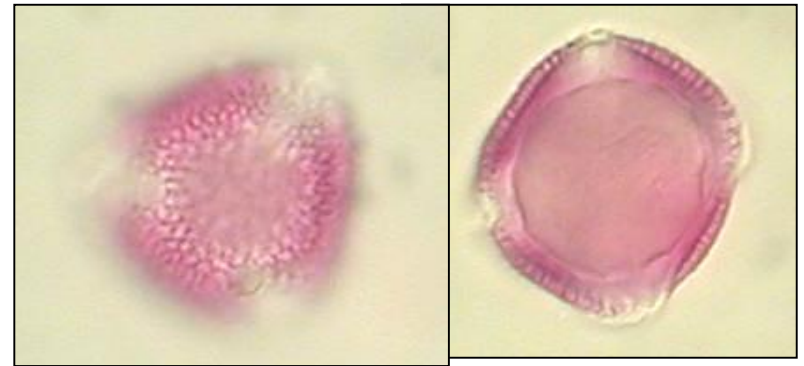


Olea europaea (olive) OLEACEAE

Pollen - tri (tetra)-zonocolporate,
isopolar, in polar view
subtriangular, small (16-26 μm)

Exine - thick, reticulate, with
meshes of uniform size

Pollination period: May - June



Other plants characterized by entomophilous pollination but occasionally, can be found in aerobiological monitoring samples.



BRASSICACEAE OR CRUCIFERAE

Sinapis alba

Brassica napus



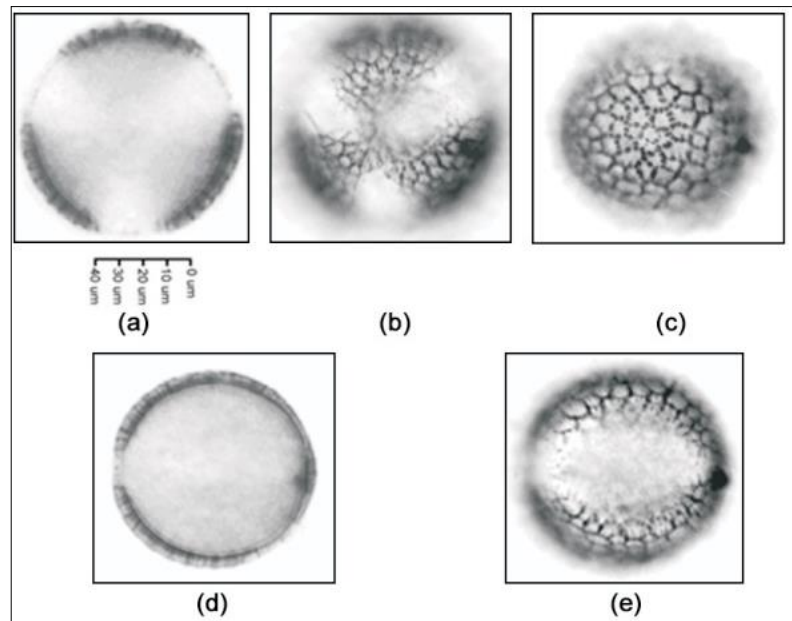
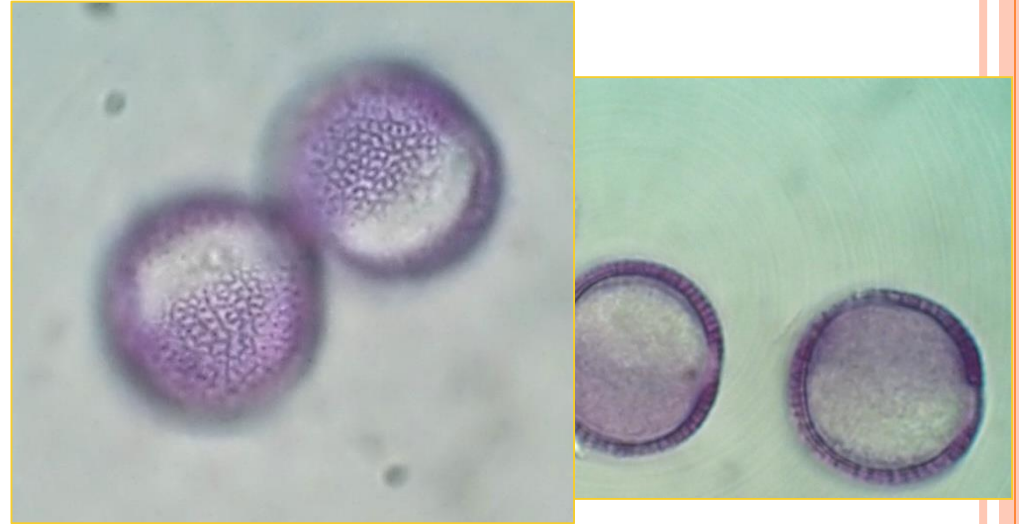
*Diplotaxis
erucoides*



Brassica spp. (BRASSICACEAE)

Grains - tricolpate, isopolar, suboblate-spheroidal, medium-large sized (22-40 μm)

- Exine – thick, polygon mesh, ranging from medium to large size, especially in intercolpium.
- Furrows: very long and wide
- Pollination period: April – May



OPERCOLATE POLLEN



POACEAE (GRAMINACEAE)



POACEAE OR GRAMINEAE OR GRAMINACEAE

- Grains - **monoporate**, spheroidal, or ovoid, medium sized or rather small (25-40 μm);
 - Exine - finely granular;
 - Pore - circular, membrane with an operculum
-
- Pollination period: April – September



TRICOLPORATE POLLEN

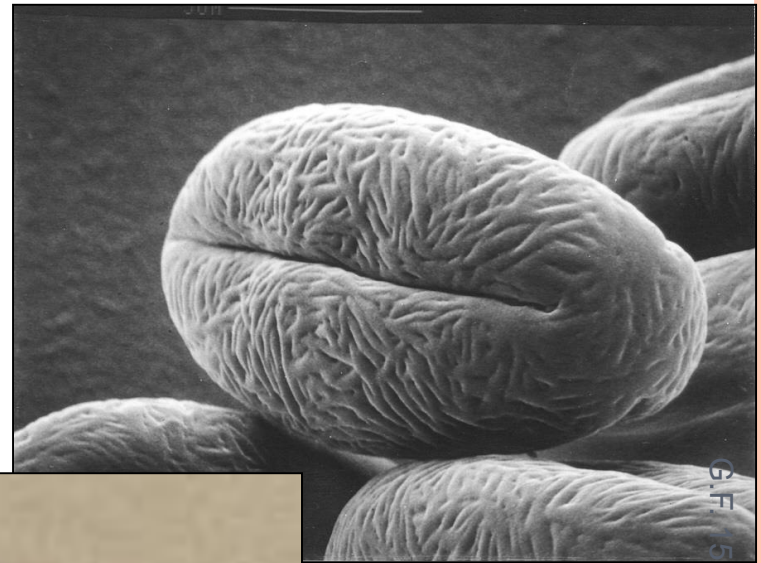


CASTANEA SATIVA



Castanea sativa (FAGACEAE)

- Grains - tricolporate, isopolar, subprolate, small (10-14 μm);
- Exine - thin, finely rugulate;
- Furrows - long,
- Pores - circular,
- **Pollination period:
June - July**

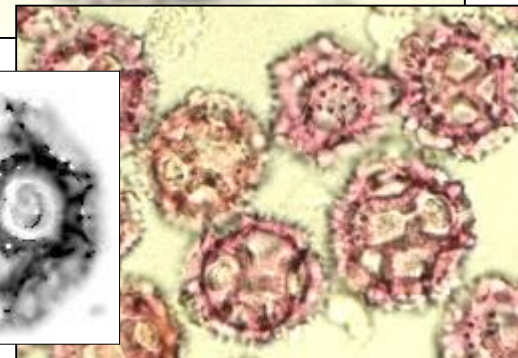
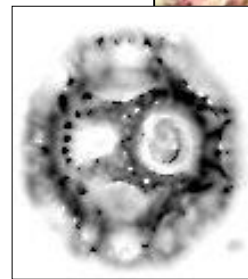


TARAXACUM OFFICINALE



ASTERACEAE LIGULIFLORAE (i.e. *Taraxacum*)

- Pollen- tri(tetra)-zonoporate, isopolar, oblate-spheroidal, **fenestrate**, small (18-30 μm);
- Exine –*fenestrae souraechinata*
- **Pollination period:
April – June**

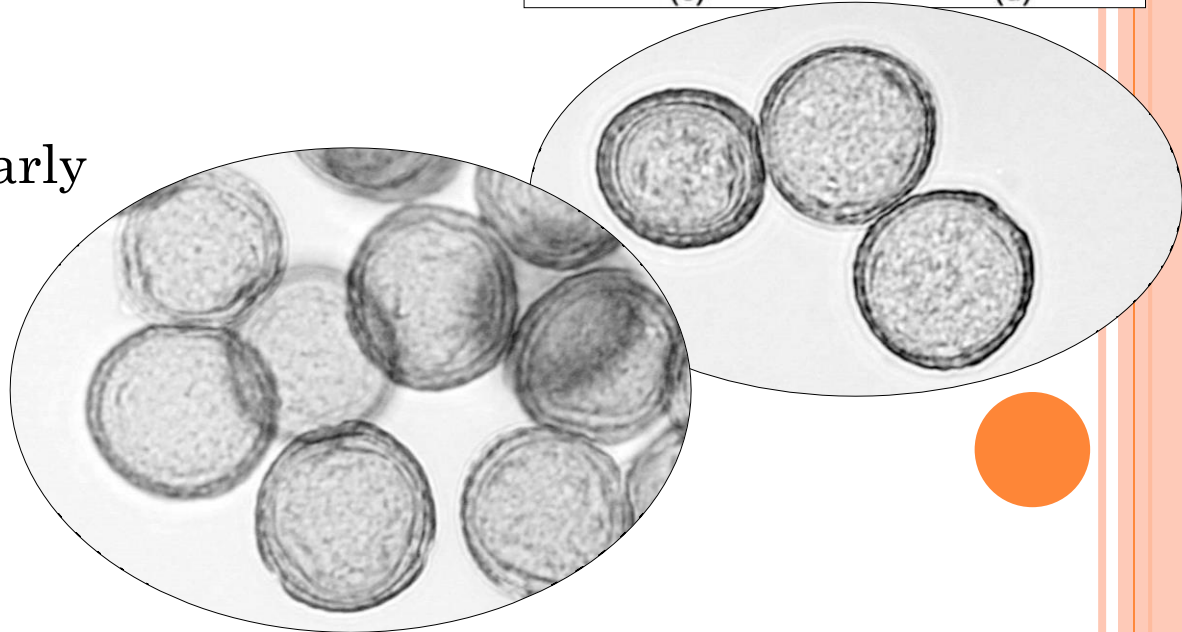
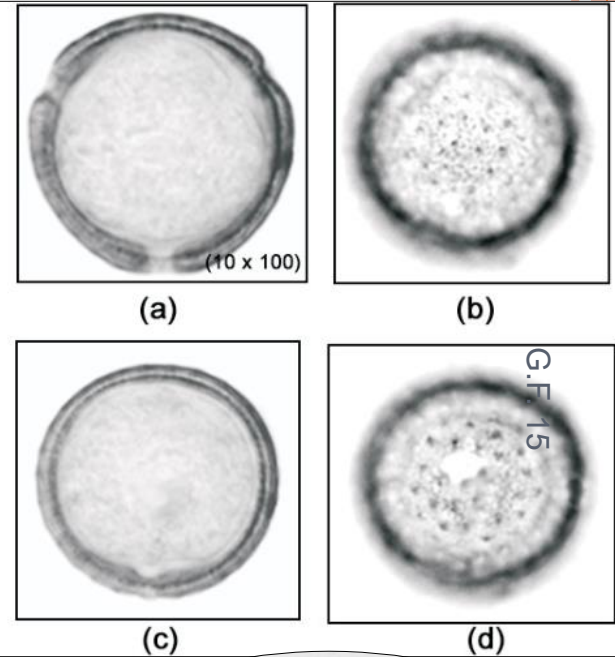


XANTHIUM SPP

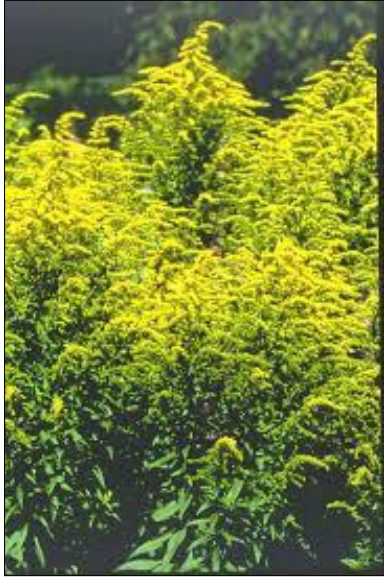


Xanthium spp. (ASTERACEAE)

- Grains - tri(tetra)-zonocolporate, isopolar, oblate spheroidal small-medium (22-28 μm);
- **Exine - thick, echinate: spinules are reduced to small pointed (the outline appears simply to undulate);**
- Colpus - narrow;
- Pores - elongated and clearly visible;
- **Pollination period:**
May – August

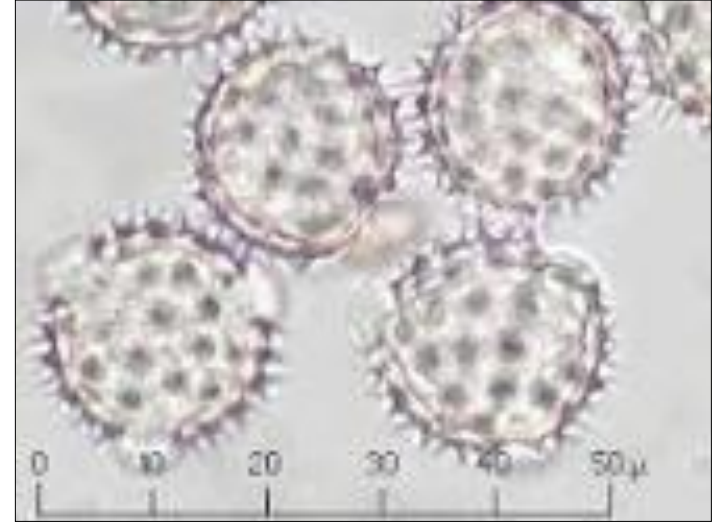


SOLIDAGO VIRGA AUREA

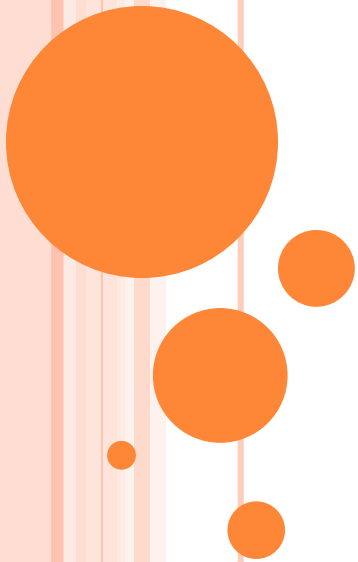


ASTERACEAE TUBULIFLORAE (I.E. *SOLIDAGO*) (GOLDENROD)

- Pollen - tri-zonocolporate, isopolar, spheroidal, small (15-25 μm);
- -Exine - medium thickness, finely granular, covered with finely pointed spines (echinate);
- -Colpus acute, elongated, membrane smooth;
- -Pores - circular, membrane smooth protruding;
- Pollination period: May – August
- Allergenicity: moderate



***OTHER MORPHOLOGY OF
AEROBIOLOGICAL POLLEN***



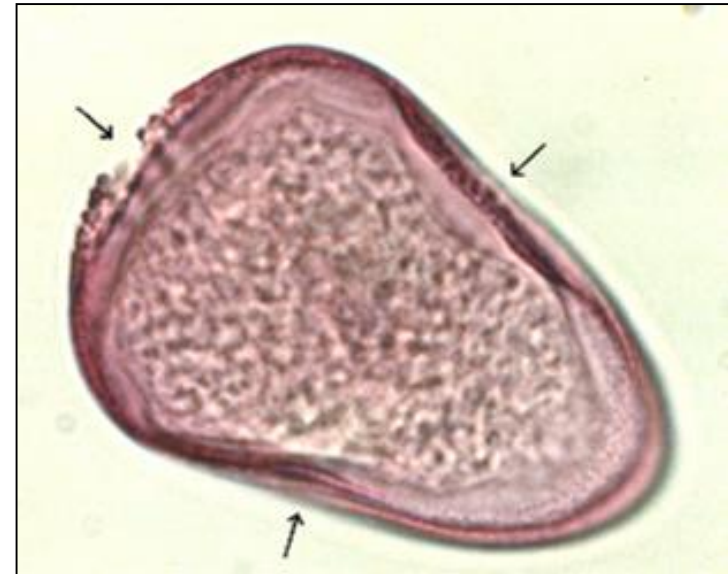
CYPERACEAE –*CAREX* SPP.

CAREX ELATA (TUFTED SEDGE) – *CAREX PENDULA*



CYPERACEAE (I.E. *CAREX*) (SEDGES)

- Pollen - inaperturate or poroidate, heteropolar, pear-shaped, medium sized or rather large (20-40 x 24-60 μm);
- Exine - rather thin, very finely granular;
- Poroids - one at the thick end of the grain and usually 3 on the sides; their surface, thin, rough and broken;
- Intine - thin beneath the poroids and thick elsewhere.
- Pollination period: April – July



PINUS SPP.



PINUS SPP. (PINE) (PINACEAE)



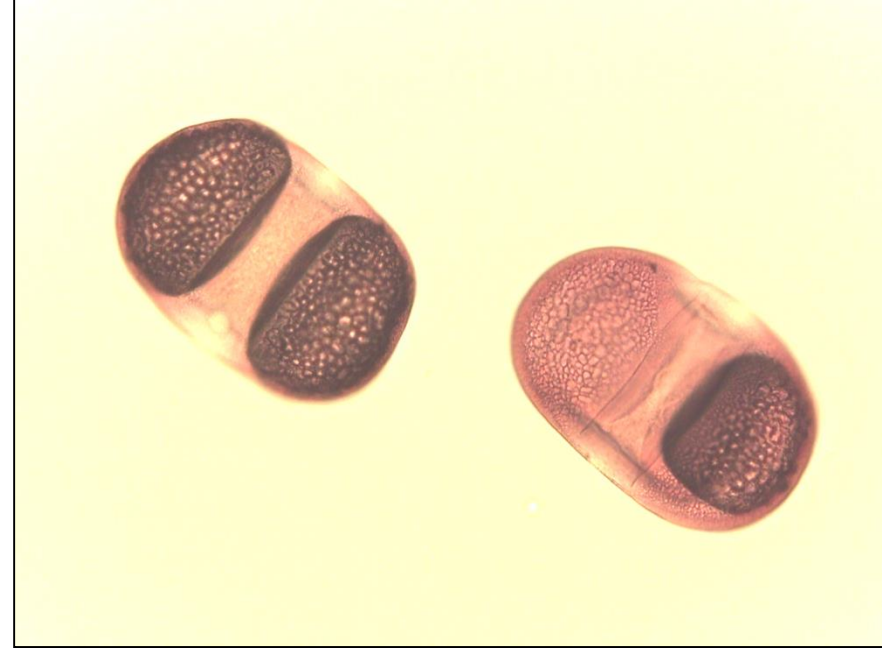
- Pollen - heteropolar, saccate (2 air-filled bladders), large (50-90 μm); the body is oblate ellipsoid, in the ventral surface the area is smooth
- **sacci** constricted at the point of attachment to the body
- **Esine**-in the body is thickest above the dorsal cap. Internal beams support the sacci.
- **Leptoma** in the ventral surface.
- **Intine** - in the body, variable in thickness.
- **Pollination period:** April – June

PICEA ABIES



PICEA SPP. (PINACEAE) (NORWAY SPRUCE)

- -Grains - heteropolar, saccate, large (75-115 μm); body is flattened ellipsoid; sacci not constricted at the point of attachment to the body.
- Exine - in the body, finely vermiculate
- **Leptoma**
- Intine - variable in thickness.
- Pollination period: May – June

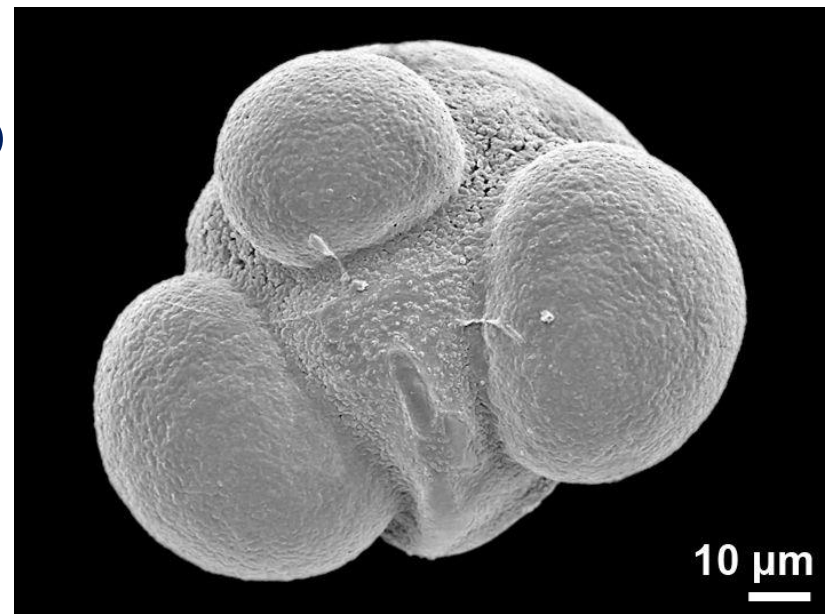


ABIES



ABIES SPP. (SPRUCE) (PINACEAE)

- Saccate, grain in 3 parts: body and 2 air-filled sacci:
- body, oblate ellipsoid, heteropolar,
- ventral surface with a smooth area between two sacci
- Sacci constricted at the point of attachment to the grain body;
- area of sac attachment small, distance between sacs larger,
- body of grain in size ranges 70-100 μm

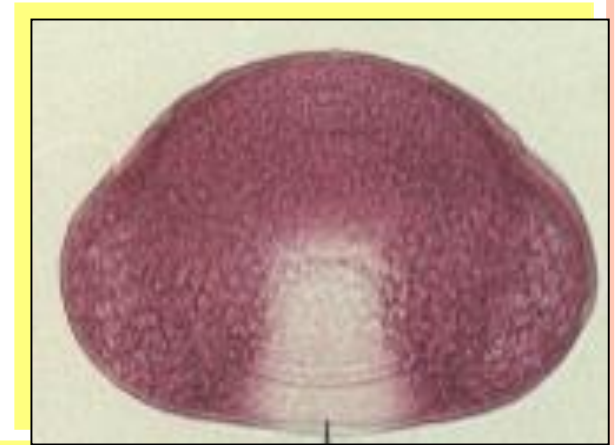


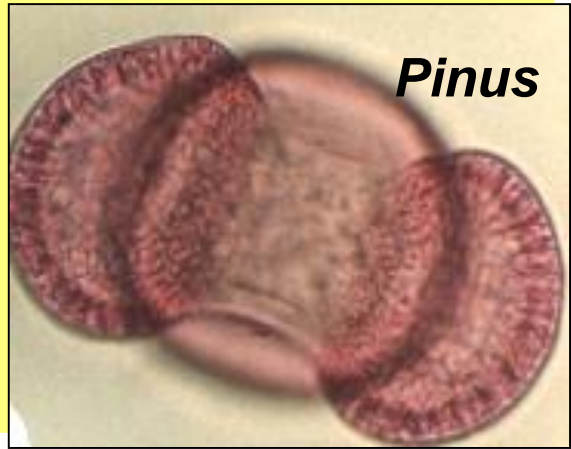
CEDRUS SPP.



CEDRUS SPP. (CEDAR) (PINACEAE)

- -Heteropolar, saccate (2 air-filled bladders), large (50-80 μm);
- -bladders (sacci) hemispherical, body spheroidal, ventral surface smooth (LEPTOMA)
- -Intestine of the body variable in thickness (2-9 μm)
- Pollination period : Fall





Pinus

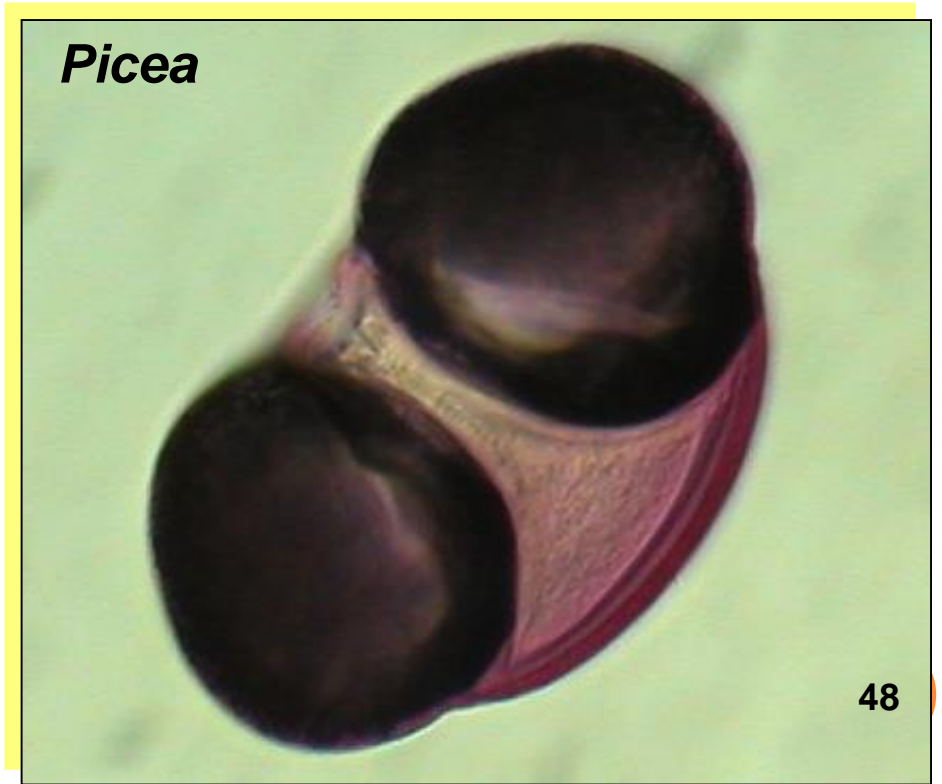


Cedrus

SACCATI



Abies



Picea

CUPRESSACEAE





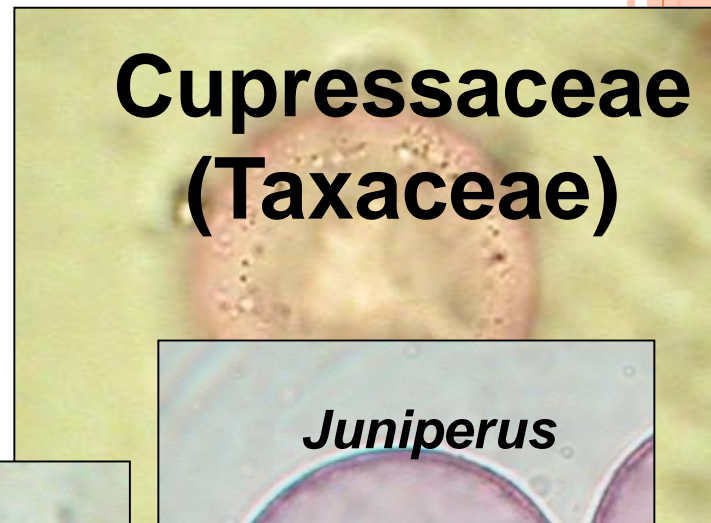
Cupressus

Taxus:

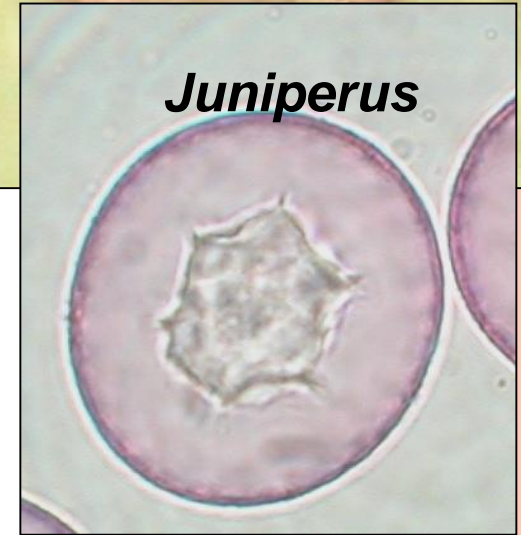
Exine, often bursting and extruding intine and contents, usually with a thin area on one side.



Taxus



Cupressaceae (Taxaceae)



Juniperus

Grains - inaperturate, apolar, spheroidal, rather small to rather large (20-30 μ m); the cytoplasm is spheroidal or stellate, packed with spherical granules;

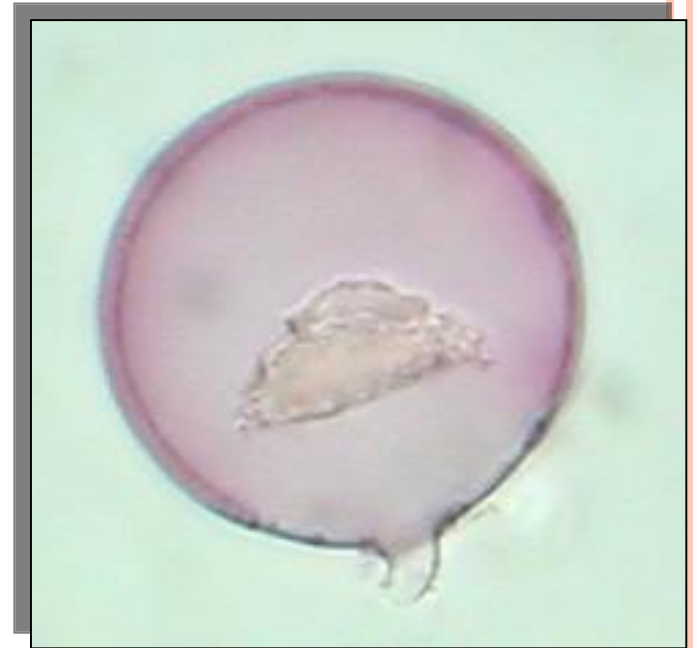
Exine - rather thin, smooth or unevenly granular;

Intine - thick (2-11 μ m), the thickness varying to correspond with the shape of the more or less stellate contents.

Pollination period: December - May

Allergenicity activity: moderate - high

CRYPTOMERIA JAPONICA



- Sferico, 32-40 μm , aperture papillate con intina estroflessa a formare un beccuccio o “papilla delle Taxodioide” comune anche a *Sequoia* e *Taxodium* (pollinazione tra febbraio e aprile)



ACACIA



ACACIA SPP. (MIMOSA) **(LEGUMINOSAE)**

- Polyad composed of 16 cells,
- The whole grain flattened and lens shaped, more or less rounded, oblate or peroblate, 25 x 50 μm ;
- Exine, medium thickness on external walls of cells, much thinner on internal ones,
- Intine rather thin, but thicker at corners of central cells.

