Pollen morphology

Dr Matt Smith & Prof Carmen Galán
The pollen grain - Dispersal units

- Monad
- Vesiculate/saccate
- Dyad
- Tetrad
- Polyad
- Pollinium
The pollen grain

- **Polarity**
- **Isopolar** - The two poles are similar
- **Heteropolar** - The two areas are dissimilar.
- **Apolar** - The two polar areas can not be identified

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The pollen grain

When identifying pollen grains there are three characteristics to think of

1. **SIZE** (very small to “gigantic”)
2. **SHAPE** (e.g. oblate, spherical or prolate)
3. **STRUCTURE** (Apertures and exine sculpturing)
The pollen grain - Size

- very small grain: the diameter is <10 µm;
- small: the diameter is 10-24 µm;
- medium size: the diameter is 25-49 µm;
- large: the diameter is 50-99 µm;
- very large: the diameter is 100-200 µm;
- gigantic: the diameter > 200 µm.

Wind pollinated, airborne pollen grains normally range from 10 µm to 80 µm.
The pollen grain - Shape

• On the basis of the ratio between the length of the polar axis \((P)\) and the equatorial diameter \((E)\)

The following shapes are defined:

• \(< 0.50\): peroblate
• \(0.50 - 0.75\): oblate
• \(0.76 - 0.88\): suboblate
• \(0.89 - 0.99\): oblate-spheroidal
• \(1.00\): spherical
• \(1.01 - 1.14\): prolate-spheroidal
• \(1.15 - 1.33\): subprolate
• \(1.34 - 2.00\): prolate
• \(> 2.00\): perprolate

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The pollen grain - Shape

Oblate

P

E

Alnus viridis 10 μm

Prolate

P

E

Castanea sativa 10 μm

Spherical

P

E

Chenopodium album 10 μm

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The pollen grain - Structure
Apertures

- Inaperturate (Fig. 1)
- Leptomate (Fig. 2)
- Colpus, length/width > 2 (Figs 3-4)
- Pore, length/width < 2 (Figs 6-9)
- Sulcate (Fig. 10)
- Colporate, exoaperture colpus plus any other type (Figs 11-12)
- Pororate, exoaperture pore plus any other type (Fig. 13)
- Extoaperture (Fig. 14)
- Endoaperture (Fig. 15)
- Margo (Fig. 16)
- Anullus (Fig. 17)
- Operculum (Fig. 18)
- Vestibulum (Fig. 19)
- Costa (Fig. 20)
Range of aperture number, position and character

Non apertures
Monocolpate
Zonocolpate
Monoporate
Sulcate or Trilete
Sincolpate

Mono- (porate, colporate, coporoidate)
Di- (porate, colporate, coporoidate)
Tri- (porate, colporate, coporoidate)
Tetra- (porate, colporate, coporoidate)
Penta- (porate, colporate, coporoidate)
Hexa- (porate, colporate, coporoidate)
>6 Poly- (porate, colporate, coporoidate)

According to the arrangement of the apertures

Zono- or Stephano-

Peri- or Panto-
Stratification of the pollen wall

- EXINE
  - ectexine
  - endexine
- INTINE
- CITOPLASME

1. Pollen wall without tectum (intectate)
2. Pollen wall with tectum (tectate)
The pollen grain - Sexine sculpturing

- Psilate
- Scabrate
- Verrucate
- Reticulate
- Foveolate
- Perforate
- Equinate
- Regulate
- Striate
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