

Peronosporaceae (7 genera, 600 species) – downy mildews and blue molds

Obligate biotrophic plant pathogens (most hosts are dicots), **determinant sporangiophores (image)**, sporangia disperse like spores often referred to as **conidia** (singular conidium), direct germination of sporangia common; Only direct germination in *Pseudoperonospora* *Peronospora*, & *Bremia* – these taxa **lack opercula** on their sporangia - *Plasmopara* and *Pseudoperonospora* retain zoospores; **haustoria** present with one exception

Lifecycle typical of other Oomycota (*Plasmopara* fig)

Development of infection structures in *Bremia lactucae* – **appressorium**, primary vesicle, secondary vesicle, intracellular hyphae, haustoria

Importance of family

Plasmopara viticola (grapes) – native to N. Amer. Wild grapes, *Phylloxera* (root aphid) also native, Millardet and Bordeaux mixture (CuSO₄ and lime) (1882)

Peronospora tabacina (tobacco) – spread rate & origin

Bremia lactucae (on lettuce)

Evolutionary pattern - family is polyphyletic if *Phytophthora* is excluded from it.

Albuginaceae; Albugo(1 genus, 30 spp) – “white rusts”, **Sporangia in chains** under plant epidermis, arranged in a **sorus. (pl. spori)**, all obligate biotrophs

Life cycle of *A. candida*– very similar to *Plasmopara*, (or *Phytophthora*), with direct germination option, globose haustoria, zoospores emerge in a vesicle, parasite of the Brassicaceae

Important species *A. Ipomoeae-panduratae* – on sweet potato, *A. occidentalis* (spinach), *A. tragopogonis* –sunflower

"Rhipidiales" - 1 family, 6 genera (*Sapromyces*, *Aqualinerella*, *Rhipidium*), Segregated from Leptomatales, but conflicting placement in different trees, may be either with the Saprolegniomycetidae (LSU) or the Peronosporomycidae (COX2). 15 spp. elongate monocentric thalli, **stagnant water with low O₂ content**, obligately fermenting (e.g. *Aqualinerella*) - photo

Readings in your book 706-709, 723-729

The source of the trees, and for more information:

Large, E.C. 1940 – The advance of the Fungi. Holt and Co. New York. – a fun book to read about the early history of the potato famine, and *Plasmopara viticola*.

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- Petersen, A. B., and S. Rosendahl.** 2000. Phylogeny of the Peronosporomycetes (Oomycota) based on partial sequences of the large ribosomal subunit (LSU rDNA). *Mycological Research* **104**:1295-1303.
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- Thines M, Goker M, Telle S, Ryley M, Mathur K, Narayana YD, Spring O, Thakur RP.** 2008. Phylogenetic relationships of graminicolous downy mildews based on cox2 sequence data. *Mycological Research* **112**:345-351.