

Websites to brush up on Ascomycete diseases

- Powdery mildews (cleistothecium)

<http://www.apsnet.org/education/LabExercises/PowderyMildew/Top.html>

- White mold (apothecium)

<http://www.apsnet.org/education/LessonsPlantPath/WhiteMold/default.htm>

- Applescab (perithecium)

<http://www.apsnet.org/education/LessonsPlantPath/AppleScab/default.htm>

- Eastern filbert blight (perithecium)

<http://oregonstate.edu/dept/botany/epp/EFB/>

Fig. 14. Ascospores being discharged from apothecia of *Sclerotinia minor*.

J. Hao, K.V. Subbarao, and J. M. Duniway

APS Image resources



Course Content Up To Now

Theme 1: What is a disease?

What do the symptoms (& signs) tell us about the host's condition?

Theme 2: Disease cycles

How, specifically, does the pathogen turn the primary cycle?

Does the pathogen turn a secondary cycle?

Theme 3: Pathogen life strategies

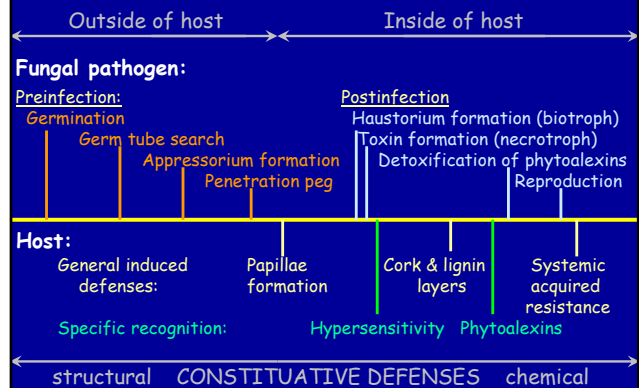
How does the pathogen cope in the world of the living?

... of the dead?

Last Theme Before Midterm: Infection

Life is a dynamic struggle, even for those that excel at it

TIME-LINE OF INFECTION



Step 1: Getting inside the plant

Pathogen group:

Fungi: Host entry is an active process
forceful penetration (or wound or natural openings)

Bacteria: Entry active but not forceful
requires wound or natural opening

Viruses: Entry is passive
requires wound or vector

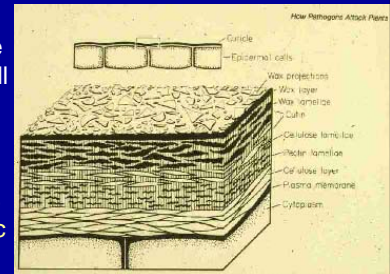
Nematodes: Entry is active
forceful penetration

Handout

Direct attack by fungal pathogens

Structure and composition of the cuticle and cell wall of foliar epidermal cells

Pathogens must possess enzymes to dissolve specific structural components of the external wall

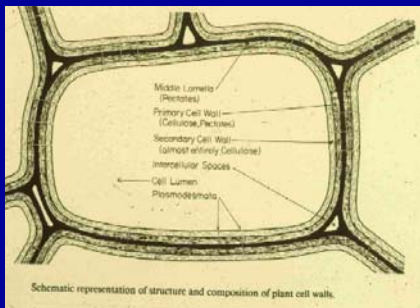


Attack inside the plant

Structure and composition of plant cell walls

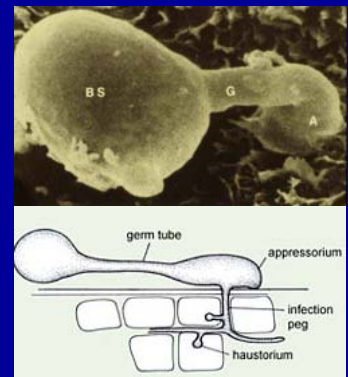
Enzymes to attack:

cutinases,
cellulases,
pectinases,
hemicellulases,
lignases,
lipases and
proteases



Fungal Infection: Appressoria

Hyphal ends swell to produce a structure termed an **appressorium** (infection cushion). A penetration peg emerges from the side of the appressorium in contact with the host surface

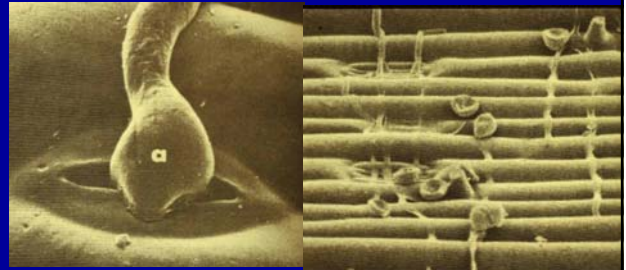


Fungal Infection: Germ tube search



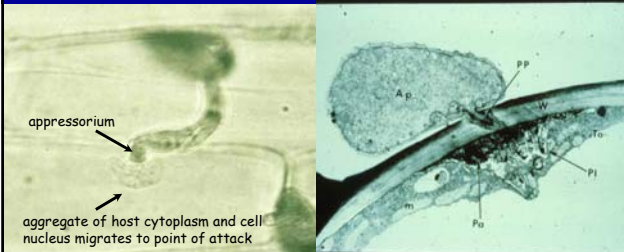
Bean rust pathogen forms an appressorium directly over stomate, thereby reducing the need for numerous enzymatic tools

Fungal Infection: Germ tube search

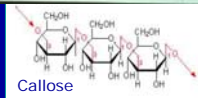


Bean rust pathogen forms an appressorium over stomate of plastic replica of bean leaf but not over stomate of plastic replica of wheat leaf – germ tube growth is perpendicular to cross walls of wheat epidermal cells – why?

Fungal Infection: Penetration peg

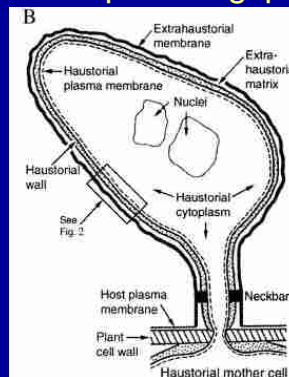


In addition to structural components of the cell wall, the penetration peg also may have to pass through a papilla (wound plug) that the host cell has constructed in an attempt to repair the damaged wall



<http://bugs.bio.usyd.edu.au/learning/resources/PlantPathology/infection/movie/penetration.html>

Biotrophic fungi produce a haustorium



The host plasma membrane stretches to envelope the haustorium
 Secreted fungal growth regulators induce alterations that change the size and permeability of the membrane – the altered host membrane is renamed the 'extrahaustorial membrane'

