THE L&R GROUP

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Aspergillus/Penicillium

Mitosporic ("mitosis" and "sporic") fungus. Hyphomycetes. Teleomorphs (sexual state): Eurotium, Neosartorya, Emericella (Ascomycetes).

Characteristics

Distribution
Ubiquitous. Approx. 200 species.

Where Found
Soil, decaying plant debris, compost piles, stored grain. Abundant and adaptive organisms that can tolerate extreme temperatures, pH levels, restricted water availability, and radiation.

Mode of Dissemination
Dry spore. Wind.

Growth Indoors
On a wide range of substrates. Water requirements range widely (dependent on species). Aw=0.71-0.94 (minimum for various species).

Industrial Uses
Many, including practical applications in food production. For example, A. oryzae is used to ferment soybeans to soy sauce. A. terreus produces mevinolin which can reduce blood cholesterol; A. niger is used in the bread and beer making industries (enzyme production) and is able to decompose plastic. A. niger and A. ochraceus are used in cortisone production.

Other Comments
Aspergillus is one of the most common fungal genera, worldwide, and Aspergillus fumigatus is one of the most common species found.

Potential Health Effects

Allergens
Common. Type I allergies (hay fever, asthma). Type III hypersensitivity pneumonitis: Humidifier lung, Malt worker's lung, Compost lung, Wood trimmer's disease, Straw hypersensitivity, Farmer's lung, Oat grain hypersensitivity, others. Other: A. fumigatus: allergic bronchopulmonary aspergillosis (ABPA), allergic fungal sinusitis.

Potential Opportunist or Pathogen
Respiratory, invasive, cutaneous, ear, and corneal disease. Severe, invasive disease is usually associated with immunosuppressed hosts. Many species grow at 37°C (body temperature). A. fumigatus: fungus ball and invasive disease. A. flavus: nasal sinus lesions, invasive disease. A. niger: "Swimmer's ear," and invasive disease.

Potential Toxin Production
Partial list: A. flavus: aflatoxin B1 & B2, cyclopiazonic acid, kojic acid. A. fumigatus: ergot alkaloids, fumigaclavines, gliotoxin, fumigatoxin, fumigillin, fumitremorgens, helvolic acid, tryptoquivaline tremorgens, verruculogen. A. niger: malformin C, oxalic acid. A. ustus: austocystins. A. versicolor: aspercolorin, averufin, cyclopiazonic acid, sterigmatocystin, versicolorin.

Laboratory Notes

Growth/Culture Characteristics
Aspergillus species grow well on general fungal media. Some xerophilic species prefer dryer conditions.

Spore Trap Recognition
Free spores are indistinguishable from Penicillium, and other genera with small round to oval colorless spores. Penicillium/Aspergillus spores may have remnants of cell wall connections.