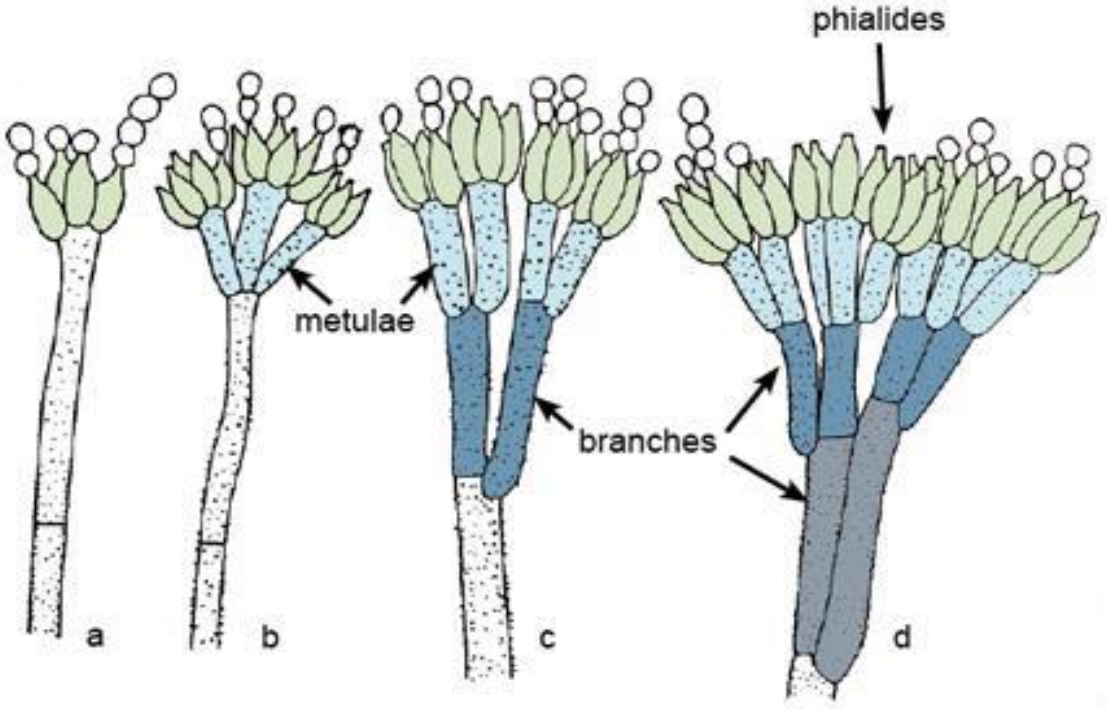
Penicillum
and other fungi

Penicillium

- Penicillum is a genus of ascomycetous fungi that is part of the mycobiome of many species and is of major importance in the natural environment, in food spoilage, and in food and drug production.

Morphological structures and types of conidiophore branching in *Penicillium* (a) Monoverticillate; (b) Biverticillate; (c) Terverticillate; (d) Quaterverticillate



Culture

Morphological description

- Colonies are usually fast growing, in shades of green, sometimes white, mostly consisting of a dense felt of conidiophores. Microscopically, chains of single-celled conidia are produced in basipetal succession from a specialised conidiogenous cell called a phialide. The term basocatenate is often used to describe such chains of conidia where the youngest conidium is at the basal or proximal end of the chain.

pathogenicty

- *Penicillium* is ubiquitous fungi, usually found as saprophytes. Only a few species are considered to be important in human or animal disease. However, many otherwise be nign species are supreme opportunists and have been found increasingly as invaders of the immunocompromised.
- ochratoxins, produced by *Penicillium verrucosum*, mau cause toxicity

Malassezia

- *Malassezia* species are naturally found on the skin surfaces of many animals, including humans. In occasional opportunistic infections, some species can cause hypopigmentation or hyperpigmentation on the trunk and other locations.

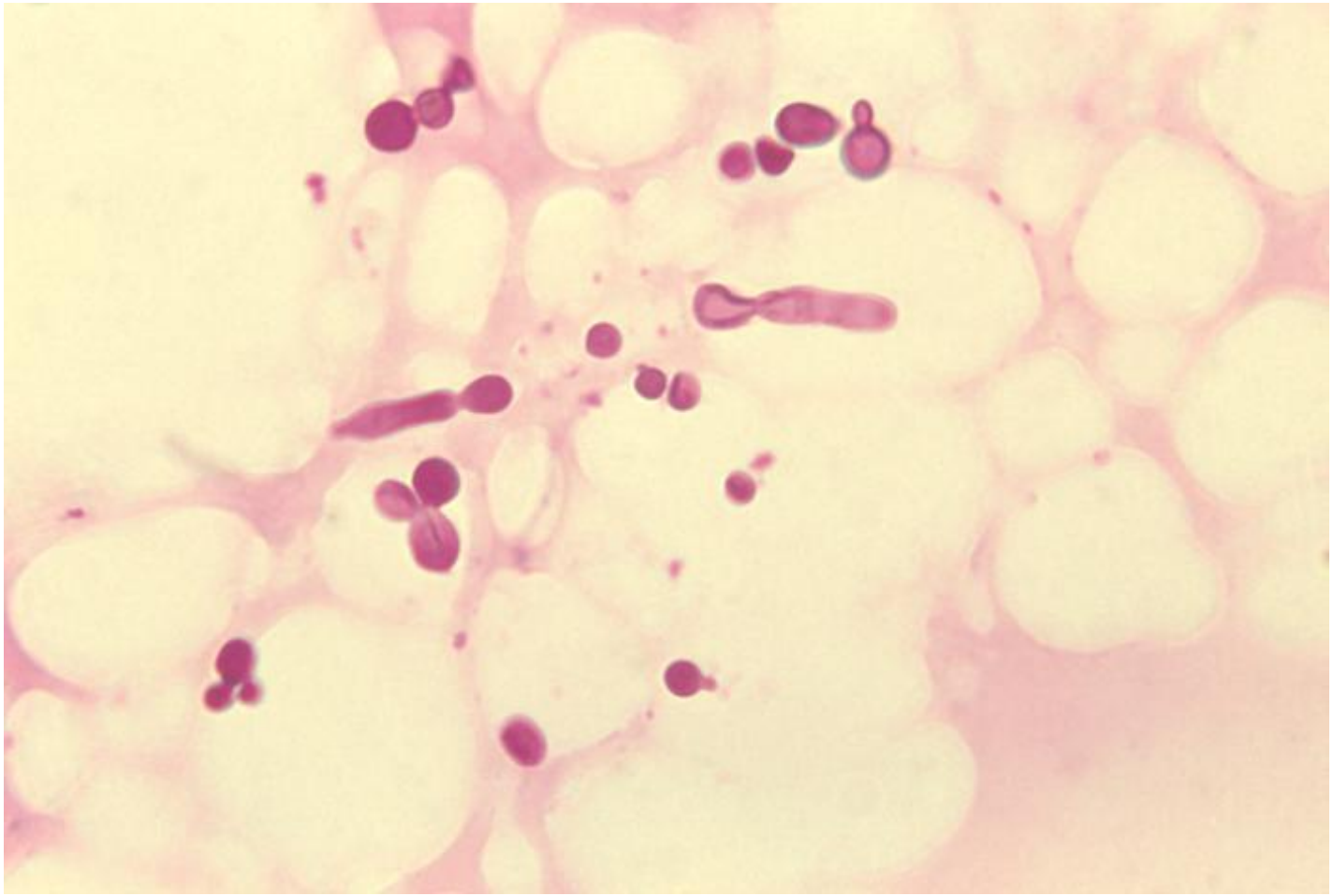
Species

- *Pityrosporum (Malassezia) ovale*, which is lipid-dependent and found only on humans. *P. ovale* was later divided into two species, *P. ovale* and *P. orbiculare*, but current sources consider these terms to refer to a single species of fungus, with *M. furfur* the preferred name.
- *Pityrosporum (Malassezia) pachydermatis*, which is lipophilic but not lipid-dependent. It is found on the skin of most animals.

Pathogenicity

- Identification of *Malassezia* on skin has been aided by the application of molecular or DNA-based techniques. These investigations show that the *Malassezia* species causing most skin disease in humans, including the most common cause of dandruff and seborrhoeic dermatitis, is *M. globosa* (though *M. restricta* is also involved).The skin rash of tinea versicolor (*pityriasis versicolor*) is also due to infection by this fungus.
- As the fungus requires fat to grow, it is most common in areas with many sebaceous glands: on the scalp,face, and upper part of the body. When the fungus grows too rapidly, the natural renewal of cells is disturbed, and dandruff appears with itching (a similar process may also occur with other fungi or bacteria).

Malassezia furfur in skin scale from a patient with tinea versicolor



Dimorphic fungi

- **Dimorphic fungi** are fungi that can exist in the form of both mold and yeast. This is usually brought about by change in temperature and the fungi are also described as **thermally dimorphic fungi**. An example is *Talaromyces marneffei*, a human pathogen that grows as a mold at room temperature, and as a yeast at human body temperature.
- The term dimorphic is commonly used for fungi that can grow both as yeast and filamentous cells, however many of these dimorphic fungi actually can grow in more than these two forms. Dimorphic is thus often used as a general reference for fungi being able to switch between yeast and filamentous cells, but not necessary limiting more shapes.[4][a]

Candida albicans growing as yeast cells and filamentous (hypha) cells

- Several species of dimorphic fungi are important pathogens of humans and other animals, including *Coccidioides immitis*,*Paracoccidioides brasiliensis*, *Candida albicans*,*Blastomyces dermatitidis*, *Histoplasma capsulatum*,*Sporothrix schenckii*,and *Emmonsia* sp.Some diseases caused by the fungi are:
- sporotrichosis
- blastomycosis
- histoplasmosis
- coccidioidomycosis
- paracoccidioidomycosis
- talaromycosis
- candidiasis

- Occur as moulds in the environment and as yeast forms in animal tissues
- Saprophytes in soil and in decaying vegetation
- Produce opportunistic infections in animals and humans

- ***Blastomyces dermatitidis:***
- -Saprophyte in soil enriched with organic matter
- -Cells budding on a broad base in tissues
- -Causes blastomycosis in dogs and humans
- ***Coccidioides immitis:***
- -Saprophyte in arid soils
- -Large spherules containing endospores
- demonstrable in infected tissues
- -Causes coccidioidomycosis in dogs, horses and
- humans; often asymptomatic in other species
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- ***Histoplasma capsulatum:***
- -Saprophyte in soil enriched with bird faeces
- Small yeast cells demonstrable in macrophages
- --Causes histoplasmosis in dogs, cats and humans;
- uncommon in other species .
- ***Histoplasma farciminosum:***
- Saprophyte in soil yeast cells in macrophages
- --Causes epizootic lymphangitis in ***Equidae***
- ***Sporothrix schenckii:***
- -Saprophyte on vegetation
- -Cigar-shaped yeast cells demonstrable in
- infected tissues and exudates
- -Causes sporotrichosis in horses, cats, dogs,
- conidiophores

Rhinosporidium

- ***Rhinosporidium seeberi*** is a eukaryotic pathogen responsible for rhinosporidiosis, a disease which affects humans, horses, dogs, and to a lesser extent cattle, cats, foxes, and birds. It is most commonly found in tropical areas, especially India and Sri Lanka.

Transmission

- Demellow's theory of infection
- Karunarathnae's autoinoculation theory
- Haematogenous spread – to distant sites
- Lymphatic spread – causing lymphadenitis (rare)
- Demellow postulated that while bathing in common ponds, the nasal mucosa came into contact with infectious material. Karunarathnae proposed that the satellite lesions in skin and conjunctival mucosa arose as a result of autoinoculation.

Lesions

- This organism infects the mucosa of the nasal cavity, producing a mass-like lesion. This mass appears to be polypoidal in nature with a granular surface speckled with whitish spores. The rhinosporidial mass has been classically described as a strawberry-like mulberry mass. This mass may extend from the nasal cavity into the nasopharynx and present itself in the oral cavity