



Published in final edited form as:

*Mycoses*. 2014 December ; 57(0 3): 1. doi:10.1111/myc.12250.

## Emerging zygomycetes: an emerging problem in the clinical laboratory

Sybren de Hoog, Ashraf S. Ibrahim, and Kerstin Voigt

This supplement of 'Mycoses' is devoted to infections caused by a group of fungi traditionally known as the zygomycetes. The *Zygomycota* represent an important group of medically important opportunistic fungi, which cause devastating fungal infections in humans and animals with severe underlying immune or metabolic disorders. These infections are increasing in numbers due to the growing populations of patients with uncontrolled diabetes and immunosuppression, as well as the increased use of prophylactic measures against other hospital infections using drugs that are ineffective against *Zygomycota* organisms.

The *Zygomycota* has been one of the ancestral phyla in the fungal Kingdom. The second class, the *Trichomycetes* contains phylogenetically diverged groups of organisms united based on their ecological requirement as endocommensals in the digestive tract of the aquatic insect larvae or other arthropods. Under the influence of molecular phylogeny the *Zygomycota* as a distinct phylum has changed significantly over the past decades. The group disintegrated into the five subphyla of *Entomophthoromycotina*, *Kickxellomycotina*, *Mortierellomycotina*, *Mucoromycotina* and *Zoopagomycotina*. These subphyla are too distantly related from each other to compose a single group higher up in the hierarchy.

These changes have little impact on medical mycology, since just the umbrella term has disappeared and the major types of mycoses are still distinguishable into: (i) the preponderantly chronic entomophthoromycoses; (ii) the rapidly progressive mucormycoses; and (iii) the few representatives of *Mortierellomycotina* causing bovine abortion. Clinical parameters in main traits coincide with the above taxonomic and phylogenetic tripartition.

The *Mucorales* is by far the largest order of the lower fungi, with nearly 240 species in 48 genera. In the interest of nomenclatural stability, common generic names such as *Mucor* and *Rhizopus* were preserved as presently applied. In their natural habitat the fungi comprise a wide morphological and ecological diversity as saprobes or opportunistic pathogens. The *Mucorales* are generalistic fungi having importance as biotransforming agents of pharmacological and chemical compounds and are extensively used in the food industry. The same, thermotolerant species – mostly belonging to the genera *Lichtheimia*, *Rhizomucor* and *Rhizopus* – are found to occur as agents of infection. This remarkable duality of good and bad united in the same individual must be explained by properties needed in their natural habitat, which are as yet only fragmentarily understood. The *Mucorales* are

cosmopolitan, and are amongst the most widespread fungi, but regional differences exist in prevalence between different patient populations.

The *Entomophthorales*

This special issue touches numerous aspects of opportunism in *Mucorales* and *Entomophthorales*, ranging from clinical aspects and different patient populations to taxonomy and virulence studies.