

# Infection Biology and Molecular Biotechnology

The Department of Molecular and Applied Microbiology (MAM) studies the infection biology of fungi, the ecological function of natural products and their importance for the structuring of microbiomes, and develops biotechnological solutions for the discovery/production of new drugs and therapies for infectious diseases. The department is divided into several research teams:

- Pathobiology of *Aspergillus fumigatus* and novel strategies for the therapy of infections: Immune evasion and host-pathogen interaction as well as extracellular vesicles.
- Functional microbiome research and natural products as a chemical language for microbial communication / Molecular biotechnology of natural products
- Eukaryotic transcription factors
- Pathogenicity and biodiversity of the Mucorales

*Aspergillus fumigatus* is the most medically important airborne human pathogenic fungus. It can cause allergic diseases as well as systemic, life-threatening infections. Because the diagnosis of invasive aspergillosis (IA) is very difficult and only a small number of effective antifungal therapeutics are available, the mortality of invasive aspergillosis is very high. The pathogenicity mechanisms of *A. fumigatus* are also poorly understood. Scientists of the MAM have discovered pathogenicity factors and are conducting research on the biology and virulence of *A. fumigatus*, as well as on immune and epithelial cells, to understand their response to and defence against infection. Additional studies now underway are increasingly focused on elucidating features of the lung microbiome that contribute to health and disease. Of particular interest are immune evasion strategies that allow the fungus to subvert the host response. To this end, MAM members use functional genomics methods on fungi, immune and epithelial cells, including knockout mouse models, as well as transcriptomics, proteomics, FACS analyses and innovative protein characterisation methods. The findings are applied to improve diagnosis and therapy.

Fungi produce a variety of natural products, e.g. antibiotics. In the field of natural products, the department focuses on the importance of these compounds for microbial communication and structuring of microbial consortia (microbiomes) as well as biotechnology and development of microbial active compounds/antibiotics. We have succeeded in discovering new principles of communication through natural products in the interaction between microorganisms, as well as identifying for the first time natural products that significantly determine this interaction.