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Master Projects in Fungal Cell Biology using state-of-the-art optical approaches

Worldwide, fungal infections cause significant morbidity and mortality and *Candida* species are major etiological agents of such life-threatening infections. *Candida albicans*, a normally harmless commensal, is found on mucosal surfaces in most healthy individuals, yet it can cause superficial as well as life-threatening systemic infections. As an opportunistic pathogen it can colonize and infect different body sites and is responsible for one of the most predominant fungal nosocomial infections. The ability of this fungus to switch from an ovoid to a filamentous form, in response to environmental cues, is critical for its pathogenicity, in particular its ability to invade and penetrate into host tissues and evade/burst out of host immune cells. Underlying this dramatic morphological transition is a striking reorganization of membrane traffic and organelles, which ultimately results in the extensive delivery of new material to a unique location (filament tip) over hours. Furthermore, this dramatic cell shape change is a distinct advantage for studying cell polarity and cellular reorganization.

There are two Master projects to be carried out in the *Polarized growth in yeast* team (http://ibv.unice.fr/research-team/arkowitz/) at Institute of Biology Valrose (http://ibv.unice.fr/) of the University of Côte d'Azur in Nice:

1) ***Light-dependent perturbation of fungal filamentous growth***
   We have recently optimized and established an optogenetic approach in *C. albicans* filamentous cells that gives us exquisite control of cell polarity in this fungal pathogen. In this project our goal is to elucidate the interaction between two potential growth sites within the cell, as well as how different membrane compartments contribute to the initiation and stabilization of a new growth.

2) ***Secretory vesicle organization and flux during dramatic morphology changes***
   The tip region of the filament is densely packed with multiple, highly dynamic membrane compartments including Golgi cisternae, endoplasmic reticulum, endocytosis sites, and secretory vesicles. Very recently we have taken advantage of a nanobody-based approach to perturb protein function in this human fungal pathogen and this project will use such an approach to alter membrane traffic, in particular the dynamics and targeting of secretory vesicles.

These projects use a combination of molecular biology, microbiology and live-cell multi-wavelength microscopy to perturb and follow filamentous growth in this fungal human pathogen, as well as probe connections between membrane traffic, cell morphology and growth. They are both an excellent introduction to cutting-edge cell biological approaches applied to a major fungal pathogen.

Interested candidates please contact R. Arkowitz (arkowitz@unice.fr)

References

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