UMR7277 UMR1091

# Doctoral position at University Côte d'Azur: Fungal Cell Biology

## Organelle dynamics in a human fungal pathogen at high temporal and spatial resolution

Worldwide, fungal infections cause significant morbidity and mortality and Candida species are the major etiological agent of such life-threatening infections and represent an emerging global microbial threat. A range of advances in medical

treatment have increased life expectancy yet also dramatically increased the population of elderly as well as severely ill patients, highly susceptible to nosocomial infections, in particular those caused by fungi such as *Candida albicans*. *C. albicans* is normally a harmless commensal, found on mucosal surfaces of the gastrointestinal and urogenital tract in most healthy individuals that causes superficial as well as life-threatening systemic infections in response to alterations of its host environment. It is particularly aggressive in immuno-compromised individuals. The ability of this organism to switch from an ovoid to a filamentous form, concomitant with changes in cell surface antigens and enzyme production, is critical for its pathogenicity, in particular to invade host tissues and evade host immune cells. Many fungi, including *C. albicans* form elongated hyphal filaments that are tube-like cells in which growth is restricted to the tip. This dramatic yeast to filament cell shape change is a distinct advantage for studying the regulation of cell polarity and membrane traffic, critical for such morphogenesis. However, the hyphal apical zone is densely packed, with multiple membrane compartments including secretory vesicles below the light resolution limit and somewhat larger Golgi cisternae in a small volume at the filament tip and these compartments are highly dynamic making live cell imaging extremely challenging, in particular with high temporal and spatial resolution.

To understand the exquisite regulation of tip growth, the aim of this project is to quantitate the movement of membrane compartments in 3D with high spatial and temporal resolution. Conventional methods including fluorescence microscopy and electron microscopy suffer from either limited spatial or temporal resolution, whereas of super-resolution microscopy approaches, has made imaging with a resolution higher than that imposed by the diffraction limit of light possible. This interdisciplinary project (carried out with Laure BLANC-FERAUD, I3S Laboratory – UMR CNRS 7271) will take advantage of fluorescent molecule blinking and their fluctuations over time, to generate super-resolved images with high temporal resolution. The goal of this project is to develop, optimize and apply such methods, specifically adapted to a multimodal microscope established at the iBV, to the investigate the reorganization of the membrane compartments during *C. albicans* filamentous growth, with high temporal and spatial resolution. This project will involve extensive state-of-the-art microscopy as well as optimization of image reconstruction and analyses computational algorithms.

We are seeking highly motivated candidates with a background in Cell Biology and interest in live cell imaging. Experience in Microbiology would be a plus.

Interested candidates can contact R. Arkowitz (arkowitz@unice.fr) by June 1st


1) M Bassilana, C Puerner & RA Arkowitz. *Curr. Opin. Cell Biol*. 2020 **62**:150-158.
2) PM Silva, C Puerner, A Seminara, M Bassilana & RA Arkowitz. *Cell Rep*. 2019 **28**:2231–2245.
3) RA Arkowitz & M Bassilana. *F1000 Res*. 2019 8.
4) A Weiner, F Orange, S Lacas-Gervais, K Rechav, V Ghugtyal, M Bassilana & RA Arkowitz. *Cell Microbiol.* 2019 21: e12963
5) H Labbaoui, S Bogliolo, V Ghugtyal, NV Solis, SG Filler, RA Arkowitz & M Bassilana. *Plos Pathog*. 2017 13: e1006205