



Master Biologie Moléculaire et Cellulaire 'BMC',  
Université Paris Cité - UFR Sciences du Vivant

Parcours : **Biologie et Développement Cellulaires 'BDC'**

<https://master2bdc.ijm.fr/>

Fiche de Projet de Stage de M2, 2024-2025

<b>Unité INSERM ou CNRS ou Université :</b> U1135, Cimi-Paris	<b>Responsable du Stage :</b> Allon WEINER
<b>Intitulé Equipe :</b> Dynamics, structure and molecular biology of fungal invasion	<b>Contacts</b> Adresse : 91 Boulevard de l'Hôpital 75013 Paris
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**Titre du projet :** Mechanisms of invasion and damage of the human fungal pathogen *Candida albicans* into epithelial layers investigated by live cell imaging and damage sensitive reporters

**Résumé du Projet de Stage** (en 300 mots maximum, mots clés en gras)

**Fungal pathogens** account for as many deaths each year as tuberculosis or malaria. The opportunistic fungal pathogen *Candida albicans* colonizes the skin, genital and intestinal mucosa of most healthy individuals and is part of the normal commensal flora. In susceptible hosts, *C. albicans* can invade the gastrointestinal mucosa and enter the bloodstream, leading to severe systemic infection. ***C. albicans* invasion into epithelial layers** presents a challenging arena for investigation, as it encompasses a complex set of inter-species interactions shaped over millions of years of evolution in a so called "arms race". Events at this interface are often highly transient and involve pathogen subversion of host pathways, as well as the activation of host defense mechanisms. Understanding *C. albicans* invasion is a major challenge, requiring a combination of dynamic, structural and molecular approaches. The aim of our group is to study **the mechanisms of *Candida albicans* invasion and damage in epithelial layers at the single cell level using multi-dimensional fluorescent microscopy, cell biology and correlative light and electron microscopy**. The objective of this M2 project is to study the mechanisms underlying *C. albicans* invasion, damage and **trans-cellular tunneling**, a phenomenon first reported in our team (Lachat et al. Nature Communications, 2022), and understand the cellular and molecular events at different stages of infection of human epithelial cell lines. This M2 internship will allow the selected candidate to acquire a range of technical skills, including fungal and **human cell culture, live cell imaging using a state-of-the-art spinning disk confocal microscope, image processing and quantitative image analysis**. Candidates who are excited by fundamental research of fungal-host interactions its underlying cell biology using cutting-edge microscopy approaches, and that want to eventually peruse a PhD are strongly encouraged to apply.

**Publications de l'équipe relatives au projet de stage (max 5)**

1. Tunnel ou dommage? Les pathogènes fongiques entrent dans la lumière  
Allon Weiner , Med Sci (Paris), 2023 Apr;39(4):328-330.
2. Trans-cellular tunnels induced by the fungal pathogen *Candida albicans* facilitate invasion through successive epithelial cells without host damage.  
Lachat J., Pascault A., Thibaut D., Le Borgne R., Verbavatz J.M., Weiner A. Nat Commun 13, 3781 (2022).
3. On-site secretory vesicle delivery drives filamentous growth in the fungal pathogen *Candida albicans*.  
Weiner A., Orange F., Lacas-Gervais S., Rechav K., Ghugtyal V., Bassilana M., Arkowitz R.A. Cell Microbiol. (2018).