**DOTTORATO DI RICERCA IN BIOLOGIA CELLULARE E DELLO SVILUPPO**

**38 CYCLE**

**Project proposal for a Sapienza PhD scholarship**

**Other research line**

**Title:** **Yeast response to environmental factors: metabolism and regulation**

**Supervisor:** **Michele M. Bianchi (michele.bianchi@uniroma1.it)**

**Co-supervisor:**

**Summary (max 300 words)**

The research line aims to study the response to environmental signals in the biotechnological yeast Kluyveromyces lactis (low oxygen, high carbon dioxide, light/dark exposure). In detail, the role of key carbon dioxide metabolic enzymes will be investigated, such as Carbonic Anhydrase, Acetyl-CoA Carboxylase and Pyruvate Carboxylase, especially by studying elements involved in transcription regulation. Among transcription regulators, KlMga2 will be considered in the research because of its involvement in the response to environmental stress, in maintenance of cell fitness and in lipid biosynthesis. Studies on KlMGA2 will allow to connect lipid metabolism with hypoxia and light, which is essential in studies of cellular adaptation to environmental changes. Carbonic Anhydrase studies will be fundamental for studies and biotechnological applications involving CO2 fixation from atmosphere.

**Pertinent Publications of the proponent (last 5 years)**

1. Santomartino R. et al. “Three, two, one yeast fatty acid desaturases: regulation and function” WORLD J. MICROBIOL. BIOTECHNOL. (doi: 10.1007/s11274-017-2257-y) **33**, 89 (2017).
2. Santomartino R. et al. “The hypoxic transcription factor *Kl*Mga2 mediates the response to oxidative stress and influences longevity in the yeast *Kluyveromyces lactis*” FEMS YEAST RES. **19**, foz020 (doi: 10.1093/femsyr/foz020) (2019).
3. Santomartino R. et al.“The hypoxic expression of the glucose transporter *RAG1* reveals the role of the bHLH transcription factor Sck1 as a novel hypoxic modulator in *Kluyveromyces lactis*” FEMS YEAST RES. **19**, foz041 (doi: 10.1093/femsyr/foz041) (2019).
4. Camponeschi I. et al. “Phenotypic suppression caused by resonance with light-dark cycles indicate the presence of a 24-hours oscillator in yeast and suggests a new role of intrinsically disordered protein regions as internal mediators” J. BIOMOL. STRUCTURE & DYNAMICS. (doi:10.1080/07391102.2020.1749133) (2020).
5. Camponeschi I., Montanari A., Beccaccioli M., Reverberi M., Mazzoni C. and Bianchi M.M. “Light-stress response mediated by the transcription factor KlMga2 in the yeast Kluyveromyces lactis” FRONT. MICROBIOL. doi: 10.3389/fmicb.2021.705012 (2021).