SCIENCES & BIOENGINEERING SCIENCES

The Research Group
Ecology, Evolution & Genetics

has the honor to invite you to the public defence of the PhD thesis of

Ducret Hugo

to obtain the degree of Doctor of Sciences

Joint PhD with Université libre de Bruxelles

Title of the PhD thesis:
Exploring light-driven phenotypic variations in corals and their ecological consequences

Supervisors:
Prof. dr. Marc Kochzius (VUB)
Prof. dr. Jean-François Flot (ULB)

The defence will take place on

Friday, December 12, 2025 at 5 p.m. in the Solvay Room (ULB Plaine Campus - Building NO: 2.NO.5.07)

The defence can be followed through a live stream:
https://us02web.zoom.us/j/2720975650?pwd=SHV3RmplZ2w0eVBVaU1DZWkxTzVZZz09

Members of the jury

Prof. dr. Isabelle George (ULB, chair)
Prof. dr. Kim Roelants (VUB)
Prof. dr. Sophie de Buyl (VUB)
Prof. dr. Matthieu Defrance (ULB)
Prof. dr. Jeroen van de Water (NIOZ, NL)
Prof. dr. Iliana Baums (Universität Oldenburg, DE)

Abstract of the PhD research

Coral reefs are solar-driven ecosystems that provide valuable ecosystem services, and that thrive under a wide range of light habitats, from shallow to mesophotic depths. Although light intensity plays a central role in their biology, knowledge gaps persist in our understanding of the mechanisms by which corals can acclimate to very distinct light habitats. In addition, observations showing that bleaching usually reduces with depth, i.e. with decreased irradiance levels, suggests that decreased light intensity during heat stress mitigates bleaching outcomes. However, acclimation to lower light intensities may lower coral's stress tolerance. Here, the general objective of this thesis is to explore the mechanisms and the consequences of light acclimation in hard corals, with the depth-generalist *Montipora capitata* as a model species. To do so, I fragmented nine *M. capitata* into six pieces each, exposed one half of the fragments at ambient light and the other half at 73% shaded light, and grew them for two years. Then, I first used a trait-based approach and sequencing of the ITS2 marker gene in Chapter II, to test whether light intensity induces phenotypic plasticity and changes in symbiont community structure. Further, I used data-independent acquisition (DIA) proteomics to identify significantly more abundant proteins and enriched biological functions in both light conditions. Lastly, I tested whether acclimation to different light intensity changed heat and light tolerance, using the recently-developed Coral Bleaching Automated Stress System (CBASS). The results of this Ph.D. show that colony-scale phenotypic plasticity is a core aspect of light acclimation in *M. capitata*, and that high-light and low-light acclimated fragments originating from the same genotypes exhibited different sets of significantly more abundant proteins. We hereby highlight an adaptive trade-off between the amount of biomass per surface area and the amount of absorption of incident light. Further, I showed that acclimation to low light intensity did not lower heat tolerance, but lowered light tolerance. This comprehensive study will contribute to expand the current knowledge on how corals acclimatize to changing environments, and will have practical implication for the conservation of future coral reefs.