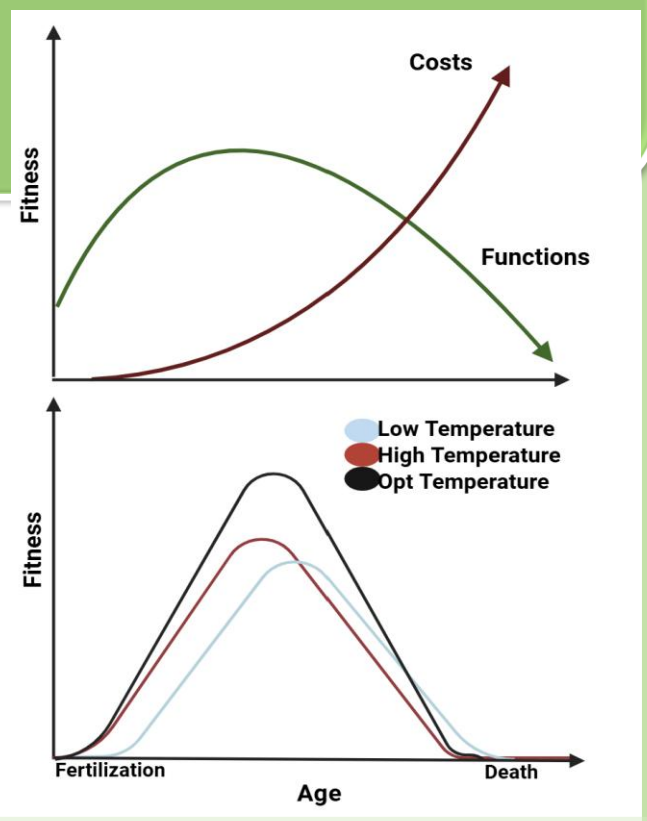
The University of Hong Kong
School of Biological Sciences

Qualifying Seminar

Understanding the eco-physiological mechanisms regulating the process of aging in ectotherms



Date: 25th September 2025

Time: 11 am HKT

Venue: 6N-11 and Zoom

About the speaker:

Leonardo Frosi is a PhD candidate in the Integrative Biology & Evolutionary Ecology Research (iBEER lab) supervised by Professor Juan Diego Gaitán-Espitia

Abstract:

Aging is a complex, continuous, and multi-mechanistic process that begins immediately after fertilization. It involved the gradual accumulation of phenotypic, functional, and molecular changes throughout an organism's lifespan. Such changes are often linked, or contribute to, declining performance, and increased vulnerability to environmental stress, disease, and mortality. Functionally, the decline in physiological performance is primarily associated with changes in immunity and metabolism, which are considered key mechanisms driving the aging process. Changes in these functional components of the organisms can lead in energetic costs and alterations of the energy budget. As energy previously allocated to growth or reproduction is progressively redirected toward maintenance and repair, this shift often results in a gradual decline in functional capacity and survival over time. Because of these changes in energy allocation strategies across development and aging, it is hypothesized that biological trade-offs exist among physiological traits related to performance.

Building on this framework, environmental conditions further influence the aging process. Stressful environments can exacerbate declines in physiological performance, imposing external (extrinsic) costs in addition to the intrinsic cost associated with aging itself. This study aims to investigate: (i) the regulatory influence of environmental temperatures and thermal stress on development and aging in ectotherms; (ii) the principles governing energy allocation and the trade-offs between reproduction and aging; and (iii) how the costs of aging vary with temperature across generations. Through this work, I aim to enhance understanding of both within- and trans-generational dynamics of aging, as well as the mechanisms that shape the trajectories of physiological performance and immunity in natural populations.