Funded PhD position at the Chinese University of Hong Kong

Topic:
Calibrating the molecular clocks for prokaryote evolution

We are seeking an enthusiastic and highly motivated PhD student with interests in microbial evolution, molecular clock and phylogenomics. Funding has been secured to support a PhD student for three years for candidates with a Master degree or four years for candidates with a Bachelor degree, with annual studentship of HK$216,300 (approx. US$27,730). The project will be supervised by Haiwei Luo (haiweiluo@cuhk.edu.hk) at The Chinese University of Hong Kong (CUHK). The PhD student will be based at CUHK and will work at the Simon F.S. Li Marine Science Laboratory of CUHK (www.msl.sls.cuhk.edu.hk). CUHK is a long-standing English-speaking institution and ranks as one of the top Universities in Asia.

Competences:
The successful candidate will have a Bachelor degree with at least one year of laboratory research experience or a Master degree in bioinformatics, phylogenomics, evolutionary biology, microbiology, or related areas in biological sciences. We are seeking a highly motivated candidate with strong experiences in bioinformatics, genomics, and phylogenetics. The candidate should have a good work ethic and is able to work in a team.

About the project:
Prokaryotic microorganisms are key players of carbon, nitrogen and sulfur cyclings today, and they were even more important in the first half of the evolutionary history of the Earth when they were the only form of cellular life. However, the evolutionary antiquities of microbial groups and their metabolisms are largely unknown. This is due to the rarity of taxonomy-informative fossils available to prokaryotic organisms, leaving the ages of most prokaryotic groups largely unconstrained.

We have been developing new strategies and methods which allow us to 'borrow' the rich fossils found in a variety of eukaryotic groups and to propagte their timing information to bacterial lineages through molecular clocks. Here are a few recent studies that were focused on estimating the ages of bacteria by leveraging fossil information from eukaryotes.

- S. Wang and H. Luo. 2021. Dating Alphaproteobacteria evolution with eukaryotic fossils. *Nature Communications* 12:3324
- T. Liao, S. Wang, E.E. Stüeken, and H. Luo. 2022. Phylogenomic evidence for the origin of obligately anaerobic Anammox bacteria around the Great Oxidation Event. *Molecular Biology and Evolution* 39(8):msac170
- H. Zhang, S. Wang, S.A. Crowe, and H. Luo. 2023. Emergence of *Prochlorococcus* in the Tonian oceans and the initiation of Neoproterozoic oxygenation (preprint: https://www.biorxiv.org/content/10.1101/2023.09.06.556545v1)
- S. Wang and H. Luo. 2023. Dating the bacterial tree of life based on ancient symbiosis. (preprint: https://www.biorxiv.org/content/10.1101/2023.06.18.545440v2)

We are now developing new strategies to estimate the ages of phages, archaea, and metabolic pathways. This PhD project seeks to expand this area by applying the available methods to solve important questions relevant to microbial evolutionary biology and geochemical evolution of the Earth. There are also great opportunities to collaborate with other important areas in the lab, such as the evolution of bacterial symbionts of corals, bivalves and other marine invertebrates, as well as the evolution of genome-reduced free-living marine bacteria.

Key words:
molecular clock, phylogenomics, early life, microbial evolution

Expectation:
The PhD student will be responsible for the implementation of the practical work of the project, with support from the PI and the lab members. The PhD student will also take the lead in drafting manuscripts for publication and present the results at academic conferences.

Start date: 1st August 2024

How to apply:
Please send your application to haiweiluo@cuhk.edu.hk with "Application PhD molecular clock" in the subject line. Applications should include a CV, a cover letter summarizing research interests, and contact information for two references.

Application deadline: Review of the applications will start immediately and continue until the position is filled. The closing date is 20th November 2023.

Further information: Please contact haiweiluo@cuhk.edu.hk with "Application PhD molecular clock " in the subject line with any queries or requests for more information about the project, or studying in Hong Kong and at the Chinese University of Hong Kong.