

A 3 year fully funded PhD is available at Curtin University (Miri, Malaysia and Perth, WA Australia).

Project description:

Microbial biodiversity, biogeochemical and biotechnological properties of Mulu Cave systems

Mulu National Park is a designated UNESCO World Heritage site, the only one in the state of Sarawak on the island of Borneo. "The geological Melinau Formation contains a remarkable concentration of caves, revealing a geological history of over more than 1.5 million years" (UNESCO, 2017). It is a key tourist asset of Sarawak. The caves are also a vital resource for various lines of research. While a variety of research by teams from around the world have been active in the area for some decades, much remains to be discovered. For example, the microbial diversity in the caves has yet to be explored. Caves are generally considered as extreme environments for life because they are devoid of light and lack the most common source of energy supplied through photosynthesis. Microbial communities as the major life forms deeper inside caves are consequently dependent upon alternative sources of energy derived from the surrounding atmosphere, minerals and rocks.

Using a suite of advanced molecular microbial tools and high throughput sequencing of taxonomic and functional marker genes, metagenomes, and metatranscriptomes the successful candidate will study the biodiversity of cave microorganisms and their potential role in the deposition or dissolution of cave mineral structures, as well as their ability to produce novel antibiotics or antitumor agents in these underexplored extreme environments. Functionalised microbial metabolites will also be analyzed by advanced GCxGC TOFMS from organic extracts. The location inside the caves that contain a unique biodiversity of bioactive bacteria and/or fungi will then be resampled to obtain isolates using selective media, and cultures will be tested for their broad spectrum antibacterial activity using bioprocess technologies.

The student will spend 6 months at the Curtin University campus in Miri, Malaysia and 6 months at the Curtin University campus in Perth, Western Australia per year.

Excellent knowledge of microbiology and ecology and practical experience in environmental microbial molecular ecology and a first-class Hons degree or equivalent is required. Preference would be given to candidates who also have a background in cultivation of microorganisms and in analytical or (in)organic chemistry and geology. Suitable candidates should have excellent written and communication skills and the ability to work in a multidisciplinary research environment and within a team.

The project includes sampling expeditions to the Mulu caves <http://mulupark.com/> located in the unique rain-forest of Borneo.

The key molecular biology and clean lab facilities as well as organic geochemical facilities necessary to complete this project are available at WA-Organic and Isotope Geochemistry Centre (WA-OIGC) <http://wa-oigc.curtin.edu.au/research/instrumentation>. Facilities for the initial extraction, purification, and quantification of nucleic acids and for microbial cultivation and bioprocessing are available at Curtin Malaysia Research Institute (CMRI).

Interested applicants need to send full CV and names of two referees to Associate Professor of Geomicrobiology Marco Coolen ([marco.coolen@curtin.edu.au](mailto:marco.coolen@curtin.edu.au)), Professor of Organic Geochemistry Kliti Grice ([K.Grice@curtin.edu.au](mailto:K.Grice@curtin.edu.au)), and Prof. Clem Kuek ([clem.kuek@curtin.edu.my](mailto:clem.kuek@curtin.edu.my); Dean of R&D and Director of CMRI) by September 15, 2018.

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WA-OIGC | School of Earth and Planetary Sciences |