

The Leibniz Centre for Tropical Marine Research GmbH ([www.leibniz-zmt.de](http://www.leibniz-zmt.de)) is an independent research and teaching institute that provides scientific knowledge for the protection and sustainable use of tropical coastal ecosystems. To this end, we work in an inter- and transdisciplinary manner with our partners in the tropics. The ZMT is a member of the Leibniz Association.

The Systems Ecology Group at ZMT is (subject to release of funds) seeking to fill an opening for a

## Doctoral candidate (gn)

(Reference: 34-N2FIXHB)

### Uncovering the mechanisms of N<sub>2</sub> fixation by oceanic free-living heterotrophic bacteria

Nitrogen (N) is a key nutrient that limits the growth of phytoplankton and significantly impacts marine ecosystems and food security. While nitrogen is abundant in seawater in the form of dissolved gas (N<sub>2</sub>), most marine organisms cannot use it directly. Only certain bacteria and archaea, known as N<sub>2</sub> fixers, can convert N<sub>2</sub> into usable forms through a process called N<sub>2</sub> fixation. The process of N<sub>2</sub> fixation supports up to 50% of oceanic primary production in the tropics. Traditionally, photosynthetic cyanobacteria were thought to be the most important N<sub>2</sub> fixers in tropical and subtropical ocean waters. Exciting new discoveries have revealed the active presence of heterotrophic N<sub>2</sub> fixers – bacteria that do not depend on photosynthesis – throughout the global ocean. Due to difficulties in culturing heterotrophic N<sub>2</sub> fixers and the challenges involved with global-scale observational efforts, little is known about how they function, where they are active, and the contribution they provide to the oceanic nitrogen cycle. Mathematical modelling is, thus, an invaluable tool for finding out more about these organisms. In this project, we plan to develop mathematical models to (1) investigate the mechanisms of N<sub>2</sub> fixation by free-living heterotrophic bacteria, and (2) assess the influence of environmental factors on this process. The findings will provide insights into the seasonal fluctuations of N<sub>2</sub> fixation, the distribution of heterotrophic N<sub>2</sub> fixers in surface waters, and their contribution to sustaining the marine food web, especially in tropical and subtropical oceans.

#### Your tasks:

- Develop scientific competences on the marine nitrogen cycle and on free-living heterotrophic N<sub>2</sub> fixers
- Develop mathematical models to study the mechanisms of N<sub>2</sub> fixation by free-living heterotrophic N<sub>2</sub> fixers under different environmental conditions
- Integrate literature data into the models
- Run computer simulations and analyse the results on the light of existing knowledge and data
- Produce results publishable in peer-reviewed international journals
- Present the results at international conferences
- Produce and defend a PhD thesis

### Requirements:

Applicants must hold a Master's degree in one of the following disciplines: marine biology, ecology, biogeochemistry, oceanography, environmental sciences, theoretical ecology, mathematics, physics, computational sciences, or in similar quantitative or numerical disciplines. Candidates should either possess programming skills or have a keen interest in acquiring them in order to develop a research career focused on the mathematical modelling of environmental problems. We are looking for highly motivated students with good communication and scientific writing competencies. The working language is English.

### Further information:

For questions, please contact Dr. Subhendu Chakraborty, email: [subhendu.chakraborty@leibniz-zmt.de](mailto:subhendu.chakraborty@leibniz-zmt.de)

### Details of position:

Salary will be paid according to the German TV-L (EG 13). The position is available for part-time **(75 % of a full-time position)** employment starting 1<sup>st</sup> May 2025 with a duration until 30<sup>th</sup> April 2028. ZMT is an equal opportunity employer. Applicants with a migration background are welcome. Persons with severe disabilities are given special consideration if they have the same professional and personal qualifications. The ZMT values its diverse workforce and pursues the goal of providing equal opportunity, which incorporates gender neutrality (gn). We will be happy to accept your documents without a photo.

### We offer:

- A challenging and varied job in an international, dynamic and interdisciplinary research environment
- A motivated and committed team from different countries and cultures
- An open and cooperative working atmosphere
- Opportunities for personal and professional development
- Interesting, varied and challenging tasks and family-friendly working conditions
- Company pension plan (VBL)
- Company health promotion and the opportunity to participate in company fitness with EGYM Wellpass

### Submission of application:

Please submit your CV, a brief statement of motivation and research interests, and the names and contact information of two referees **by 28.02.2025 as a single pdf file** with the reference number "34-N2FIXHB" to Ms. Carina Seemann, email: [bewerbung@leibniz-zmt.de](mailto:bewerbung@leibniz-zmt.de).

Leibniz Centre for Tropical Marine Research, Fahrenheitstraße 6, D-28359 Bremen.

