

Unexplored aspects of marine proxies and environmental pollution: Unravelling the unknown effects of antibiotics on foraminifera

Earth and environmental sciences often apply various proxies to monitor recent environmental changes and reconstruct past conditions. Nowadays, marine pollution is an important and often discussed topic in science. Human activity is increasing the amount of debris in the oceans, but the impact is most evident in coastal areas. However, this contamination is not only present in the macroscopic range, but also microscopically or in the form of dissolved particles. Precisely these microscopic and dissolved particles can harm many microorganisms, disrupting the food chain right at the base. As a result, such a disturbance has an effect on changes in oxygen concentrations in the sea, which in turn is negative for humans, since a reduction in dissolved oxygen leads to a reduction in fish stocks.

The main goal of this project is determination of the impact of antibiotics on foraminifera. Foraminifera are primarily marine unicellulars (protists), which can be found in all marine habitats from shallow water to the deep sea. Due to their high abundance they play an important role in the global carbon and nitrogen cycle. For this purpose, water and sediment samples are taken from the Baltic Sea and will be analysed. The focus of this study is on examining different antibiotics such as cell permeable versus impermeable antibiotics, which are introduced into the sea through human activity, such as agriculture/aquafarming and wastes. Subsequently, the impact of antibiotics on the foraminifera on macro- and microscopic scales (e.g., crawling, building of test abnormalities) and on a cellular level (e.g., observation of the organelles, bacterial symbiosis) will be investigated using different dedicated methods. Foraminifera are often cultivated in laboratory experiments to draw conclusions about how changed environmental parameters affect marine habitats. However, there are often many bacteria in the cultures, which have a negative impact on the results, which makes it important to have a culture seawater in which only foraminifera can grow.

We plan to test major types of antibiotics massively applied in agriculture or aquafarming in order to prepare a recommended list of the least harmful antibiotics used for culture media, as well as designed for actualistic experiments in the Earth and environmental sciences. We will compile quantitative recipes of culture media restricting the metabolism of unwanted bacteria.