



ANTARCTIC 2023-2024

ANITA: PATHOGENS AND ANTIBIORESISTANCE ASSOCIATED TO PLASTIC: THREAT IN ANTARTIC WATERS?

LEAD INSTITUTION

UMR MARBEC (Université de Montpellier, CNRS, IRD, Ifremer), FR

ABSTRACT

The presence of plastic micro-fragments and macro-waste in all the world's oceans is today a major ecological concern, even in Antarctica where they have been observed massively and identified as responsible for mortality in marine mammals and birds. However, the microbiological impact of marine plastics is completely ignored. Plastic found in temperate seas has the ability to carry around bacterial pathogens for marine wildlife and humans. We also know that marine animals ingest macro- and micro-plastics. Plastics may thus act as vector of pathogens, i.e. that transports and transmit pathogens to marine animals. If these animals are commercial and consumed by humans, then the transfer could be to humans. Moreover, if these pathogens are viable with active antibio-resistant genes, this threat of transfer would become alarming. It has been reported the presence of pathogens in Antarctica seawater (including some for human). Coupled with the fact that the Antarctic Ocean is the scene of massive presence of plastic, it is reasonable to ask whether these plastics harbor pathogens for marine animals and humans, and whether they are antibiotic resistant. The ANITA research project aims to provide new knowledge on the microbial risk of plastic pollution for the health of marine biodiversity and humans in the Antarctic Ocean. Using molecular analysis, ANITA project will provide an exhaustive inventory of marine life and human bacterial pathogens associated with micro- and macroplastic in contrasted sites such as harbors, coast line, pack ice, near permanent research stations, and open sea. For some specific human pathogens associated with plastics, the ANITA project will document their viability, abundance and antibiotic resistance using classical methods of bacterial culture directly on board. Physio-chemical characterization of the seawater (including nutrients and chl_a) will also be carried out in all sampling sites. Relating the presence and abundance of plastic-associated pathogens to the polar environment will act as a reference for future comparisons with other regions of the world, and in particular those where plastics are found in environments heavily impacted by humans and with fundamentally different environmental conditions (e.g. temperate and tropical zones).