



MASTER THESIS PROJECT

# MERCURY AND CIGUATOXINS MEASUREMENTS IN TWO FISH SPECIES FROM DIFFERENT LAGOONS OF FRENCH POLYNESIA WITH EVALUATION FOR HUMAN CONSUMPTION

JÚLIA GRINYÓ I ESCUER

University of Liège,  
Liège, Belgium

PLENTZIA (UPV/EHU), JULY 2022

## Summary

Fish consumption provides proteins, energy and a range of essential nutrients that contribute to human health. However, consumption of high amounts of fish raises the issue of potential exposure to anthropogenic and natural contaminants present in the oceans that accumulate in fish. Mercury (Hg) is a natural metal, but human activities have dramatically increased Hg concentrations in the environment. Hg in the ocean can accumulate in edible fish raising human health concerns, mainly for its neurotoxic and development effects. Ciguatoxins (CTXs) are naturally produced by some benthic microalgae typically found in tropical coral reefs. CTXs can also accumulate in fish and consumption of seafood contaminated by CTXs can cause Ciguatera Poisoning, a disease that includes gastrointestinal, neurologic, and cardiac complex symptoms. French Polynesia is an endemic ciguatera region with a high fish consumption rate. Since Hg and CTXs data were scarce in lagoon fish from the Society Islands (most populated archipelago of French Polynesia), this work studied both toxic compounds in the herbivore surgeonfish *Ctenochaetus striatus* and the carnivore grouper *Epinephelus merra*, two broadly consumed fish found in all the lagoons of the Society archipelago. Total mercury (THg) was measured in muscle and liver of fish using atomic absorption spectroscopy (AAS). Ciguatoxins were extracted from fish flesh and extracts were tested for toxicity using the neuroblastoma cell-based assay (CBA-N2a). Higher THg concentrations were measured in the flesh of the carnivore than that of the herbivore fish. In contrast, higher levels of ciguatoxins were found in herbivores. Flesh of *C. striatus* and *E. merra* can be consumed by the average Polynesian adult population without posing potential health problems related to Hg exposure. Lagoon fish consumption from low urbanized places in the Society Islands seems preferable to that of more urbanized sites to minimize the risk of suffering Ciguatera Poisoning. Artificial substrates were deployed to survey the abundance and diversity of CTXs-producing benthic microalgae, but additional studies should be conducted to draw conclusions about the potential risk of ciguatera outbreaks in the Society Islands.