11TH U.S. SYMPOSIUM ON HARMFUL ALGAE

INVESTIGATION OF ECOLOGICAL, PHYSIOLOGICAL, AND ENVIRONMENTAL DRIVERS OF CTX BIOACCUMULATION IN CARIBBEAN HERBIVOROUS REEF FISH FROM ST. THOMAS, USVI

Ciguatera is a leading cause of phycotoxin-borne seafood illness throughout the world and is expected to increase in geographical extent and frequency throughout the Greater Caribbean region. Improved prediction and management of ciguatera will depend on identifying ciguatoxin (CTX) pathways in reef ecosystems, including drivers of toxin accumulation and movement across relevant species. The transfer of CTX from toxigenic Gambierdiscus spp. to herbivorous fish represents a critical link in the fate of CTX as its primary entry point into marine food webs. To better understand the role herbivores play in CTX fate, we examined relative toxicities of three reef associated herbivorous fish collected from St. Thomas, US Virgin Islands, including Ocean surgeonfish (Acanthurus bahianus), Redband parrotfish (Sparisoma aurofrenatum), and Stoplight parrotfish (Sparisoma viride). Specimens of each species were collected opportunistically during a 10-yr period between 2012 and 2022 from four long-term monitoring sites (both nearshore and offshore) across seasons. Extraction of CTX from herbivorous fish tissue was optimized for subsequent analyses using the N2a-MTT assay, during which we observed fractions of CTX-like activity inconsistent with elution patterns of C-CTX-1/-2 – the major congeners observed in higher trophic level Caribbean fish. This indicated the presence of herbivore-specific CTXs that may be missed using traditional extraction methods targeting congeners previously reported at higher trophic levels. Potential drivers of toxin accumulation in herbivorous fish were then assessed by comparing toxicity to a variety of environmental (collection site/time), physiological (size, age), and ecological (species, diet) factors. Diet was studied using a combination of dietary tracer methods (bulk CNS stable isotope analyses (SIA); fatty acid profiling and compound-specific SIA). This work represents the first comprehensive study of CTX accumulation in Caribbean herbivorous fish, which provides critical evidence for toxin pathways in lower trophic levels and emphasizes the potential role of additional CTX congeners in ciguatera ecotoxicology.

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