

DETECTION OF CIGUATOXIN IN EXOTIC FISH SPECIES CAUGHT IN THE CANARY ISLANDS

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INTRODUCTION

Ciguatoxins (CTXs) are natural marine toxins produced by benthic dinoflagellates (*Gambierdiscus* spp. and *Fukuyoa* spp.). They enter the human food chain through contaminated fish, causing **ciguatera poisoning (CP)**, one of the most common foodborne intoxications worldwide.

In the Canary Islands, the increasing presence of exotic fish species and rising sea temperatures may facilitate CTX persistence

Active surveillance through the official control system monitors high-risk species, ensuring early detection and protection of public health.

OBJECTIVES

- DETECTION:** Identify CTX activity in samples of exotic fish species.
- SEMI-QUANTIFICATION:** Estimate toxin levels using **cell-based assay**.
- ECOLOGICAL RELEVANCE:** Assess the role of exotic species in the **maintenance and transmission** of CTXs in Canary waters.

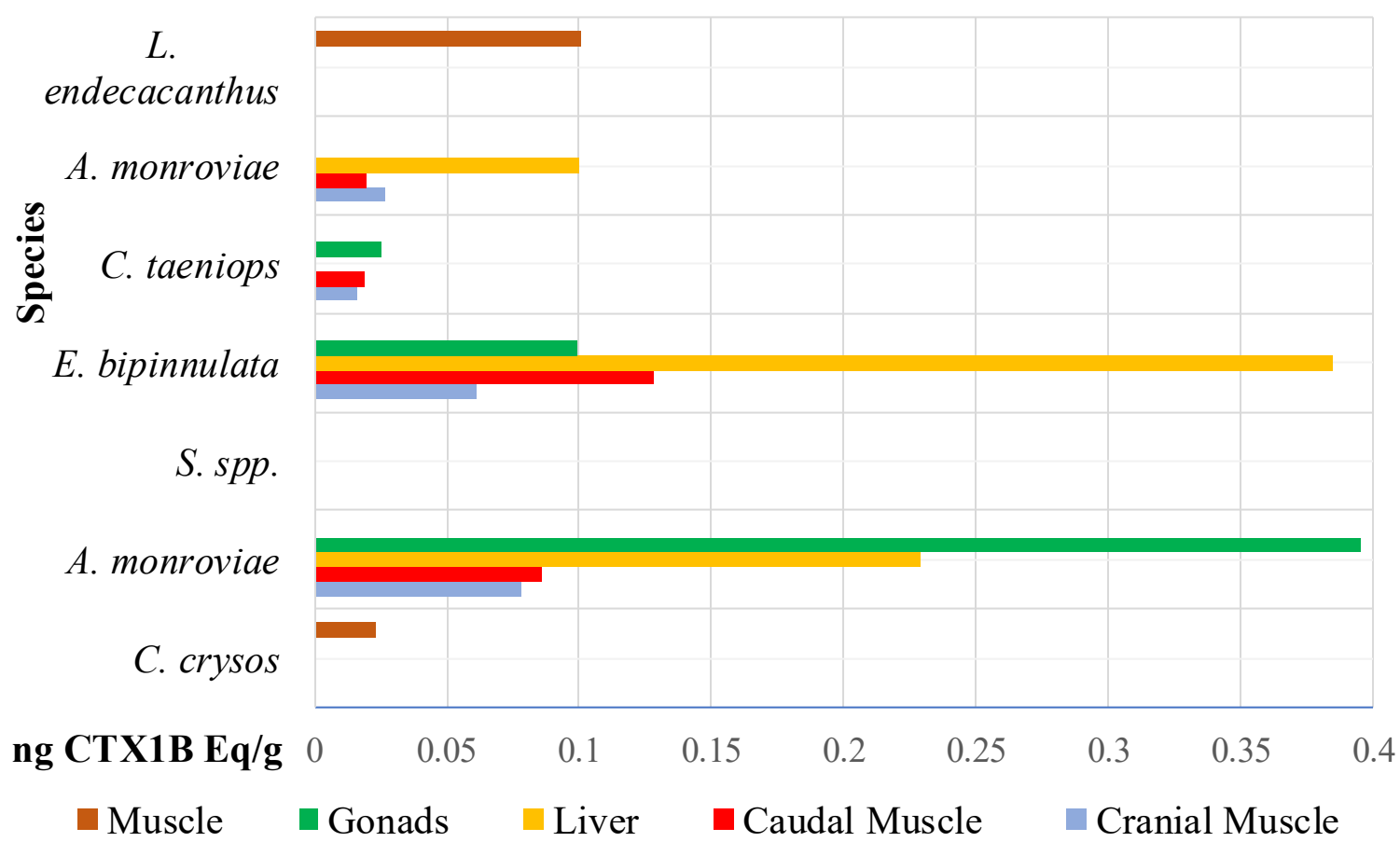


Figure 2. CTX1B Equivalent Concentrations in Different Tissues of Exotic Fish Species from the Canary Islands

Notably, 6 out of 18 samples exceeded 0.1 ng CTX1B Eq/g, indicating a high risk of CTX poisoning

MATERIAL & METHODS

SAMPLES: 7 exotic fish (6 species) from the Canary Islands, collected 2022–2024 under the **official CTX control program**.

TISSUES: cranial & caudal muscle, liver, gonads

CTX EXTRACTION & DETECTION:

standard protocol¹; **Neuro-2a cell-based assay (CBA)** with ouabain/veratridine.

LOD = 0.018 ± 0.016

LOQ = 0.040 ± 0.041

ng CTX1B Eq/g

RESULTS & DISCUSSION

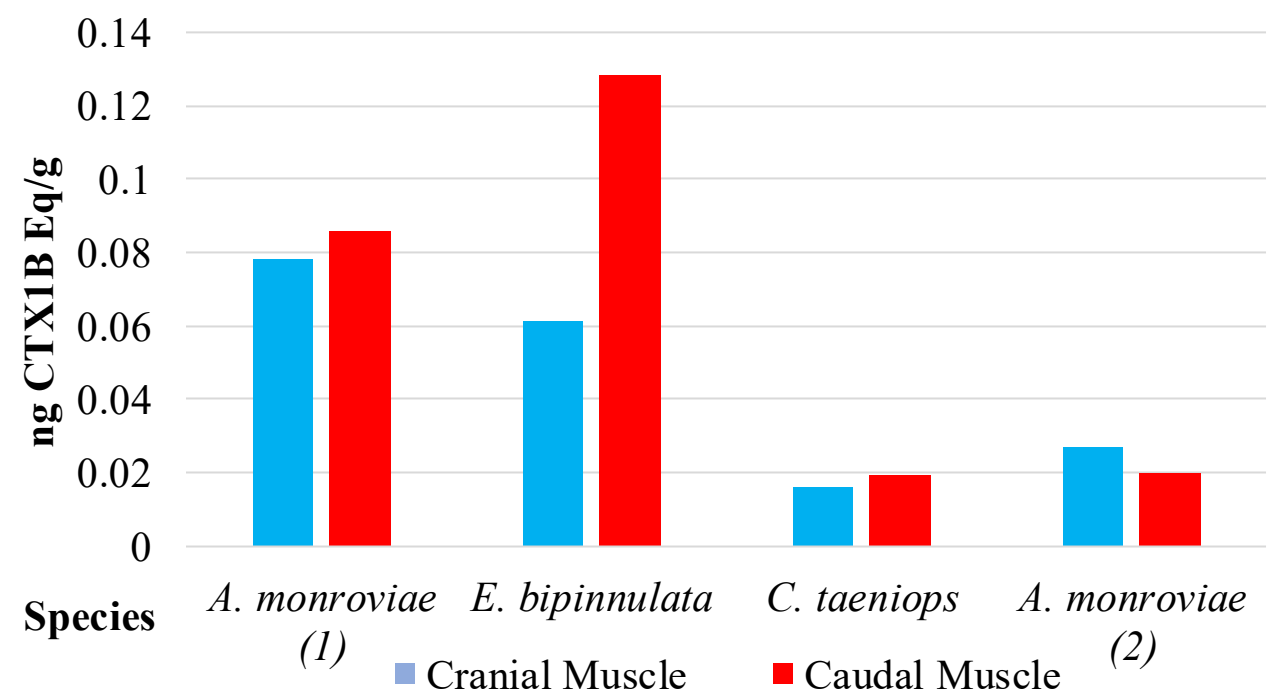


Figure 1. Comparative Analysis of Cranial and Caudal Muscles Across Fish Species

Slightly higher toxicity levels were found in the caudal muscles of three out of four individuals



Acanthurus monroviae: herbivorous surgeonfish from the eastern Atlantic linked to ciguatoxin maintenance

CONCLUSION

This study assessed the impact of exotic fish species captured in Canary waters on the natural cycle of CTXs and their implications for **food safety**. Key findings include:

- Organs as hotspots:** Viscera, particularly **liver and gonads**, had higher CTX levels than muscle, posing a significant health risk in regions where these organs are traditionally consumed.
- Muscle distribution:** **Caudal muscle** contained higher toxin concentrations than cranial muscle, especially in *Elagatis bipinnulata*, likely due to increased vascularization. Sampling protocols should consider this variation for accurate risk assessment.
- Role of herbivorous species:** Some exotic herbivores, such as the **African surgeonfish (*Acanthurus monroviae*)**, contributed to CTX maintenance in the food web. Their inclusion in monitoring programs is important where they are part of the local diet.
- Ecosystem impact of exotic species:** The introduction of non-native species can alter marine food webs and facilitate CTX accumulation, potentially creating **new toxin reservoirs**.

REFERENCES

- Caillaud A, Eixarch H, de la Iglesia P, Rodriguez M, Dominguez L, Andree KB, Diogène J. Towards the standardisation of the neuroblastoma (neuro-2a) cell-based assay for ciguatoxin-like toxicity detection in fish: Application to fish caught in the Canary Islands. *Food Addit Contam Part A*. 2012;29(6):1000-10. doi:10.1080/19440049.2012.660707