

Task team on Inter-agency Global Ciguatera Strategy for Improved Research and Management

Co-chairs:

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**Seventeenth Session of the IOC-FAO Intergovernmental Panel
on Harmful Algal Blooms**

Paris, 18-20 March 2025

ToRs of the Task Team

- (i) **Interact with IOC, FAO, IAEA and WHO** to pursue and strengthen the concertation of their respective actions in support of the Global Ciguatera Strategy,
- (ii) Pursue **coordination activities** to develop and strengthen synergies through the cooperation of currently funded efforts in support of the Ciguatera Strategy (other than international agencies),
- (iii) Evaluate the **methods used for isolating and culturing benthic HAB organisms** (bHABs). Convene a meeting of experts to establish protocols and a training course for the isolation and culturing of bHABs, with the aim of enhancing proficiency and representing the natural diversity present in the field. Additionally, provide financial support for conducting inter-laboratory exercises on bHAB collection techniques, standardizing methods, and facilitating trans-regional studies.
- (iv) **Pursue communication activities** (including Harmful Algal News) and update the existing IOC web page on ciguatera displaying the strategy (e.g. relevant links)
- (v) Interact with **ICHA organizers** to solicit presentations on ciguatera research and stimulate the convening of special ciguatera sessions at relevant medical, seafood safety and security, and other scientific meetings,
- (vi) Contribute to the **HAB Solution (HAB-S) UN Decade of Ocean Science for Sustainable Development** proposal to integrate the Ciguatera Strategy into integrated and co-developed mitigation solutions for reducing ciguatera poisoning,

i. UN agency-coordinated activities

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Codex *alimentarius* commission

- Code of Practice for the Prevention and Reduction of Ciguatera Poisoning (CXC 83-2024)
- *ADOPTED* – 26.11.2024



IAEA capacity building projects

National Projects

- COLOMBIA COL7004. Strengthening National Capacities for Detecting Marine Biotoxins during Harmful Algal Blooms (2020-2024) TCF 648 631 Euros.
- CUBA CUB7010 Improving National Capacities for Monitoring the Impacts of Climate Change on the Marine Environment Using Nuclear and Isotopic Techniques (2020-2024) TCF 300 000 Euros
- BRASIL BRA7012 Applying Nuclear Techniques Including Stable Isotopes to Identify Triggers of Harmful Algal Blooms (2020-2024) TCF 459 765 Euros
- Trinidad and Tobago TRI7002 Strengthening National Capacity to Assess Coastal and Marine Environment in Trinidad and Tobago. (2022-2024) 385 076 Euros
- Mauritius MAR7006 Enhancing National Capabilities for Analysis, Monitoring and Mitigation of Ciguatera and Other Fish Poisoning.

Regional Project

- LAC Regional RLA7025 Strengthening Capacities in Marine and Coastal Environments Using Nuclear and Isotopic Techniques (2020-2024) 300 000 Euros

IAEA capacity building projects

Interegional project 2024-2028 INT7022 on Strengthening Ocean Health for Sustainable Development: A Global Approach Using Nuclear and Isotopic Techniques

- A first technical meeting on “Protocol standardization for algal and toxin surveillance Sampling, Toxin Analysis, and Quality Control Standards” was held in Cuba Mar 10-14, 2025.

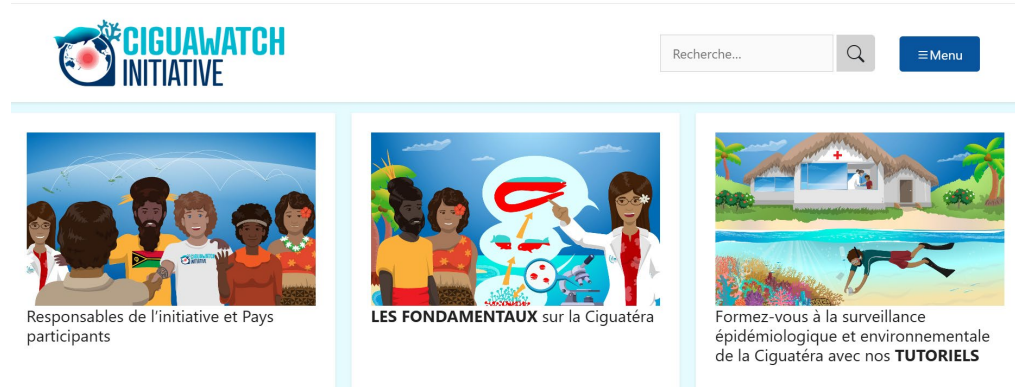
CTX (and PSP) analysis using RBA and chemical methods

Preparation of reference material

Benthic HABs monitoring (IOC training)



CIGUAWATCH initiative

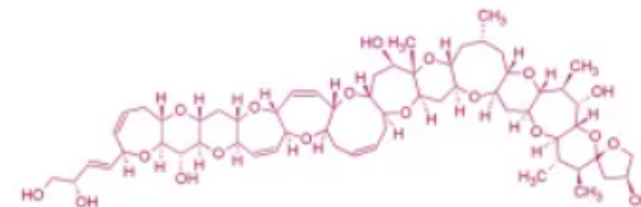


- Technical Cooperation Project on the training and improvement of CP risk management capacity and systems in Fiji, Samoa, and Tonga (FAO TCP/SAP/1807) in 2023
- Agreement was recently signed between Wallis & Futuna and ILM to conduct similar trainings with local Health and Environment agencies.
- On-line trainings with stakeholders from the ministries of Environment, Fisheries and Health were completed in 2024.
- A field training to strengthen local monitoring capacities is scheduled from April 16th to May 5th, 2025 in Wallis and Futuna.
- Discussions are also currently underway with the Agence Française de Développement Group to extend these efforts to other PICTs also concerned with CP issues.

ii. Other cooperation efforts

Reference material

- Various P-CTX standards and CTX-contaminated biological materials are commercially available through the Louis Malardé Institute
<https://phyconesia.ilm.pf>.
- NRCC in collaboration with Alison Robertson is working on making Caribbean CTXs available, though not yet available



P-CTX1B

Origin : *Gymnothorax javanicus* liver tissue



BM-CTX-Cmic

Origin: *Chlorurus microrhinos* (parrot-fish, herbivorous fish, freeze-dried flesh tissue)



BM-CTX-Cmel

Origin : *Caranx melampygus* (jack, carnivorous fish, freeze-dried flesh tissue)

WP2.2. Impacts of Marine Heat Waves (MHWs) on Ciguatera risk

Lead: Mireille Chinain (ILM-UMR SECOPOL, French Polynesia)
Thierry Jauffrais (IFREMER-UMR Entropie, New Caledonia)

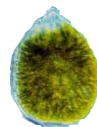
1. Field surveys for CP risk assessment



Efflorescence



Gambierdiscus



Ostreopsis



Prorocentrum

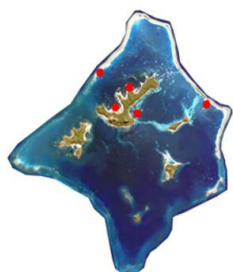
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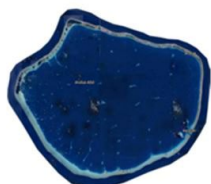
Related CTX prevalence in surrounding sentinel species

Follow-up of bHAB species wild populations *in situ*

French Polynesia



Mangareva, Gambier



Arutua, Tuamotu

New Caledonia



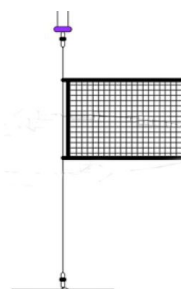
Grande Terre & Lifou



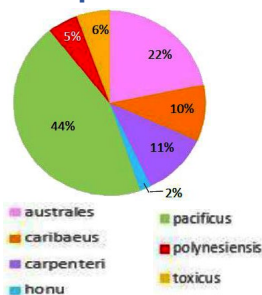
Lagon Sud

Assess season-driven variations in CP risk, and those consecutive to MHWs

Window screen



qPCR



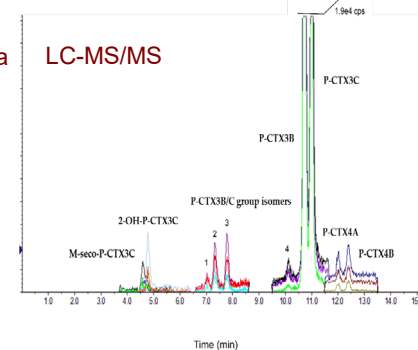
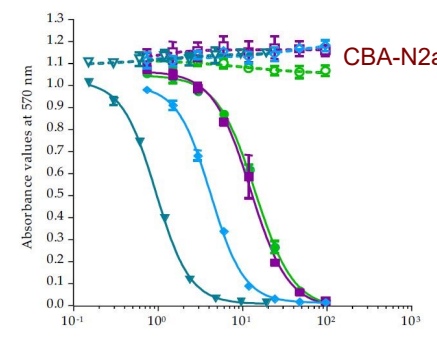
WS : genetic diversity and relative abundance (qPCR)

SPATT : multitoxin screening by LC-MS/MS



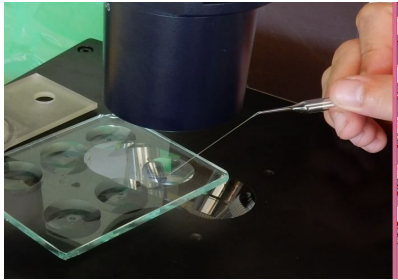
CTX prevalence in CP-prone fish and giant-clams

Toxicological analyses

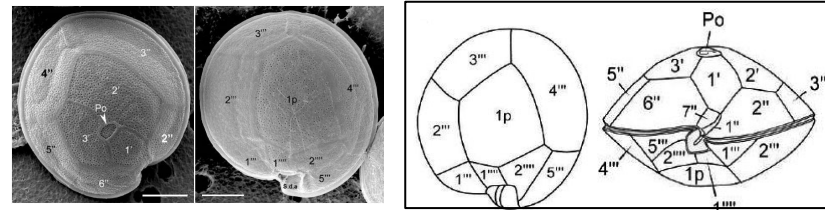


2. Lab experiments : algal collections + *in vitro* cultures + ecophysiological studies

Algal collection and clonal cultures

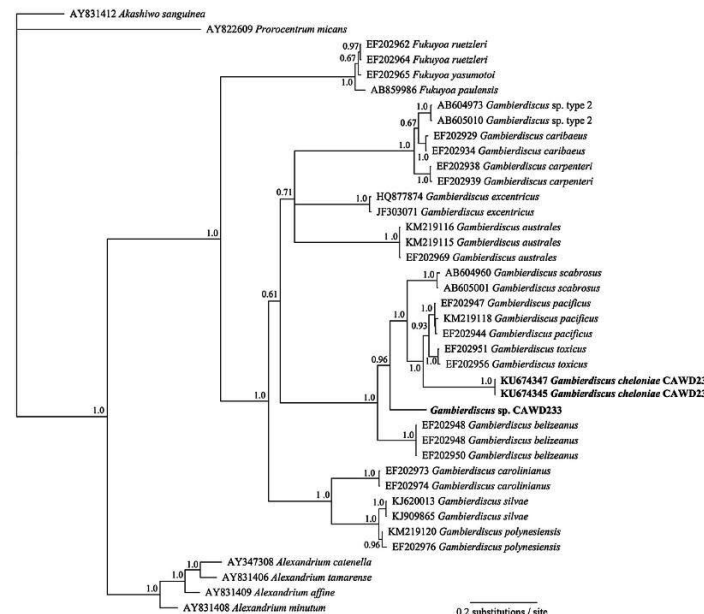


Morphological and/or molecular characterization

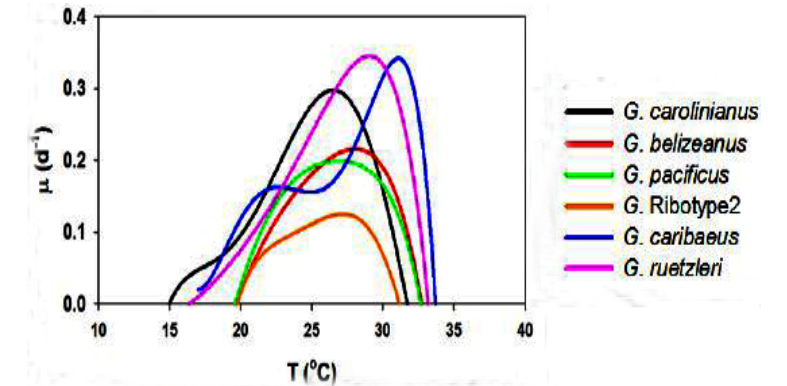


MEB analyses

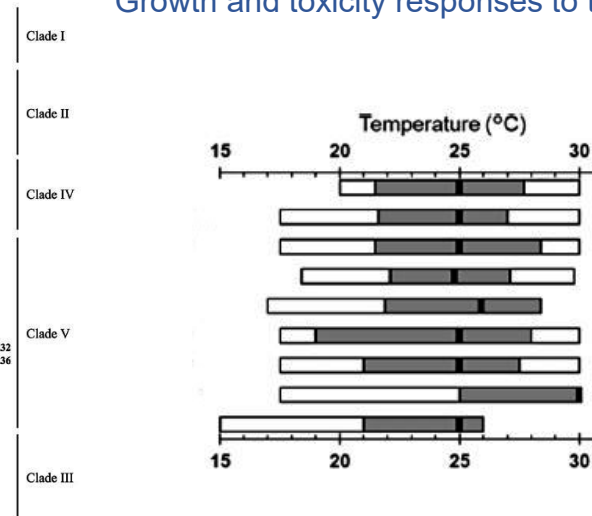
Phylogeny



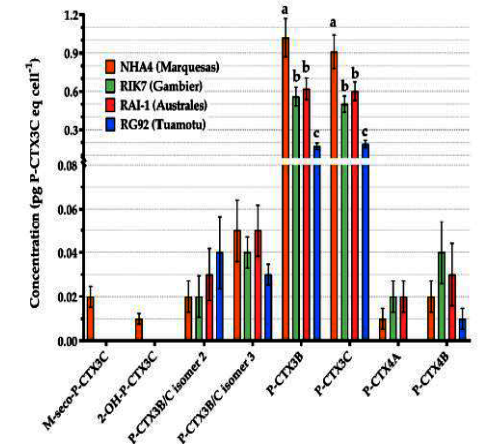
Thermal tolerance when exposed to 20°C < t° < 32°C



Growth and toxicity responses to t°C peak values characteristics of MHW



Growth performance across strains



T°C-induced toxin profile variations

CARMINA-project

Diversity & toxicity of benthic microalgae associated with Ciguatera

- **Objectives**

Develop detection tools for the monitoring of ciguatoxin-producing species

- **Collaborations**

ANSES
NOAA

- **Budget**

150 K€

- **Caribbean countries involved in the CARMINA-project**



CARMINA-project Recent activities

- Collection of bHAB strains in Mexico (*Gambierdiscus*, *Coolia*, *Vulcanodinium rugosum*, *Amphidinium*)
- 2 PhD projects ongoing feeding samples into Carmina-project
- Application for funding for MX-FR staff exchange
- MoUs focusing on sample exchange (ABS-regulation)
- Collection of >90 *Gambierdiscus* strains from Cuba (ongoing PhD in Mexico also growing biomass of a maximum number of strains)
- PhD focusing on ecophysiology and toxin production of a strain of *Gambierdiscus*, and a strain of *Vulcanodinium rugosum*.

Alternative integrated Management strategies of Watersheds in tropical islands: solutions to promote the resilience of tropical islands' socio-ecosystems – AMWI

- PEPR SOLUBIOD project that builds on a national network of 11 living labs implemented both in France and Overseas territories
- One of the primary goals: **restoration and enhanced productivity of coastal reefs and lagoons, to promote the sustainable use of marine resources and increase socio-ecosystems resilience in tropical islands.**
- The CP-related actions led by the Institut Louis Malardé (ILM) involve the deployment of **environmental monitoring tools for CP risk assessment** in 3 study sites in Moorea and Tahiti islands (French Polynesia) with an emphasis on **community-based participatory science** and promoting solutions to better take CP risk into account in marine resource management and restoration initiatives.

The role of benthic communities in the production and transfer of bHAB toxins BENTOX+

Funded by the Programme d'Investissements d'Avenir (PIA) UCAJEDI n°ANR-15-IDEX-01 grant - Académie d'Excellence 3 “Espace, Environnement, Risques et Résilience”, Université Côte d'Azur (150 k€, 2023-2025).



Window screens



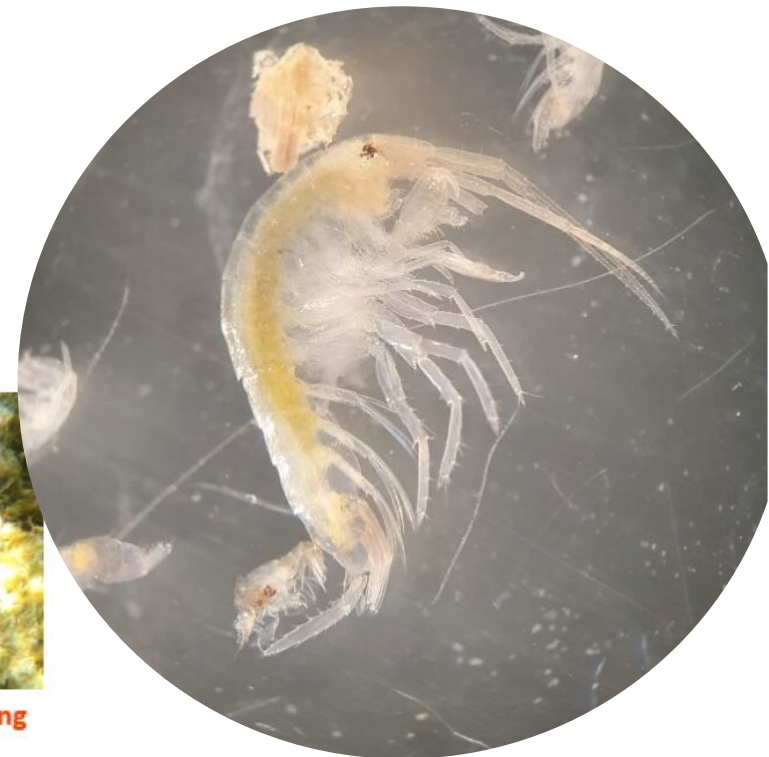
Scraping



Light traps



Manual sampling



Other conducted activities

- **International Symposium on Ciguatera poisoning in the Pacific Islands** hosted by the Cawthron Institute will be held from 19-22 may, 2025 in Nelson (Nelson, New Zealand). Topics addressed include the ecology of CP causative agents, CP social impacts and emerging issues, monitoring approaches and future tools. Future collaboration and funding sources opportunities will also be extensively discussed through round tables.
- **An e-working group on the SOP harmonization of CBA-N2a for CTX** detection was launched in 2024. This initiative is led by Lucia Solino from the EU Reference Laboratory for Monitoring of Marine Biotoxins (EURLMB). A wrap-up meeting is scheduled in October 8th, 2025 in Paris.

Communication

- iv. Pursue communication activities (including Harmful Algal News) and update the existing IOC web page on ciguatera displaying the strategy
 - v. Interact with ICHA organizers to solicit presentations on ciguatera research and stimulate the convening of special ciguatera sessions at relevant medical, seafood safety and security, and other scientific meetings
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iv. and v.

- Caribbean CTX-progress was reported in HAN issue 73 (October 2023)
- An article relating to the isolation of C-CTX5 and confirmation of its structure by NMRspectroscopy was published in Tetrahedron in June 2024
- Joint publication involving the IAEA, academics (Université côte d'Azur), governmental agencies (Malarde Institute, Ifremer) on Tissue distribution and metabolism of ciguatoxins in an herbivorous fish following experimental dietary exposure to *Gambierdiscus polynesiensis*.
- During the 2023 ICHA conference in Hiroshima (Japan), a session was fully devoted on ciguatera

Future activities

- The establishment of a “**global inter-agency strategy**” has proven to be challenging
- Continue the work of the TT on ciguatera, but widen the perimeter to include other benthic species such as *Ostreopsis*, *Prorocentrum* and *Coolia* -face common issues related to species sampling, which are collectively addressed in the development of early warning systems (EWS). Renaming the TT “**TT on Benthic HABs**”.
- **Invite futher members, within other countries** e.g. from Macronesia, Japan, South America (Mexico, Chili, Cuba), Indian Ocean (Réunion), EU, USA as well as from UN agency (e.g. IAEA)

Future activities

Further the work on sampling strategy and early warning system approach

- Workshop on sampling and validation of qPCR methods
 - Validation of N2a and RBA methods for CTX detection
 - Validation of LC-MS/MS methods for confirmation of cases and bHAB toxin profiles
 - Prepare fish tissue reference material
 - Epidemiology : establishing guides for risk evaluation and management
 - Further research to better link benthic species occurrence and fish toxicity
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- Support needed for countries to maintain or further entries into the OBIS, HAEDAT and INFOSAN databases on worldwide occurrence reports of Gambierdiscus/Fukuyoa spp and bHAB events