



Risk Assessment Research Assembly programme



THE EUROCIGUA PROJECTS

RARA 2022 GOALS

- How food safety regulatory research can support the SDGs and relevant European policies, including Green Deal and to foster alignment of food safety R&I investments.
- Increased awareness of how food safety is integral part of safe and sustainable food systems
- Networking and relationship building in the wider food safety risk assessment ecosystem
- Alignment of food safety R&I investments to support regulatory science outcomes at European, regional and national level

Parallel session 2 - What more can EFSA and national funding do together to prepare for future risk assessment challenges?

- preparedness to address current and future regulatory science needs
- funding and partnership schemes EFSA has in place to best support policy decisions
- relevant partnership schemes that support a science policy interface function



FRAMEWORK PARTNERSHIP AGREEMENT

AGREEMENT NUMBER-
GP/EFSA/AFSCO/2015/03

Risk characterization of ciguatera food
poisoning in Europe

ONE FPA 4 SPECIFIC GRANTS



JUNE 2016-JAN 2021



FRAMEWORK PARTNERSHIP AGREEMENT

AGREEMENT NUMBER –
GP/EFSA/KNOW/2022/03

“An integrated approach to characterise
the human health risks of ciguatoxins in fish
in Europe”.



AUGUST 2022-OCT 2025

THE CHALLENGE

CIGUATERA

FIRST REPORT :

Canary Islands: 2004 –

Amberjack (*Seriola rivoliana*) 26 kg : 9 people affected

In Europe, autochthonous ciguatera food poisoning outbreaks were reported since 2008 in Spain (Canary Islands) and in Portugal (Madeira). Between 2008 and 2015 continuous outbreaks and cases appeared in Canary Islands
14 events, 104 cases



Date	Place	No. of Cases	Type of fish
Nov 2008	Tenerife	25	<i>Seriola fasciata</i>
Jan 2009	Tenerife	4	<i>Seriola dumerilis</i>
Sep 2009	Gran Canaria	3	<i>Seriola spp.</i>
Nov 2009	Tenerife	2	<i>Seriola spp.</i>
Apr 2010	Tenerife	6	<i>Seriola spp.</i>
Jun 2011	Gran Canaria	5	<i>Seriola spp.</i>
Jan 2012	Lanzarote	10	<i>Seriola spp.</i>
Apr 2012	Lanzarote	9	<i>Seriola spp.</i>
May 2012	Tenerife	4	<i>Seriola spp.</i>
Dec 2012	Tenerife	12	<i>Epinephelus spp.</i>
Dec 2013	Lanzarote	16	<i>Epinephelus spp.</i>
Feb 2015	Tenerife	3	<i>Mycteroperca fusca</i>
Apr 2015	Tenerife	3	UNK
May 2015	Tenerife	2	<i>Pamatomus saltatriz</i>

THE CHALLENGE

- The most frequent marine biotoxins have limits and official controls in the European legislation, CTXs are not yet regulated in Europe, BUT..... the current European legislation establishes that the presence of CTXs in fishery products is not allowed:

REGULATION (EC) No 854/2004 :

“that fishery products containing biotoxins such as Ciguatera are not placed on the market”



THE MAKING

✓ **BOTTOM UP**

✓ **TAYLOR MADE BY
EFSA AND SPAIN**

Detection of Gambiordiscus
and CP Outbreaks

CANARY ISLANDS AND MADEIRA



Raised at AF 2010 - Discussed by EREN in 2012



Spain expressed the need to characterize
ciguatera food poisoning in Europe.
13th EREN network meeting (April 2015)



Emerging Risks Exchange Network (EREN)

Proposal of a project made by the Spanish Agency for
Consumer Affairs, Food Safety and Nutrition
(AECOSAN) to EFSA in May 2015

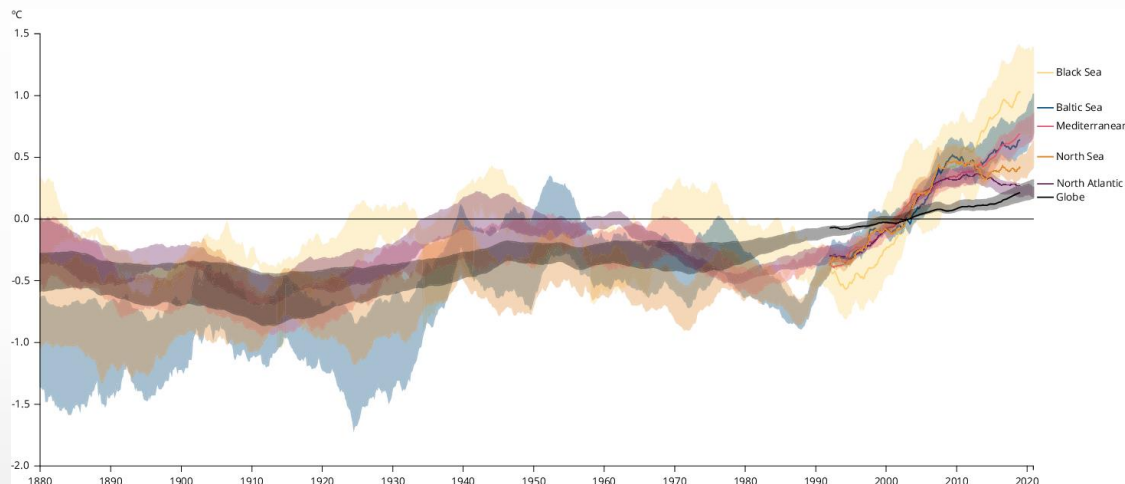


SIGNATURE OF THE FRAMEWORK PARTNERSHIP
AGREEMENT 19 MAY 2016



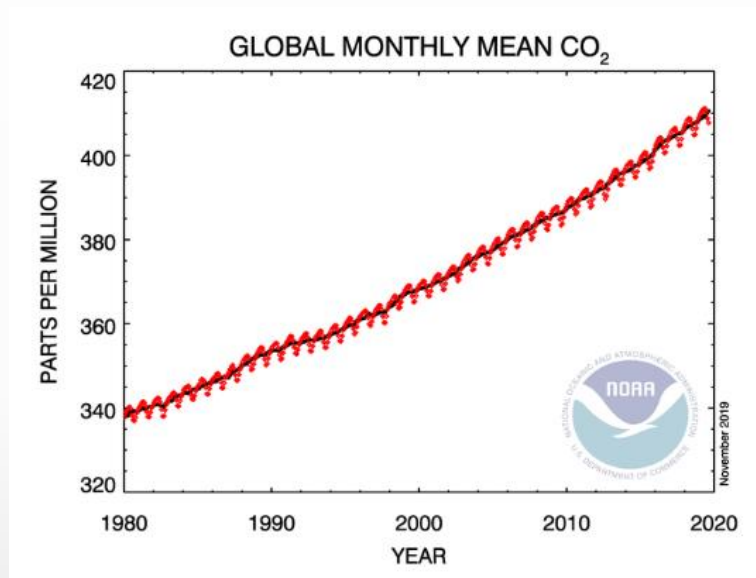
KEY TIPS FOR SUCCES; THE CONTEXT

CIGUATERA AND CLIMATE CHANGE: More frequent and less predictable



Increase of the ocean surface temperature

- Increase of the **sea surface temperature**
- **Acidification** of the sea due to the CO₂



Increase of the atmospheric CO₂

- **Migration of species (vectors of diseases)**
- **New substrates that support dinoflagellates**





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KEY TIPS FOR SUCCESES; THE CONTEXT

CIGUATERA, ECONOMY AND TRADE

CODEX WORKING GROUP PANEL CONTAMINANTS - FAO CHARACTERIZATION OF THE RISK OF CIGUATERA WORLDWIDE

TO RECOMMEND MEASURES TO REDUCE CONTAMINATION TO SAFE
LEVELS TO ENSURE PUBLIC HEALTH AND FACILITATE TRADE. Río de
Janeiro, Brazil – 3-7 April 2017



REPORT OF THE EXPERT MEETING ON CIGUATERA POISONING

ROME, 19–23 NOVEMBER 2018



- Lost economic profits of fishers in affected markets
- Reduced profits of local businesses due to declining tourism
- Losses in economic welfare from reduced dietary choices for consumers
- Losses in economic welfare from reduced dietary choices for consumers

Discussion paper on a Code of practice or guidelines to
prevent or reduce ciguatera poisoning

CODEX ALIMENTARIUS
NORMAS INTERNACIONALES DE LOS ALIMENTOS

Organización de las Naciones Unidas para la Alimentación y la Agricultura | Organización Mundial de la Salud

support World Food Safety Day

Acercar del Codex | Textos del Codex | Temas | Comités | Reuniones | Recursos | Publicaciones | Noticias y Eventos | Login

codexalimentarius > Comités > Grupos de trabajo electrónicos > detail

E-Working Group

Discussion paper on a Code of practice or guidelines to prevent or reduce ciguatera poisoning - CCCF 15

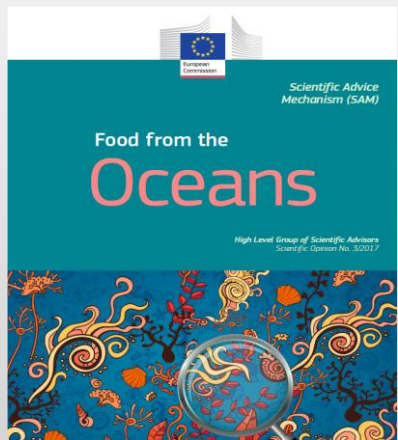
Language: English
Lead Host Country: United States of America
CO-host Countries: European Union
Deadline for registration: 23/06/2022
Deadline for comments: 09/12/2022
Status: Active
Link to eWG invitation message: Ciguatera.pdf

KEY TIPS FOR SUCCESES; THE CONTEXT



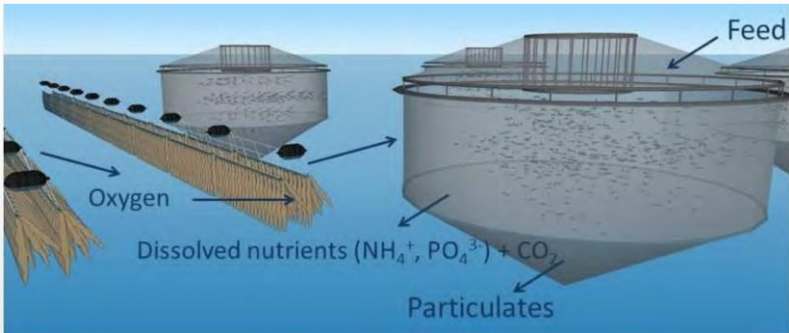
EU strategies and policies

Food from the oceans



European Green Deal,

Blue bioeconomy – towards a strong and sustainable EU algae sector



European Green Deal: F2F





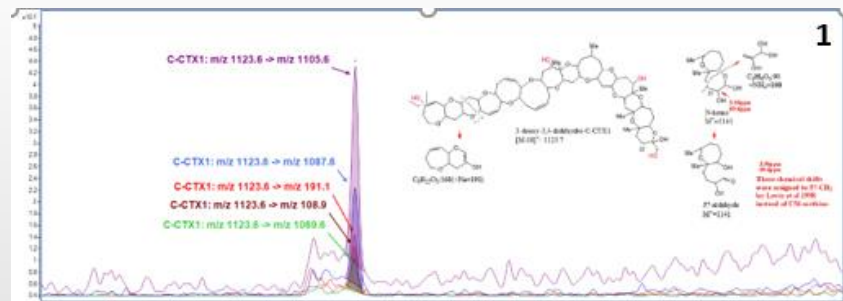
KEY TIPS FOR SUCCES; THE CONTEXT

GLOBAL APPROACH

FOOD SAFETY



- IDENTIFICATION OF CTX TOXINS:
- METHODOLOGIES
- STANDARDS/REF MATERIALS
- TRAINING



“FROM FOOD SAFETY TO FOOD SYSTEMS”

HUMAN HEALTH

- IDENTIFICATION OF CP INCIDENCE:
- CASE DEFINITION
- DATA SOURCES
- SURVAILLENCE PROTOCOL
- COMMUNICATION/AWARENESS



ENVIRONMENT

- CTX IN ENVIRONMENT TOXINS
- FISH AND DINOFLAGELLATE
- MODELLING





KEY TIPS FOR SUCCEES; THE CONTEXT

Responding to EFSA's Strategic Objectives

**S
O
2**

**Ensure preparedness for future
risk analysis needs**

EOR 2.1.2

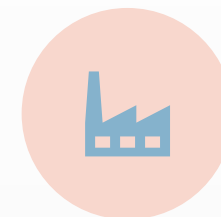
**The identification of emerging risks
is improved**

EOR 2.1.4

**Preparedness for future regulatory
and policy needs addressing the EU
Green deal aspirations is ensured**



LONG-TERM PARTNERSHIPS



EU CAPACITY BUILDING



MONITORING AND
SURVEILLANCE APPROACHES
FOR NEWLY EMERGING
CHEMICALS



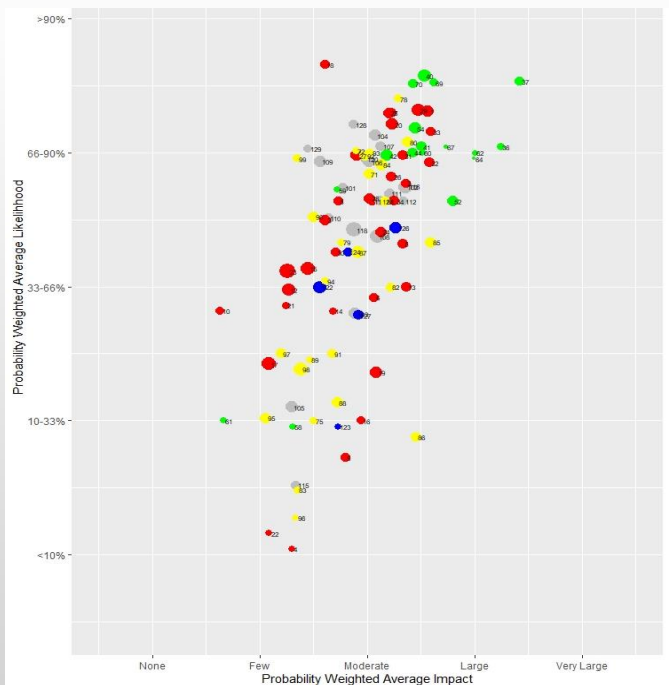
PREDICTIVE MODELLING

KEY TIPS FOR SUCCESES; THE CONTEXT

Responding to EFSA's identified targets:



The EFSA Climate Change project (CLEFSA)



Ciguatera one of the issues with the highest likelihood of emergence in the future.



Responding to EFSA's identified targets:



EFSA Journal 2010; 8(6):1627

Emerging toxins: Ciguatoxin group. EFSA Journal 2010; 8(6):1627. [38 pp.].

- ✓ Certified reference standards and reference materials are needed
- ✓ Methods other than the Mouse Bioassay should be further developed, optimised and validated
- ✓ More information on occurrence in fish and other seafood is needed
- ✓ Due to their high acute toxicity and emerging occurrence, appropriate strategies to protect human health need to be developed
- ✓ Limited data on experimental animals and human intoxications limited the establishment of acute reference dose (ARfD)
- ✓ Further information to better characterise the oral toxicity and relative potencies is needed

These toxins were considered as emergent in Europe

KEY TIPS FOR SUCCESS; PARTNERSHIP AND COLLABORATION

EUROCIGUA

EuroCigua



- 2 million € (Co-funded by EFSA 1 million €), 4 years
- 14 partners from six Member States
- Main goal: Characterize the risk of ciguatera food poisoning in Europe

SPAIN



PORTUGAL



GREECE



GERMANY



CYPRUSS



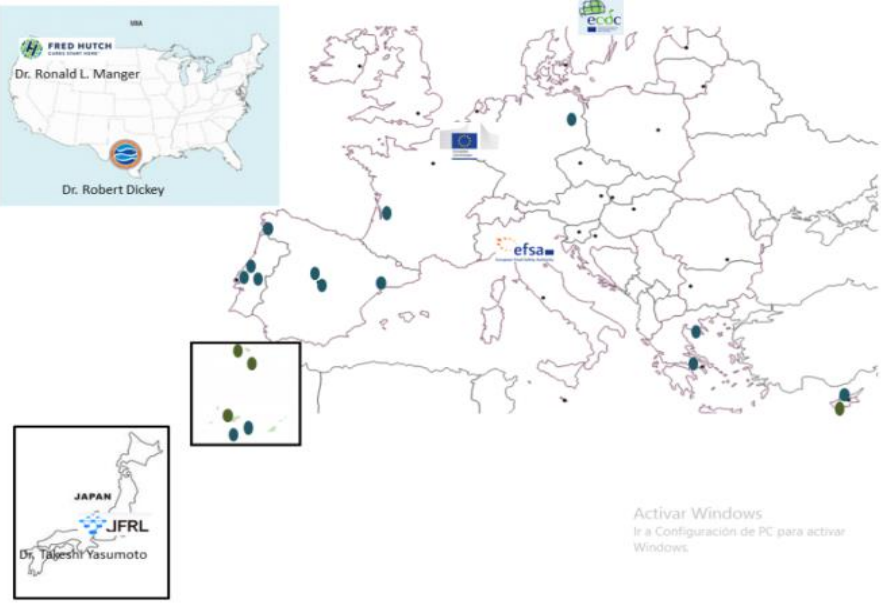
FRANCE



KEY TIPS FOR SUCCESES; PARTNERSHIP AND COLLABORATION

" individuals and organisations whose valuable work, support and assistance will facilitate the project overall however, they shall not be responsible for the execution of core tasks and their actions shall not have any financial implications for the project under the Framework Partnership Agreement. The subject matter of this FPA is an emerging risk which could affect several EU Member States, therefore the scientific collaboration of those organisations in the project may be required"

Collaborators & AB



Collaborators	Ministry of health, Cyprus
	Regional Ministry of Agriculture, Livestock, Fisheries and Water the Canary Islands Government
	Instituto das Florestas e Conservação da Natureza, IP-RAM/ Governo Regional da Madeira, Secretaria Regional do Ambiente e Recursos Naturais
	Direção de Serviços de Investigação e Desenvolvimento da Pesca, Direção Regional de Pescas, Secretaria Regional de Agricultura e Pesca
Advisory Board	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (ANSES)
	Dr. Robert Dickey - University of Texas Marine Science Institute
	Dr. Ronald Manger - Fred Hutchinson Cancer Research Center
	Dr. Takeshi Yasumoto - Japan Food Research Laboratories (JFRL)
	European Food Safety Authority - EFSA
	European Centre for Disease Prevention and Control - ECDC
	European Commission (EC)
	Joint Research Center (JRC)

KEY TIPS FOR SUCCEES; PARTNERSHIP AND COLLABORATION

EUROCIGUA II

- **2 million € (Co-funded by EFSA 1 million €), 3 years**
- **12 partners from five Member States**
- Main goal: “An integrated approach to characterise the human health risks of ciguatoxins in fish in Europe”.

SPAIN
PORTUGAL
GERMANY
FRANCE
NETHERLANDS



EuroCigua II





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KEY TIPS FOR SUCCESES; PARTNERSHIP AND COLLABORATION

Collaborators & AB



European
Environment
Agency



European
Commission



Food and Agriculture
Organization of the
United Nations

Advisory Board

Dr. Robert Dickey - Emeritus Past President, National Association of Marine Laboratories
Dr. Ronald Manger - Retired from Fred Hutchinson Cancer Research
Dr. Patricia Tester - National Oceanic and Atmospheric Administration, US Department of Commerce
Prof. Dr. Takeshi Yasumoto - Japan Food Research Laboratories
Dr. Naomasa Oshiro - National Institute of Health Sciences Japan
AESAN
EFSA
European Commission
ECDC
FAO

Collaborators

Ministero della Salute - Direzione generale della sanità animale e dei farmaci veterinari
Fondazione Centro Ricerche Marine (Cesenatico)
Wageningen Food Safety Research (Netherlands)
Spanish Agency for Food Safety and Nutrition, AESAN
Laboratory for marine biotoxins; ANSES
General Directorate for Food of the Ministry of Agriculture French
Consejo Superior de Investigaciones Científicas
Consejería de Agricultura Ganadería y Pesca del Gobierno de Canarias
Intergovernmental Oceanographic Commission of UNESCO
European Environment Agency (EEA)
IFREMER, France
University of California San Francisco, Mass Spectrometry Facility (USA)
Serviço de Saúde da Região Autónoma da Madeira
DRA – DSLAA, Laboratório Regional de Veterinária e Segurança Alimentar, Madeira
Instituto das Florestas e Conservação da Natureza, IP-RAM, Secretaria Regional do Ambiente, Recursos Naturais e Alterações Climáticas (Madeira Natural Park)



ALIGNMENT OF FUNDS



Monitoring, control and mitigation of marine organism proliferations associated with human disturbances and climate change in the Macaronesian Region", ULPG



Canary Islands, Madeira, Azores, Cape Verde and Senegal to cover the Marine Observatory dedicated to evaluating the impact generated by invasive species, harmful algal blooms (HABs) and the changes produced by global warming and human activity in marine habitats.



ATLANTIC NETWORK FOR HEALTH SURVEILLANCE OF FISHERY AND AQUACULTURE PRODUCTS

[Programme 2014 - 2020 INTERREG V-A Spain - Portugal \(Madeira - Açores - Canarias \(MAC\)\)](#)

Network for the health surveillance of fishery and aquaculture products in the Macaronesian macro-region (**Madeira, Canary Islands, Mauritania and Senegal**) that will help to increase the safety, health level and quality of the products that reach our markets.



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ALIGNMENT OF FUNDS



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DE CIENCIA
E INNOVACIÓN



Food risks associated with ciguatoxins: monitoring and tracking the toxins and toxin-producing organisms in marine ecosystems (CIGUARISK)

Ciguarisk

Riesgos alimentarios asociados con las ciguatoxinas:

monitoreo y seguimiento de las toxinas y organismos productores de toxinas en los ecosistemas marinos



id^æa



CSIC



BANCO ESPAÑOL DE ALGAS
marinebiotechnology.org



25 de agosto, 2022

Un biosensor conectado al móvil permitirá detectar toxinas en el pescado y el marisco

Identificará de forma inmediata y fiable las ciguatoxinas y las tetradotoxinas



CELLECTRA - Biotechnological tools based on cells and receptors for the detection of ciguatoxins and tetrodotoxins

STARTING DATE:

01/09/2021

END DATE:

31/08/2024

PROGRAMME:

MARINE AND CONTINENTAL
WATERS

LESSONS LEARNT

- GOOD IDEA NOT ENOUGH, YOU NEED THE EXPERTS
- SUPPORT FROM THE NATIONAL AF AND FP FOR EFSA
- TO GET ADVISE FROM EXPERTS AND COLLABORATORS IS COSTLESS AND EXTREMELY FRUITFULL
- EUROPEAN AND INTERNATIONAL ORGANIZATIONS ENGAGEMENT
- RISK MANAGERS WELCOME
- NEED OF STRONG COMMUNICATION BETWEEN GRANTS AND WITH EFSA
- LOTS OF PATIENCE, DIPLOMACY AND TIME



PUBLICATIONS



First report of *Gambierdiscus* in the Western Mediterranean Sea (Balearic Islands)

Lucía Soliño^{a,b,*}, Pedro Reis Costa^{a,b}

^aIPMA - Instituto Português do Mar e da Atmosfera, Rua Alfredo Magalhães Ramalho, 6, 1495-006, Lisbon, Portugal

^bCCMAR - Centre of Marine Sciences, University of Algarve, Campus of Gambelha, 8005-139, Faro, Portugal

Abstract: *Gambierdiscus* (Dinophyceae) species are benthic dinoflagellates living in marine littoral zones of circumtropical and Mediterranean Sea. The present study confirms the presence of *G. australes* in the two Balearic Islands of Majorca and Minorca.

Predictive score and probability of CTX-like toxicity in fish samples from the official control of ciguatera in the Canary Islands

J. Andres Sanchez-Henao^a, Natalia Garcia-Álvarez^{a,*}, Antonio Fernández^a, Pedro Saavedra^b, Freddy Silva Sergeant^c, Daniel Padilla^d, Begoña Acosta-Hernández^e, Manuela Martel Suárez^f, Jorge Diogène^g, Fernando Real^h

^aDivision of Fish Health and Pathology, Institute of Animal Health and Food Safety (IRISA), University of Las Palmas de Gran Canaria, 35416-Arucas, Las Palmas, Spain

^bDepartment of Mathematics, University of Las Palmas de Gran Canaria, Canary Islands, Spain

^cMarine and Continental Waters Environmental Monitoring, IRTA, Ctra. Poble Nou, Km 5.5, 43540 Sant Carles de la Ràpita, Spain

Emerging Marine Biotoxins in Seafood from European Coasts: Incidence and Analytical Challenges

Pablo Estevez¹, David Castro¹, Ana Pequeño-Valtierra¹, Jorge Giraldez¹ and Ana Gago-Martínez^{1,2,*}

¹ Department of Analytical and Food Chemistry, University of Vigo, Campus Universitario de Laxe, 36310 Vigo, Spain

² Department of Analytical and Food Chemistry, University of Vigo, Campus Universitario de Laxe, 36310 Vigo, Spain

Presence of CTXs in moray eels and dusky groupers in the marine environment of the Canary Islands

Andres Sanchez-Henao^a, Natalia Garcia-Álvarez^{a,*}, Freddy Silva Sergeant^b, Pablo Estevez^b, Ana Gago-Martínez^{b,c}, Francisco Martín^d, María Ramos-Sosa^e, Antonio Fernández^e, Jorge Diogène^f, Fernando Real^g

^a Division of Fish Health and Pathology, University Institute of Animal Health and Food Safety (IRISA), University of Las Palmas de Gran Canaria, 35416-Arucas, Las Palmas, Spain

^b Department of Analytical and Food Chemistry, Campus Universitario de Vigo, 36310 Vigo, Spain

^c European Union Reference Laboratory for Marine Biotoxins, CITEXVI, Campus Universitario de Vigo, 36310 Vigo, Spain

^d Canary Health Service, Directorate-General for Public Health, Canary Islands, Spain

An Attempt to Characterize the Ciguatera Profile in *Seriola fasciata* Causing Ciguatera Fish Poisoning in Macaronesia

Pablo Estevez¹, David Castro¹, Ana Pequeño-Valtierra¹, José M. Leao^{1,2}, Oscar Vilariño^{1,2}, Jorge Diogène¹ and Ana Gago-Martínez^{1,2,*}

¹ Department of Analytical and Food Chemistry, University of Vigo, Campus Universitario de Laxe, 36310 Vigo, Spain

² Department of Analytical and Food Chemistry, University of Vigo, Campus Universitario de Laxe, 36310 Vigo, Spain

Further Advance of *Gambierdiscus* Species in the Canary Islands, with the First Report of *Gambierdiscus belizeanus*

Àngels Tudó¹, Greta Gaiani¹, Maria Rey Varella¹, Takeshi Tsumuraya², Karl B. Andree¹, Margarita Fernández-Tejedor¹, Mònica Campàs¹ and Jorge Diogène^{1,*}

¹ IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain

² Department of Biological Sciences, Graduate School of Science, Osaka Prefecture University, Osaka, 599-8570, Japan

Mass spectrometry for the optimization of MS/MS analysis of ciguatera toxins

G. Gaiani^a, S. Leonardo^a, À. Tudó^a, A. Toldrà^a, M. Rey^a, K.B. Andree^a, T. Tsumuraya^b, M. Hiramatsu^b, J. Diogène^a, C.K. O'Sullivan^{c,d}, C. Alcaraz^a, M. Campàs^{a,e}

^a IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Spain

^b Department of Biological Sciences, Graduate School of Science, Osaka Prefecture University, Osaka, 599-8570, Japan

^c Departament d'Enginyeria Química, URV, Av. Palsos Catalans 26, 43007, Tarragona, Spain

^d KREA, Pg. Lluís Companys 23, 08010, Barcelona, Spain

Ecotoxicology and Environmental Safety

journal homepage: www.elsevier.com/locate/ecoenv

Harmful Algae

journal homepage: www.elsevier.com/locate/hal

Food Chemistry

Volume 280, 15 May 2019, Pages 8-14

Food Chemistry

Volume 280, 15 May 2019, Pages 8-14

Rapid detection of ciguateric toxins in *Gambierdiscus* and *Fukuyoa* with immunosensing tools

G. Gaiani^a, S. Leonardo^a, À. Tudó^a, A. Toldrà^a, M. Rey^a, K.B. Andree^a, T. Tsumuraya^b, M. Hiramatsu^b, J. Diogène^a, C.K. O'Sullivan^{c,d}, C. Alcaraz^a, M. Campàs^{a,e}

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^b Department of Biological Sciences, Graduate School of Science, Osaka Prefecture University, Osaka, 599-8570, Japan

^c Departament d'Enginyeria Química, URV, Av. Palsos Catalans 26, 43007, Tarragona, Spain

^d KREA, Pg. Lluís Companys 23, 08010, Barcelona, Spain

***Gambierdiscus* and *Fukuyoa* as potential indicators of ciguatera risk in the Balearic Islands**

Àngels Tudó^{a,b}, Anna Toldrà^a, Maria Rey^a, Irene Todolí^a, Karl B. Andree^a, Margarita Fernández-Tejedor^a, Mònica Campàs^a, Francesc X. Sureda^a, Jorge Diogène^{a,*}

^a IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain

^b Pharmacology Unit, Faculty of Medicine and Health Sciences, Universitat Rovira i Virgili, C/ St. Llorenç 21, E-43201, Reus (Tarragona), Spain

animals

Article

Accumulation of C-CTX1 in Muscle Tissue of Goldfish (*Carassius auratus*) by Dietary Experience

Andres Sanchez-Henao¹, Natalia Garcia-Álvarez^{1,*}, Daniel Padilla¹, Maria Ramos-Sosa¹, Freddy Silva Sergeant¹, Antonio Fernández¹, Pablo Estevez², Ana Gago-Martínez², Jorge Diogène³ and Fernando Real¹

¹ Division of Fish Health and Pathology, Institute of Animal Health and Food Safety (IRISA), University of Las Palmas de Gran Canaria, 35416-Arucas, Las Palmas, Spain

² Department of Mathematics, University of Las Palmas de Gran Canaria, Canary Islands, Spain

³ Marine and Continental Waters Environmental Monitoring, IRTA, Ctra. Poble Nou, Km 5.5, 43540 Sant Carles de la Ràpita, Spain

mass spectrometry for the optimization of MS/MS analysis of ciguatera toxins

G. Gaiani^a, S. Leonardo^a, À. Tudó^a, A. Toldrà^a, M. Rey^a, K.B. Andree^a, T. Tsumuraya^b, M. Hiramatsu^b, J. Diogène^a, C.K. O'Sullivan^{c,d}, C. Alcaraz^a, M. Campàs^{a,e}

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^c Departament d'Enginyeria Química, URV, Av. Palsos Catalans 26, 43007, Tarragona, Spain

^d KREA, Pg. Lluís Companys 23, 08010, Barcelona, Spain

Ciguatera

Article

Ciguatera Detection in Flesh and Liver of Relevant Fish Species from the Canary Islands

Maria José Ramos-Sosa¹, Natalia Garcia-Álvarez^{1,*}, Andres Sanchez-Henao¹, Freddy Silva Sergeant¹, Daniel Padilla¹, Pablo Estevez², Maria José Caballero¹, José Luis Martin-Barrasa^{1,3}, Ana Gago-Martínez¹ and Fernando Real¹

¹ Division of Fish Health and Pathology, Institute of Animal Health and Food Safety (IRISA), University of Las Palmas de Gran Canaria, 35416-Arucas, Las Palmas, Spain

² Department of Mathematics, University of Las Palmas de Gran Canaria, Canary Islands, Spain

³ Marine and Continental Waters Environmental Monitoring, IRTA, Ctra. Poble Nou, Km 5.5, 43540 Sant Carles de la Ràpita, Spain

toxins

Article

New Insights into the Occurrence and Toxin Profile of Ciguateric Fish: Quantitative Modelling of the Flow of Ciguatera Toxin through a Marine Food Chain

Pedro Reis Costa¹, Pablo Estevez², David Castro², Lucía Soliño¹, Neide Gouveia³, Carolina Santos⁴, Susana Margarida Rodrigues¹, José Manuel Leao² and Ana Gago-Martínez^{2,*}

¹ IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain

² Department of Analytical and Food Chemistry, University of Vigo, Campus Universitario de Laxe, 36310 Vigo, Spain

³ Department of Biological Sciences, Graduate School of Science, Osaka Prefecture University, Osaka, 599-8570, Japan

⁴ KREA, Pg. Lluís Companys 23, 08010, Barcelona, Spain

2012 to 2017 in Germany, Japan, and Vietnam

Laia Reverte¹, Anna Toldrà¹, Karl B. Andree¹, Sanja Andree¹

¹ IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain

Assessment of cytotoxicity in ten ciguatera fish species from Macaronesian Islands by neurotoxicity tests

Laia Reverte¹, Anna Toldrà¹, Karl B. Andree¹, Sanja Andree¹

¹ IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain

toxins

Article

Origin of Ciguatera Fish: Quantitative Modelling of the Flow of Ciguatera Toxin through a Marine Food Chain

Michael J. Holmes and Richard J. Lewis^{*1}

¹ IRTA, Ctra. Poble Nou Km 5.5, 43540, Sant Carles de la Ràpita, Tarragona, Spain



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An integrated approach to characterise the human health risks of ciguatoxins in fish in Europe

KICK-OFF MEETING

Las Palmas de Gran Canaria



FSN Food Safety News

Sponsored by Marler Clark

Breaking news for everyone's consumption



 **AESAN**
@AESAN_go... · 27 oct.
La higiene alimentaria está en el centro de la estrategia #EUFoodSafety. La ciguatoxina es una toxina emergente que afecta al pescado y a las personas. EFSA ha participado en la reunión de EUROCIGUA que investiga su riesgo en Europa.
[@EFSA_EU](#)
[@cantabriaes](#)
[#EUFarm2Fork](#)

 **EU Food Safe...** · 27 oct.
Food hygiene is at the heart of our #EUFoodSafety strategy.
Ciguatoxin is an emerging toxin affecting fish and humans and ...

Las ciguatoxinas han causado 125 intoxicaciones alimentarias en Canarias desde 2004

26 octubre 2022

EFE:

LA PROVINCIA

DIARIO DE LAS PALMAS

Contenido exclusivo para suscriptores digitales

Canarias renueva su compromiso con el seguimiento de la ciguatera

La comunidad autónoma ha registrado 21 brotes que suman un total de 125 intoxicaciones alimentarias de este tipo desde 2004

Animal's Health

España lidera un proyecto internacional para el control de la ciguatera en Europa

El Ministerio de Sanidad de España coordina el proyecto de investigación Eurocigua II para el control y vigilancia de casos de ciguatera en Europa

Ciguatera in Europe project granted follow-up

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THANK YOU

