MARINE TOXINOLOGY

New insights.

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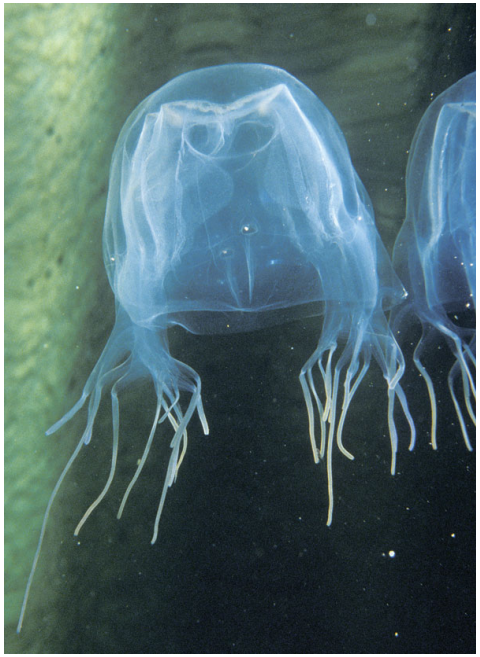
INTRODUCTION :

Natural toxins are numerous in tropical seas where various venomous and poisonous species can cause severe human health troubles.



Introduction II

In tropical seas, new syndromes are regularly described. In Europe, practitioners are directly concerned in numerous conditions :

- Seafood distributed through the world
- Oversea territories always exposed
- Tourists coming back tropical countries can be poisoned.
- Global warming in Europe

INTRODUCTION III :

In temperate seas, marine toxinology seems to represent a less important problem, but according to recent data, the situation is changing for two main raisons:

- Firstly, climate modifications allow the development of several toxic indigenous species like jellyfishes or dinoflagellates.

- Secondly, the establishment of introduced tropical species including toxic algae or fish is now possible with the milder weather.

Human beeings are strangers in the Seas

Observation :

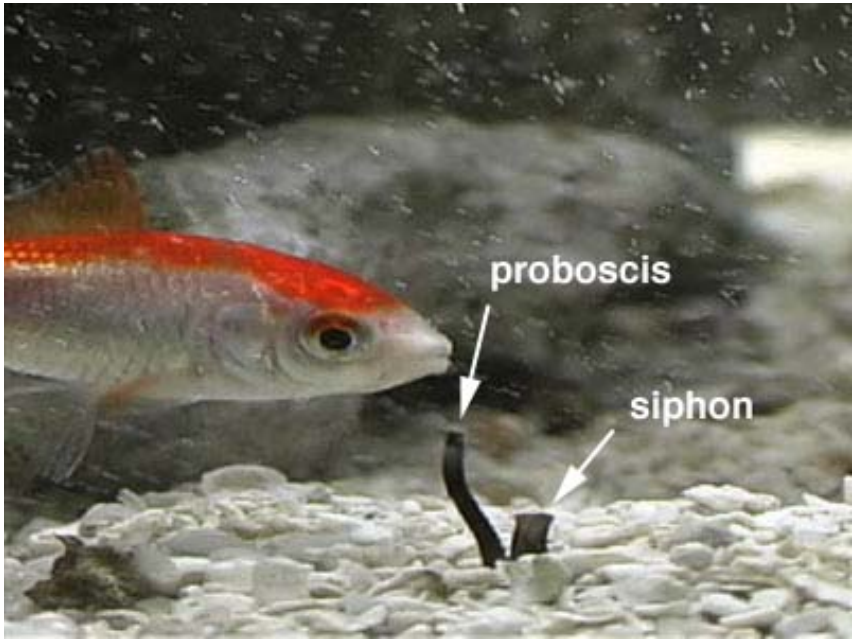
Girl, 8YO with her parents, 30 km from Noumea. She comes from Main France for the first in New Caledonia. She having fun in the beach with sea snails (putting the most beautiful in her swimsuit).

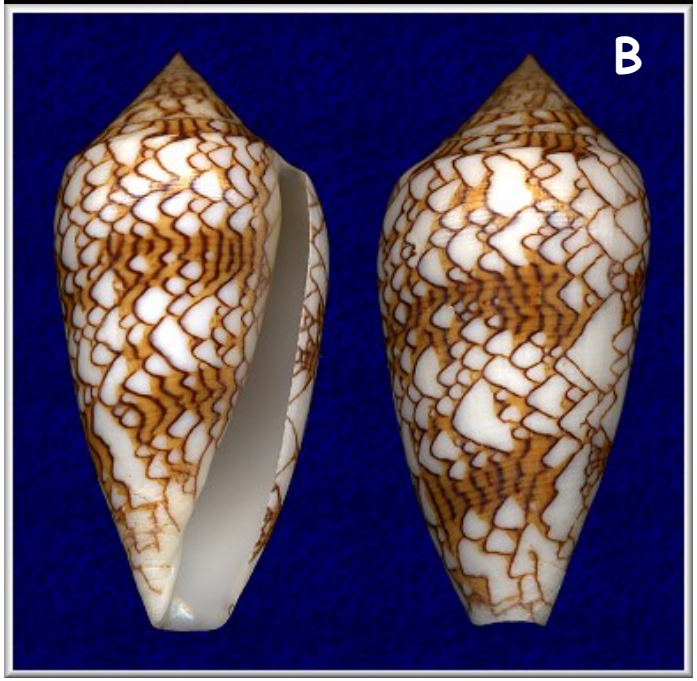
Suddenly, she shouts and says to her mother she does not fell good. She is pale… One episode of vomiting and malaise. The parents ask by mobile phone assistance. In few minutes, she is not able to walk anymore with ascending paralysis. In 10 minutes, breath difficulties. When the paramedics arrive 35 after the phone call, she is dead.

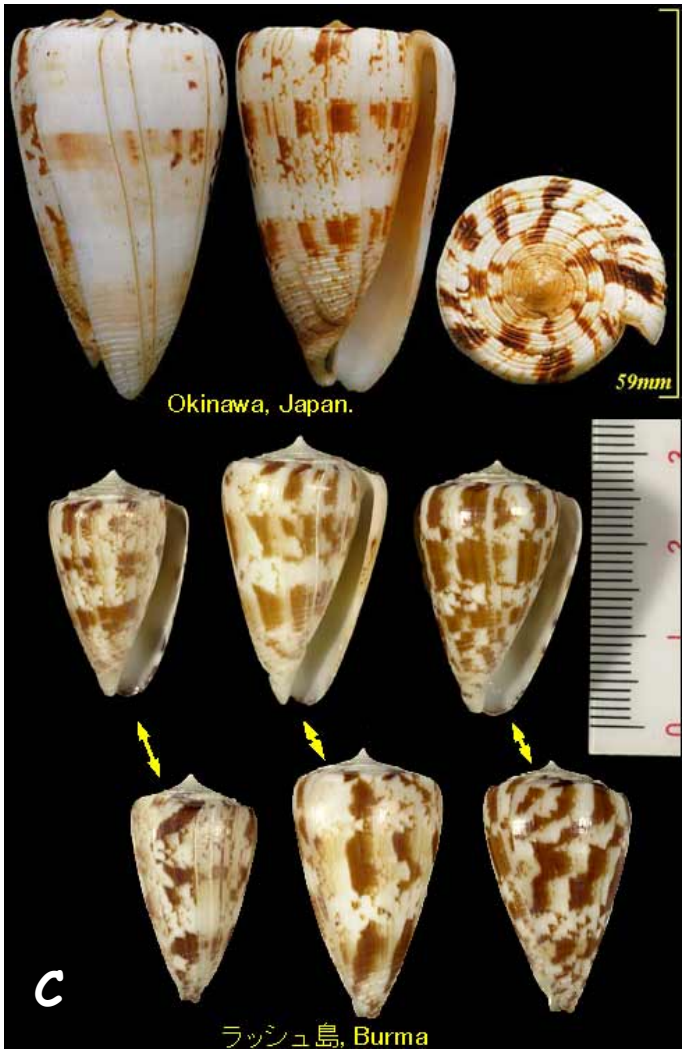
Incredible neurotoxicity of the cone shells (in this case it was *Conus geographus*).

- alpha-conotoxins : nicotinic ligand-gated ion channel
- omega-conotoxins : voltage-gated calcium channel
- mu-conotoxins : voltage-gated sodium channel
- delta-conotoxins : voltage-gated sodium channel
- kappa- conotoxins : voltage-gated potassium channel
- conantokins : ligand-gated glutamate (NMDA) channel

Piscivorus species (*C.textilis, C.geographus, C.magus…*) may induce life-threatening situations.







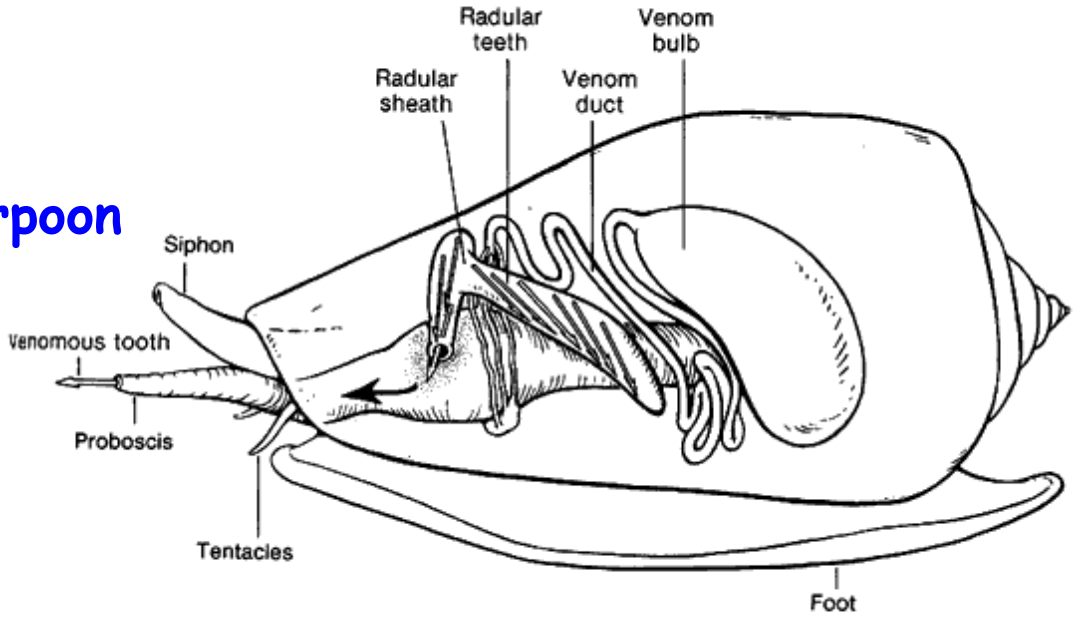
3 dangerous species for human

A – *Conus geographus*

B- *Conus textile*

C- *Conus striatus*

Venom apparatus : a real harpoon



Human beeings are strangers and in the tropical seas quick and important evolutions are observed…

CIGUATERA FISH POISONING

Public health problem in numerous tropical areas (French overseas territories +++).

Poisoning after ingestion of fish flesh at the upper levels of the food chain (bio-accumulation of different kinds of toxins of the micro algae *Gambierdiscus toxicus*).

The algae produces in some Circumstances (coral reef Weakness) toxins with Contamination of the food chain.

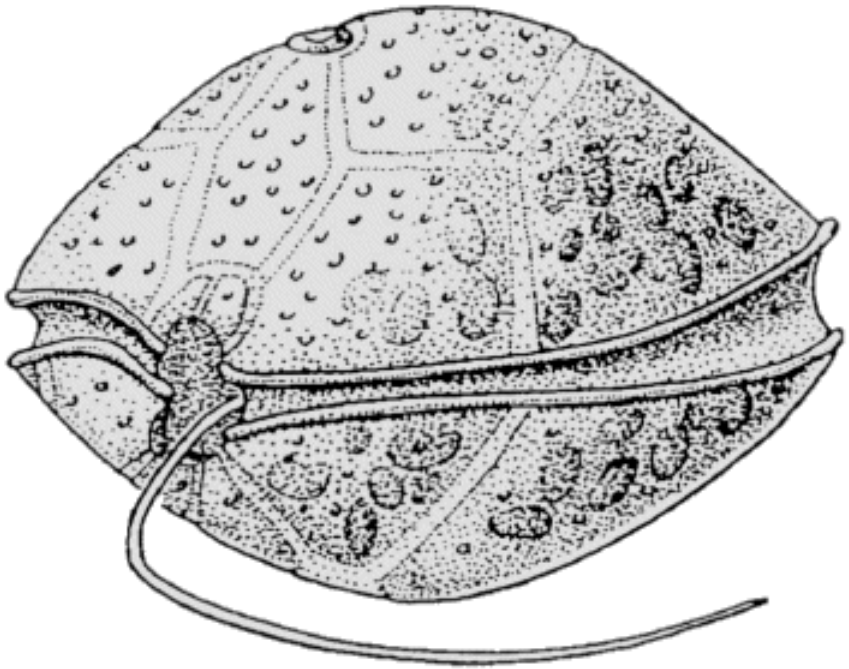
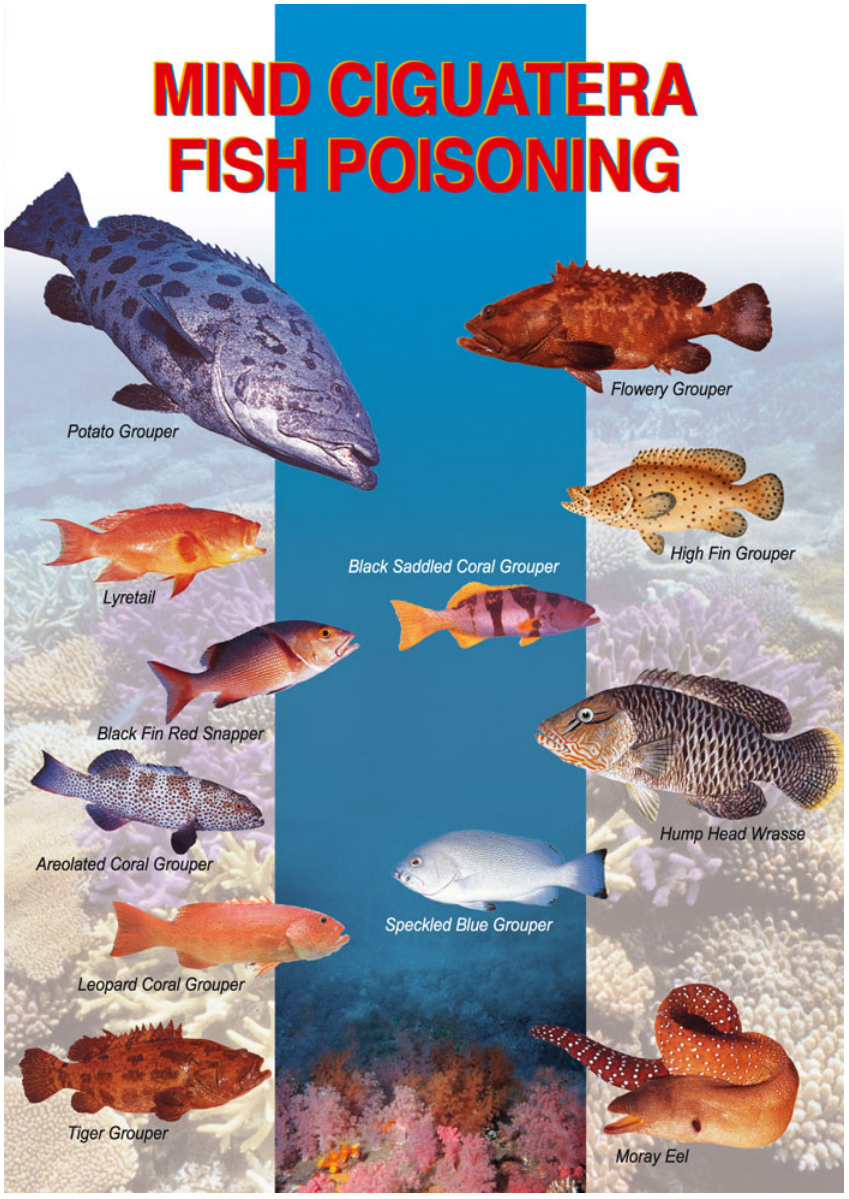


Figure 3 :
Gambierdiscus toxicus
(grossissement : x 2000)




Barracuda


Amberjack


Snappers


Snappers

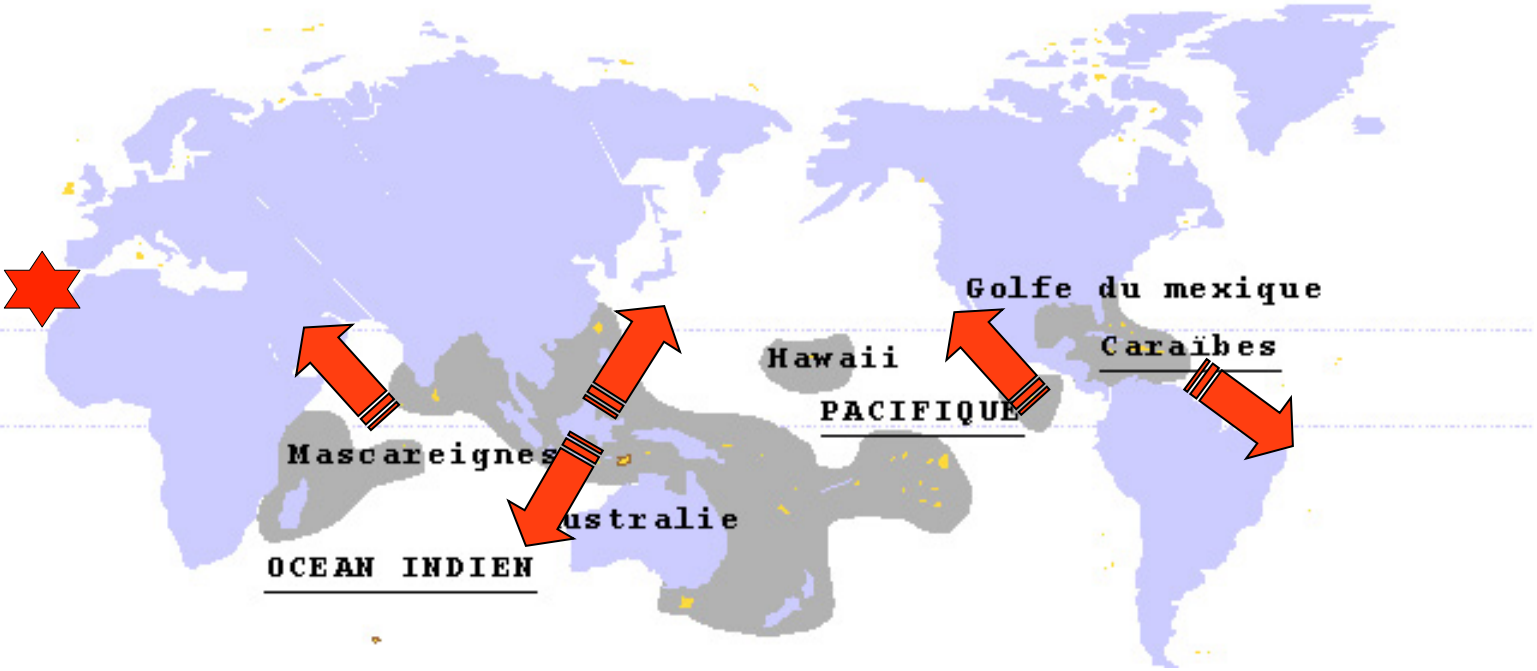
Clinical features of ciguatera fish poisoning : 3 phases

Beginning : 30' to 24h after the meal
Digestive troubles, malaise, sweating, hypersalivation, sensitive troubles (paresthesias of the face and the extremities, dysesthesias +++).

State stage : from 24h to 3 weeks
Major sensitive troubles, sometimes motor troubles, asthenia, myalgias, bradycardia, low blood pressure, shivering, diffuse pains.

Chronic stage: from few days to several months : intense pruritus and severe weakness. No real efficient treatment.

Ciguatera geographical distribution



High increase of the case number of ciguatera In the French West Indies.

RAPID COMMUNICATIONS

Outbreak of ciguatera food poisoning by consumption of amberjack (*Seriola* spp.) in the Canary Islands, May 2012

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In tropical seas, ancestral knowledge is disappearing ! Observation 1 :

South of Madagascar, November 1994 : One adult great white shark of the genus *Carcharodon* is shared by to villages. The elders advised to avoid consuming the taboo flesh…

The same evening, the authorities in the capital Tana are alerted, and when the medical team from the government arrived 48 hours after the meal, 179 people were already dead (all less than 45 YO). In total, 215 deaths…

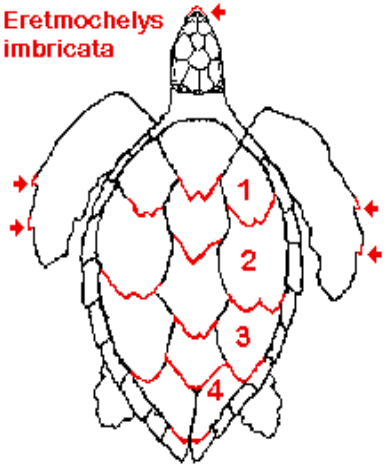
Carchatoxism

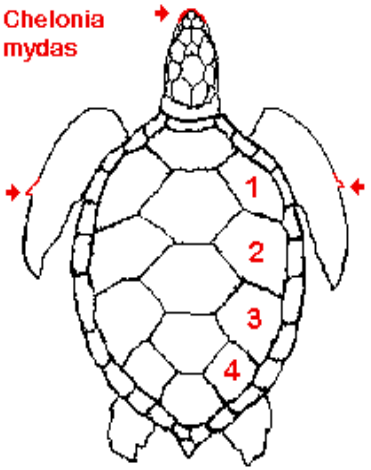
After ingestion of big sharks flesh, collective poisonings described in the Indian Ocean.
Clinical feature close to ciguatera but more intense with frequent neurological complications and respiratory arrests. Toxins discovered by Japanese teams after this episode in Madagascar : Carchatoxins with unknown origin.

In tropical seas, ancestral knowledge is disappearing !
Observation 2 :

Rangiroa (French Polynesia, October 2002), one sea turtle is captured and 19 people ate despite the negative advise of the local shaman. Digestive troubles for all of them. But the flesh was delicious and 3 patients decided to eat a second meal with the turtle.
They were all managed in intensive care unit in Papeete: 2 men (40 and 64 YO with severe neurological troubles, a 24 YO pregnant woman died du to multi-organ failure in 2 days).

Chelonitoxism





In tropical seas, ancestral knowledge is disappearing !
Observation 3 :

Near Kourou in French Guiana, June 2008 : a fisherman caught a balloon-fish of the genus *Diodon*. A native family decided to eat it despite the local taboo (2 adult men and a young girl of the same family) : respiratory arrest in 20 to 30 minutes, 48 hours of artificial ventilation for 2 of them, but one adult male died after 3 months of vegetative coma induced by neurological sequels.

FUGU poisoning or tetrodotoxism

A ムシフグ *Takifugu exascurus* (16 cm)
B ショウサイフグ *Takifugu vermicularis* (20 cm)
C ナシフグ *Takifugu radiatus* (23 cm)
D マフグ *Takifugu porphyreus* (yg.ad. 27 cm)
E マフグ *Takifugu porphyreus* (ad. 38 cm)
F ヒガンフグ *Takifugu pardalis* (20 cm)
G アカメフグ *Takifugu chrysops* (22 cm)
H オキナワフグ *Chelonodon patoca* (15 cm)
I シッポウフグ *Amblyrhynchotes hypselogeneion* (17 cm)
J シッポウフグ *Amblyrhynchotes hypselogeneion* (var. 17 cm)
K シロサバフグ *Lagocephalus wheeleri* (30 cm)
L クロサバフグ *Lagocephalus gloveri* (30 cm)

Clinical feature of tetrodotoxism:

5 to 30 minutes after the first mouthful

Facial paresthesias, mouth anesthesia, headaches, numbness, vomiting, dyspnea, bradypnea, ascending paralysis, Respiratory arrest.

TRT : artificial ventilation to avoid neurological sequel.
After 24 hours, possible full recovery.

TROPICAL SEA FULL OF DANGERS...

IN EUROPEAN SEAS, NEW DANGERS with the climate disturbances

- Development of toxic indigenous species
- Invaders.

IN EUROPE, DEVELOPMENT of TOXIC INDIGENOUS SPECIES:

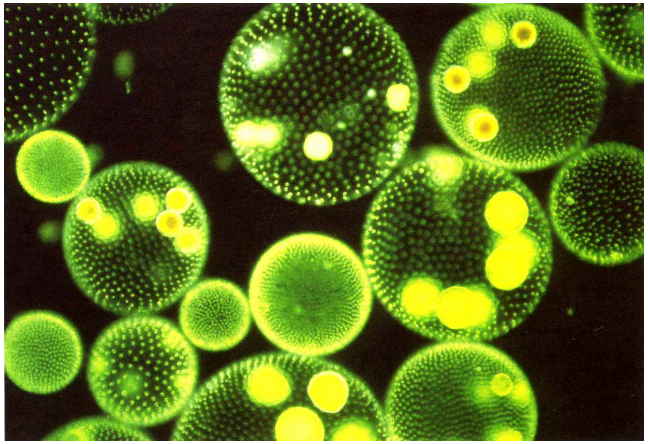
Modifications of the biotopes equilibrium (eutrophication) can induce massive development of plankton species : BLOOMS.

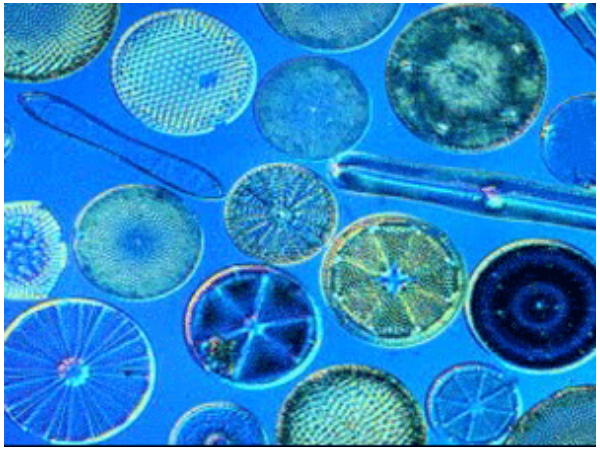
- Dinoflagellates
- Jellyfishes.

First example:

TOXIC DINOFLAGELLATES and SHELLFISH POISONING

Phytoplankton development can be increased when sun, heat and fertilizer polluted sea water allow the microscopic algae bloom. At very high concentration, the sea water color can be modified. Most algae species (diatoms…) are harmless for human, but several species can produces toxins.



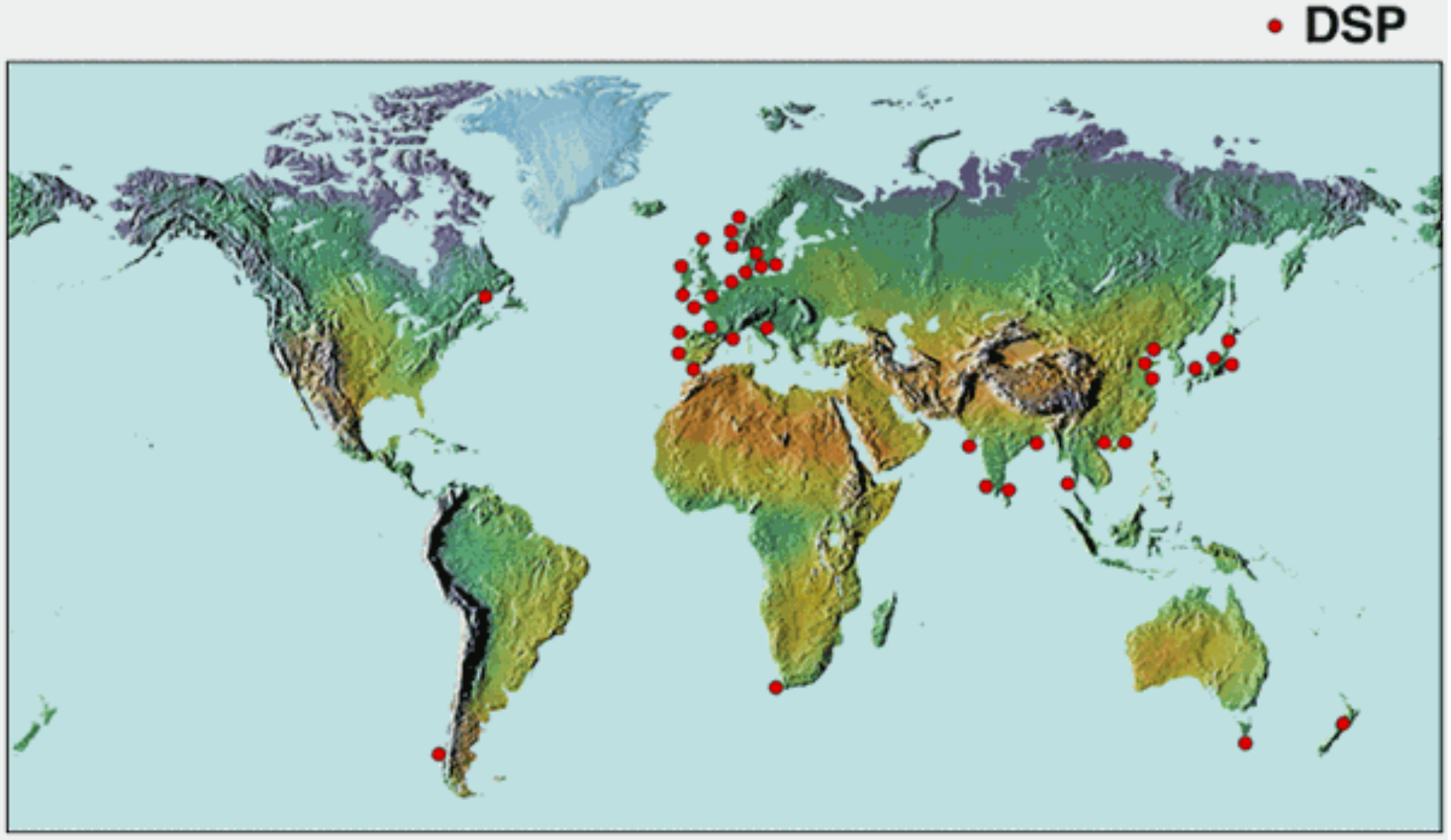


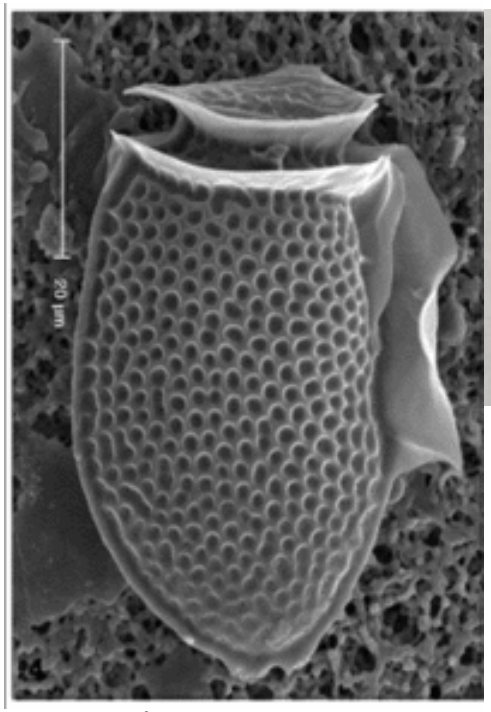
Typical aspect of dinoflagellate bloom, here in Norway.

Toxic dinoflagellates can produce toxins at the origin of 4 different kinds of shellfish poisonings :

-The Diarrheic Shellfish Poisoning (DSP in Europe +++)
- The Paralytic Shellfish Poisoning (PSP in America +++)
- The Neurotoxic Shellfish Poisoning (NSP in tropical America)
- The Amnesic Shellfish Poisoning (ASP in North America)

DSP in Europe +++



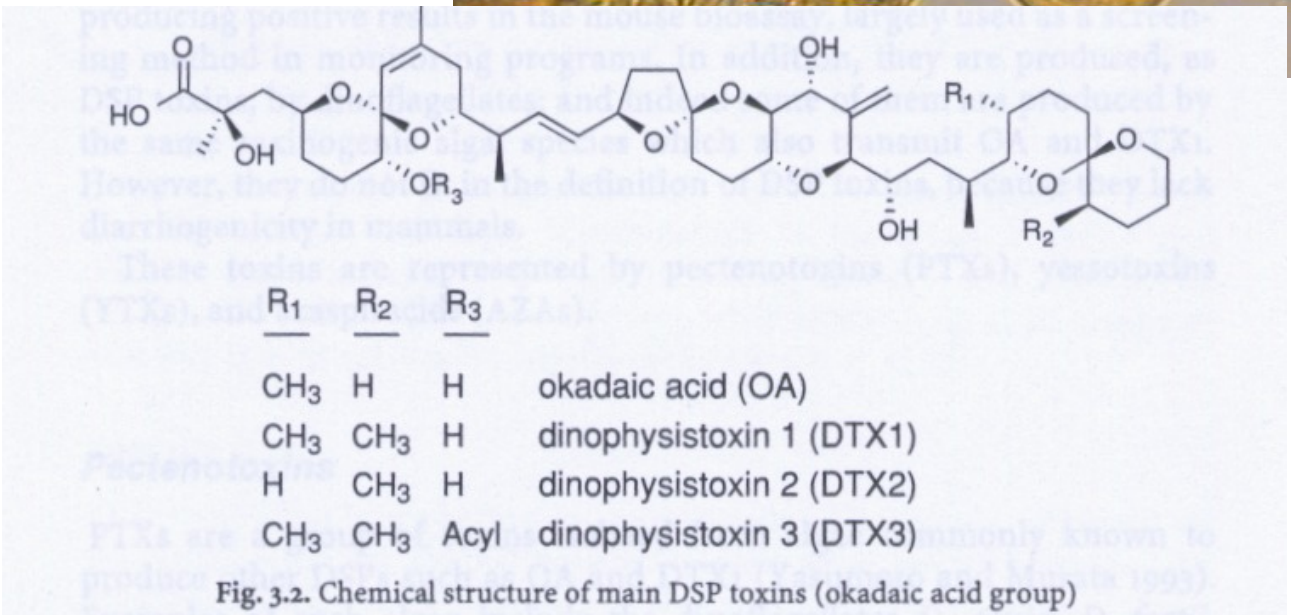


Dinophysis acuminata

Dinophysis caudata

Prorocentrum lima

DSP toxins



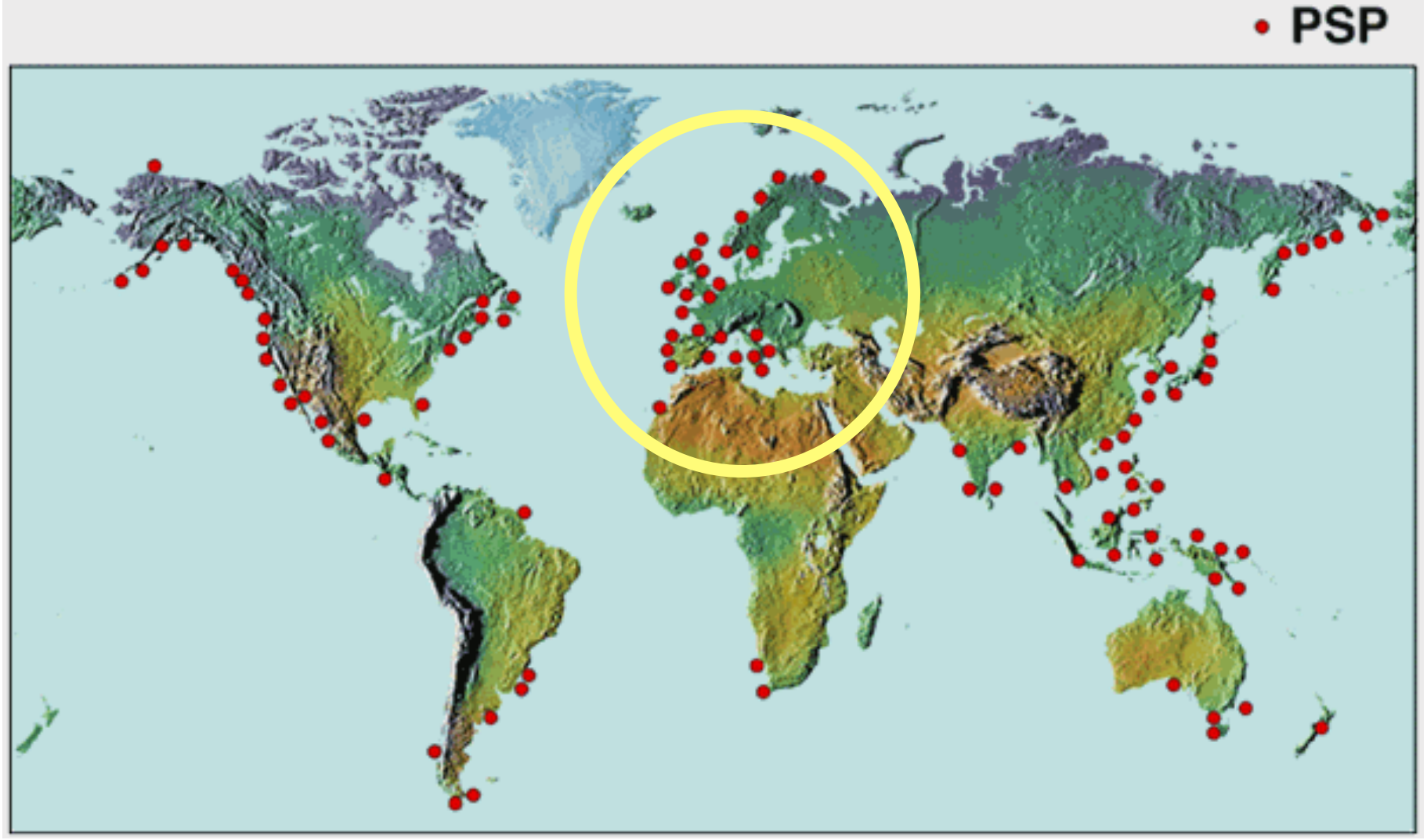
R_1	R_2	R_3	
CH_3	H	H	okadaic acid (OA)
CH_3	CH_3	H	dinophysistoxin 1 (DTX1)
H	CH_3	H	dinophysistoxin 2 (DTX2)
CH_3	CH_3	Acyl	dinophysistoxin 3 (DTX3)

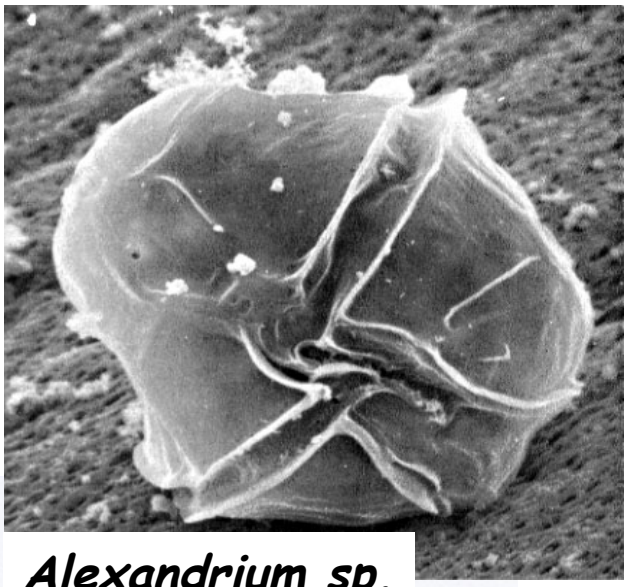
Fig. 3.2. Chemical structure of main DSP toxins (okadaic acid group)

The DSP syndrome can be induced by new discovered toxins :

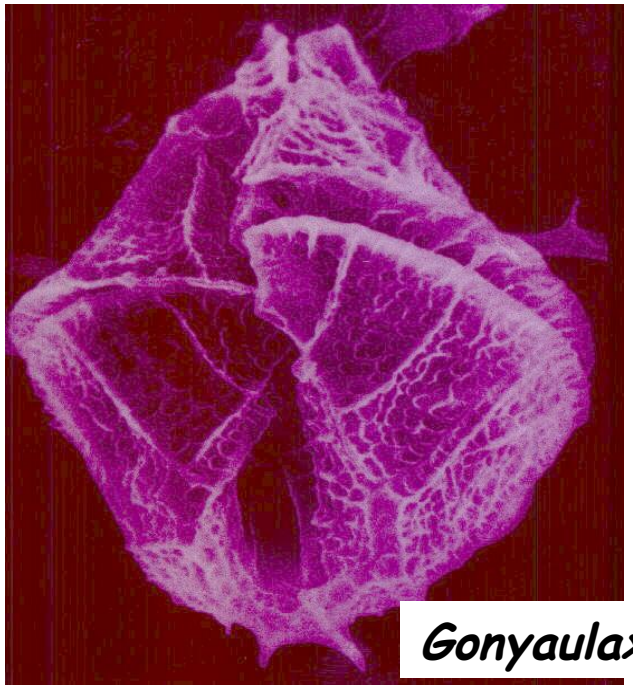
- pectenotoxins (PTXs)
- yessotoxins and homoyessotoxins (YTXs) produced by dinoflagellates of the genus *Protoceratium*.
- azaspiracids (AZPs)

Dinoflagellates at the origin of PSP were uncommon in European Atlantic coast and unknown in the Mediterranean Sea. In few years, these species are more and more frequently observed in European waters.

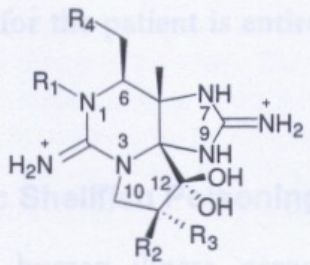




Alexandrium sp.



Gonyaulax sp.



STX = saxitoxin
NEO = neosaxitoxin
GTX = gonyautoxin

				R_4						
				carbamate toxins		N-sulfocarbamoyl toxins		decarbamoyl toxins	deoxydecarbamoyl toxins	
				$-O-\overset{O}{\overset{\|}{C}}-NH_2$		$-O-\overset{O}{\overset{\|}{C}}-NHSO_3^-$		$-OH$	$-H$	
R_1	R_2	R_3								
H	H	H	1	STX	11	GTX5, B1	17	dcSTX	27	doSTX
OH	H	H	2	NEO	12	GTX6, B2	18	dcNEO		
H	H	OSO_3^-	3	GTX2	13	C1	19	dcGTX2	28	doGTX2
H	OSO_3^-	H	4	GTX3	14	C2	20	dcGTX3	29	doGTX3
OH	H	OSO_3^-	5	GTX1	15	C3	21	dcGTX1		
OH	OSO_3^-	H	6	GTX4	16	C4	22	dcGTX4		
H	H	OH	7	11αOH-STX			23	11αOH-dcSTX		
H	OH	H	8	11βOH-STX			24	11βOH-dcSTX		
OH	H	OH	9	11αOH-NEO			25	11αOH-dcNEO		
OH	OH	H	10	11βOH-NEO			26	11βOH-dcNEO		

Fig. 3.1. Structure of paralytic shellfish toxins

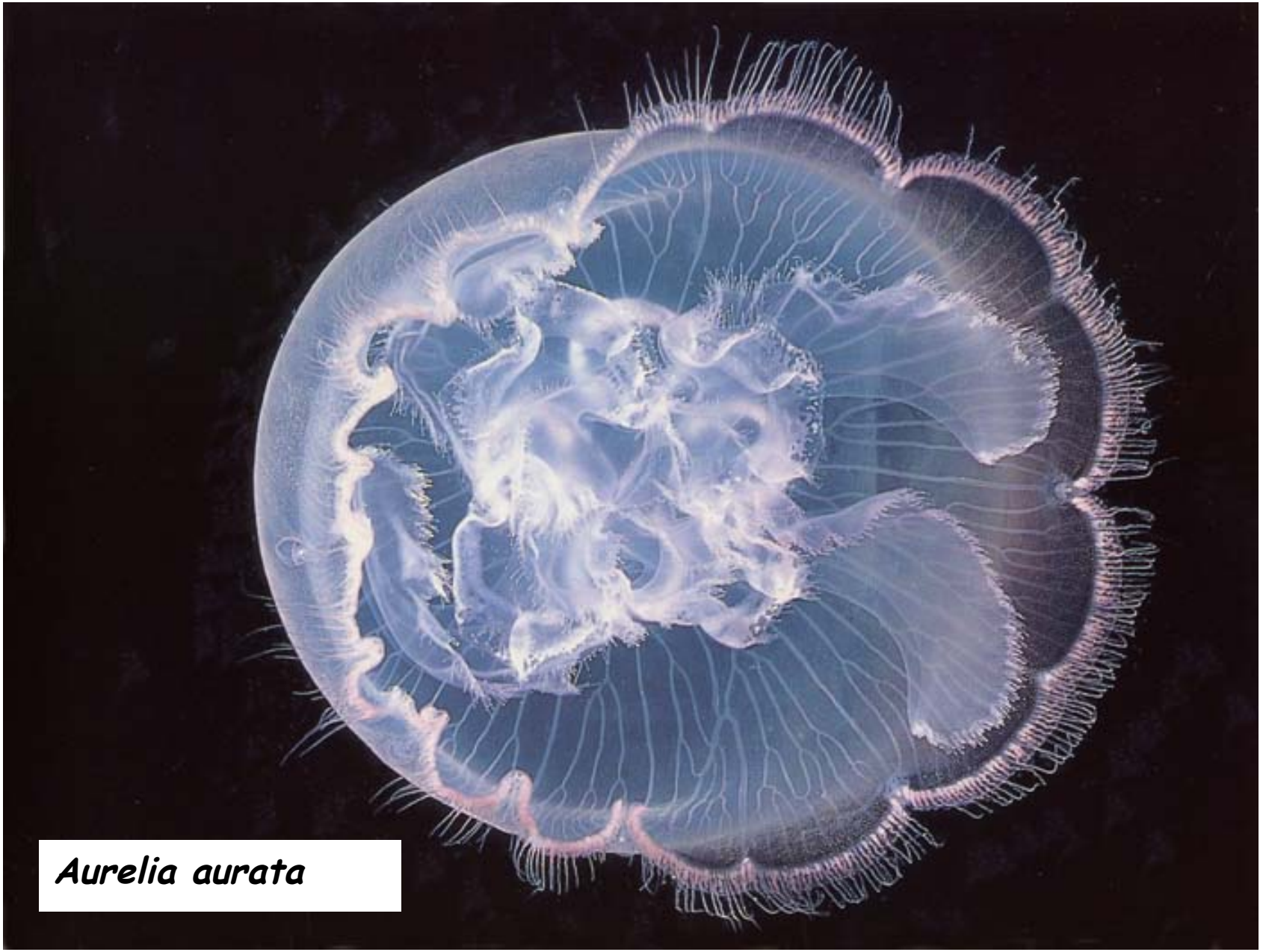
Since the end of the 1990's, saxitoxin producing species are more and more frequent in Europe. PSP epidemic development is from now a possible event in Europe.

Second example:

JELLYFISH BLOOMS

Skin contact with Mediterranean jellyfish is a frequent problem during spring and summer: when the sea temperature allows to swim, numerous patients are burned.

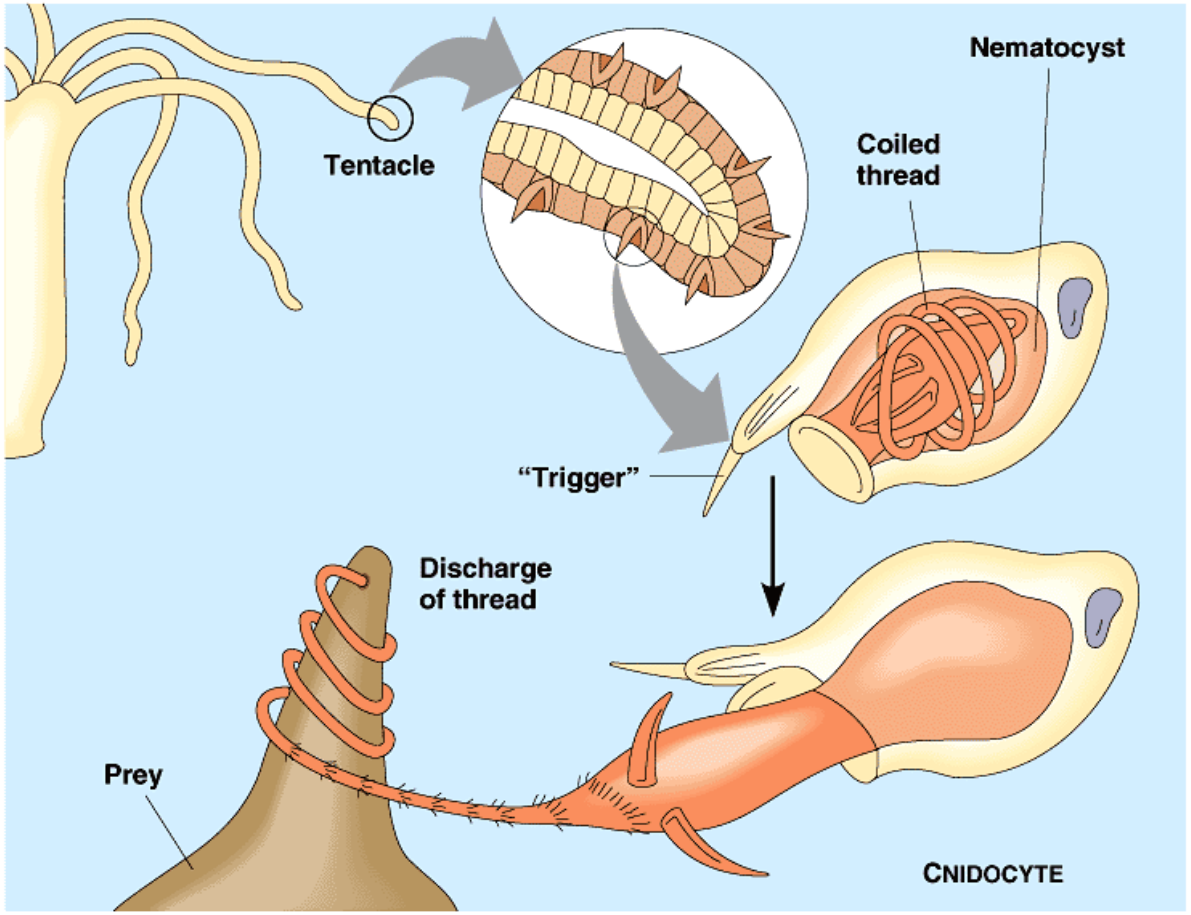
Pelagia noctiluca

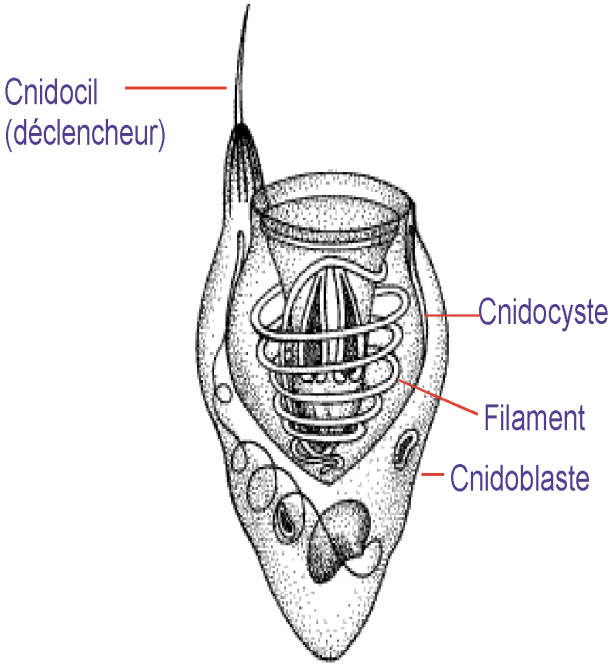


Aurelia aurata

Chrysaora hysoscella

Clinical symptoms:
Immediate intense pain (like an electric chock), then mild to severe burning sensation, and pruritic and erythematous dermatitis. Blisters are possible in few minutes.
After a period of remission of several days, a bad evolution (pigmentation, necrosis, ulcers) is possible if big quantities of venom were released.





The aim of the treatment is to avoid a complete release of the venom at the origin of bad evolutions.

Treatment of a skin contact with a jellyfish:

- DO NOT RUB
- Sea water washing
- Shaving foam or sprinkled sand (to trap the tentacles)
- Second sea water washing
- Alcohol or vinegar
- Third sea water washing
- Symptomatic treatment like burns due to heat

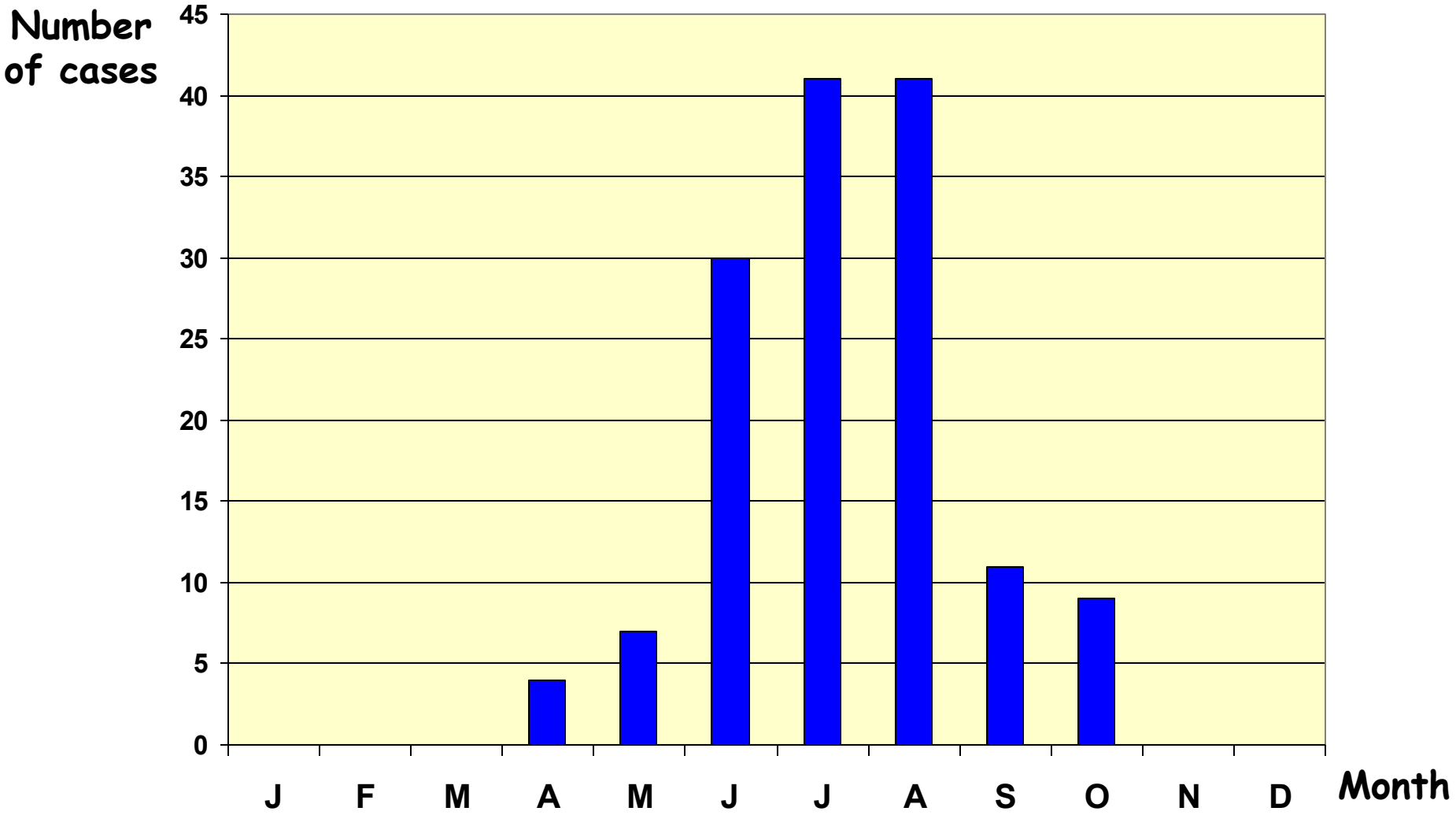
In case of blooms, envenomations

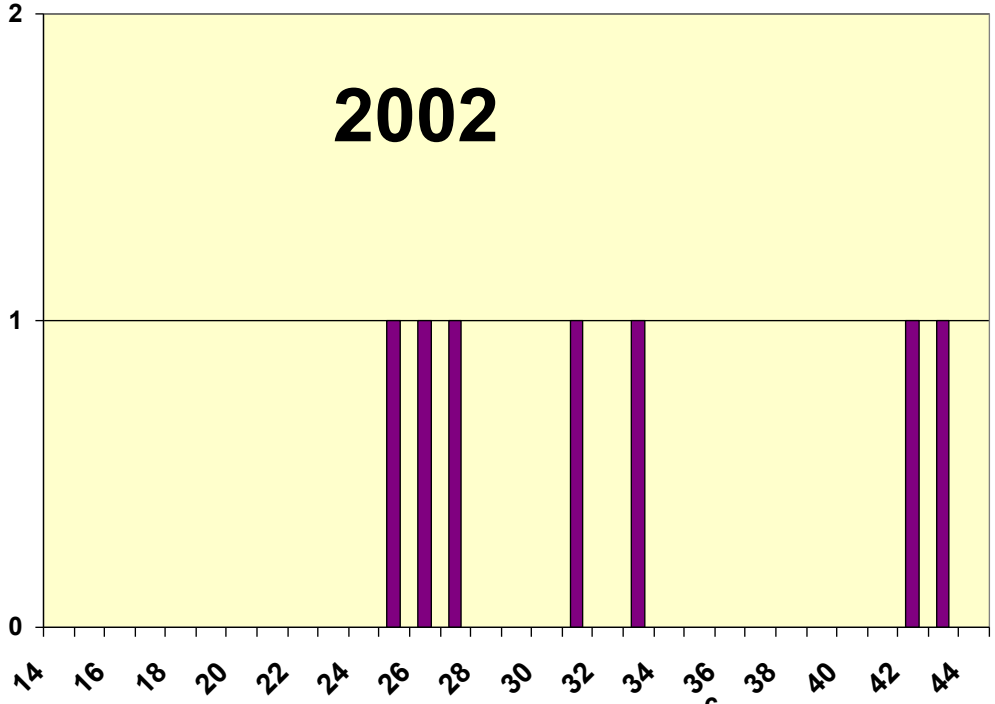
- are more frequent at the beginning of the bloom, but when the population is advised, it is possible to have no more cases during several days.
- are often more severe with extended concerned skin surface (including face burns). Special circumstances can induce very severe clinical features like direct diving into the bloom.

Blooms can concern harmless hydrozoa species like *Velella velella*: not dangerous for human but a good witness of ecological imbalance.

Illustration:
Experience of the Marseille poison centre concerning jellyfish envenomations.

Chronology of jellyfish envenomations in mainland France Mediterranean Coastline in the PPC Marseille, 2002 to 2008 included.

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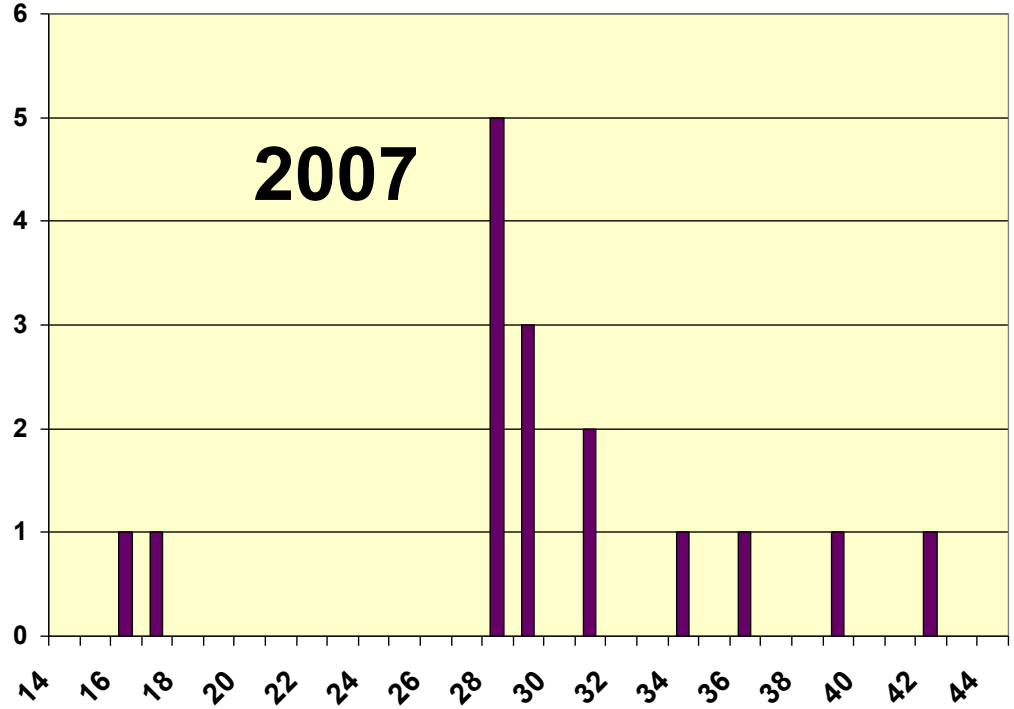
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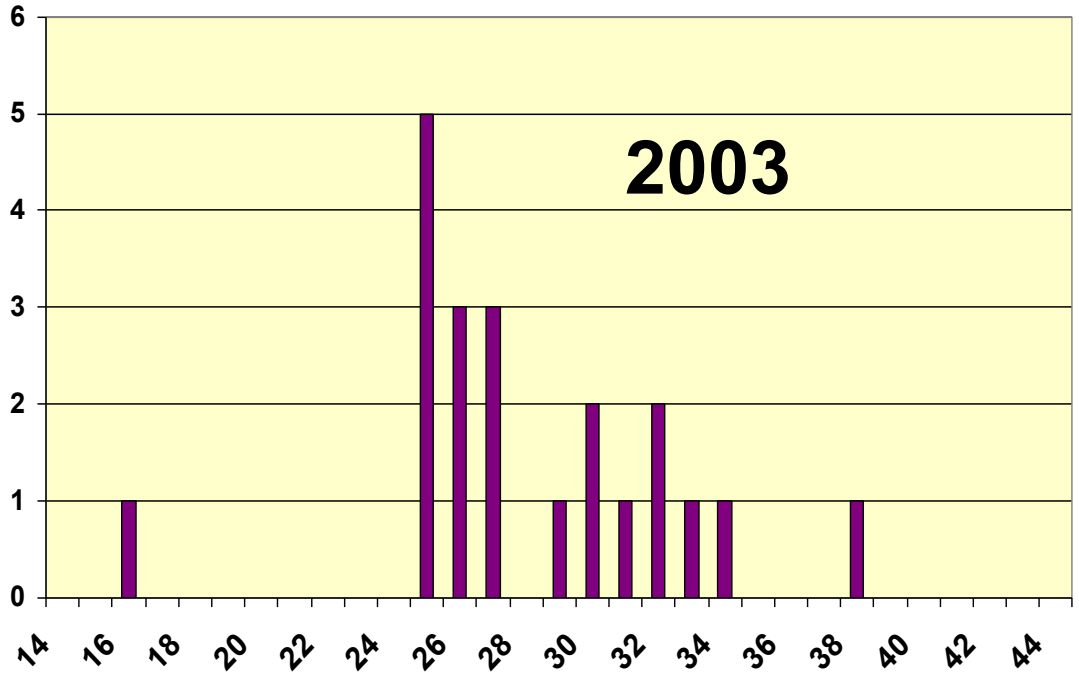
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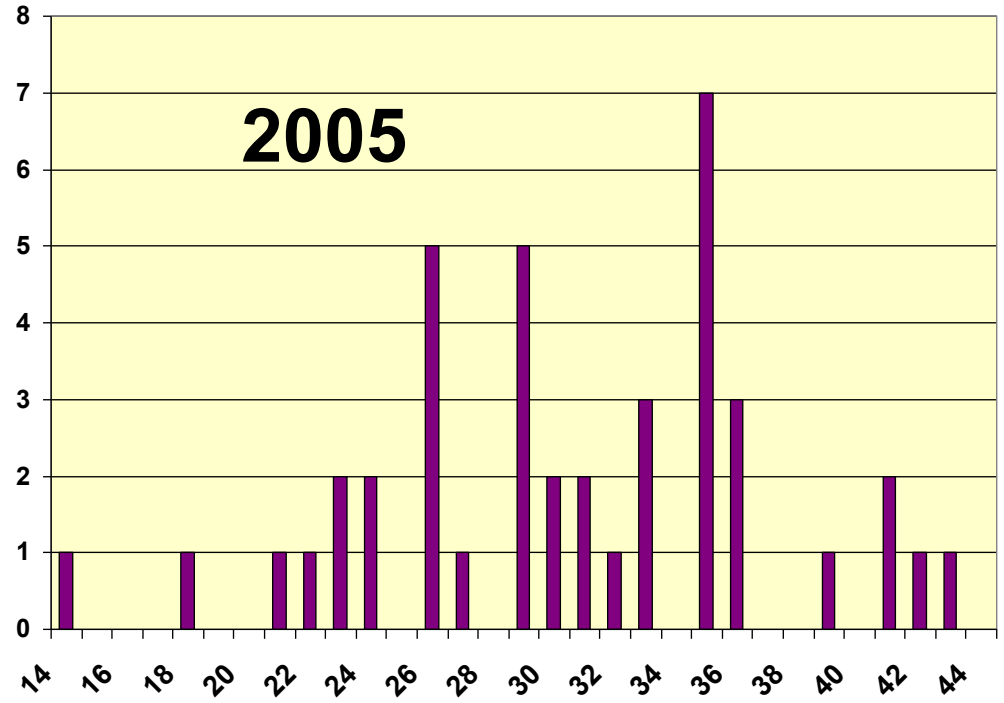
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Jellyfish blooms consequences :

- Real health problem for swimmers

- Economical disturbances (salmon in Ireland or Norway) with the incredible example of the Nomura jellyfish (*Nemopilema nomurai*) blooms in Northern Japan.

INVADERS : INTRODUCED or INVADING TROPICAL SPECIES:

- Extension of the natural geographical distribution from the South to the North

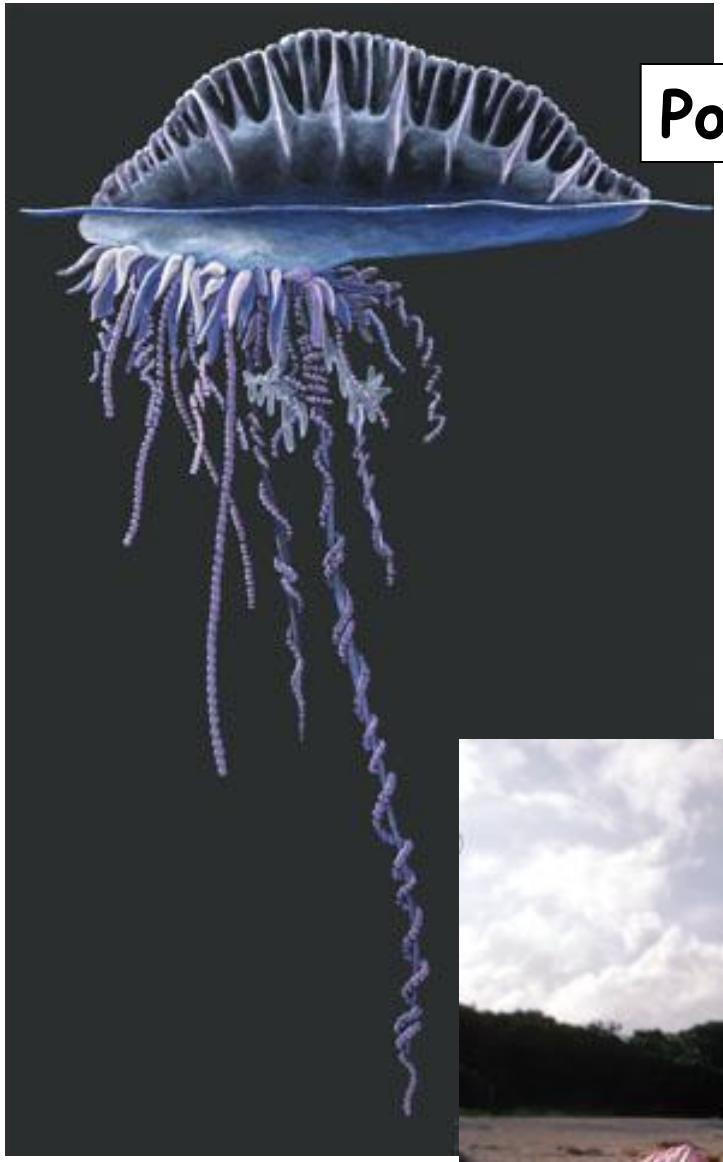
- Lessepsian fishes = migration from the Red Sea to the Mediterranean Sea through the Suez canal

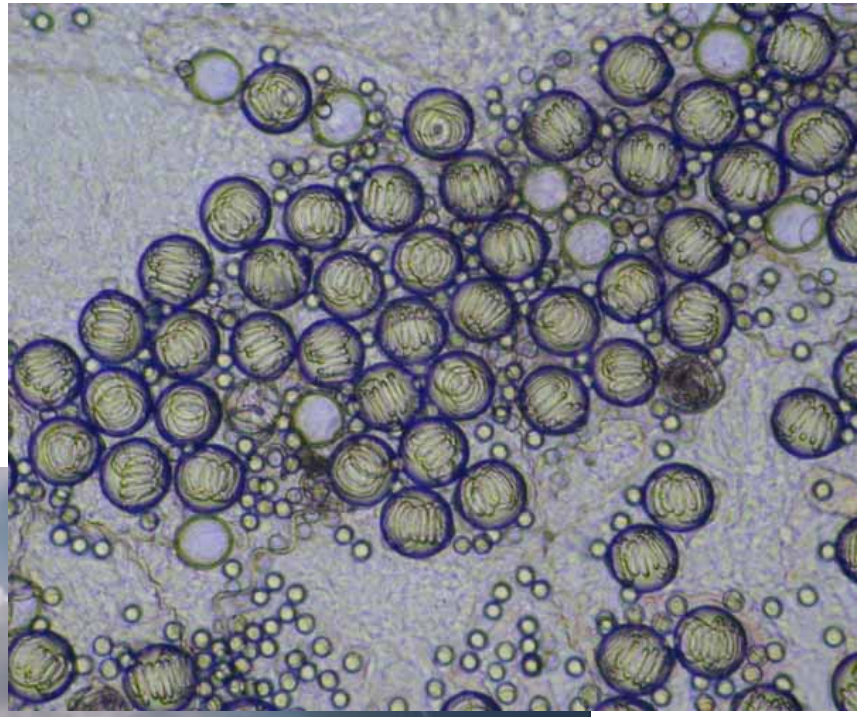
- Toxic algae species: macro or micro species.

First example of invaders:

PORTUGUESE MAN-OF-WAR in EUROPE

Portuguese man-of-war (*Physalia sp.*)





Portuguese Man-of-War (*Physalia*) envenomation :

Very rare in temperate Atlantic coast.
Last week of August 2008, at Biscarosse (near Bordeaux) in 3 hours, 40 swimmers were envenomed by 2 or 3 specimens of large *Physalia*.
Severe burnings + General clinical symptoms including tachycardia, hypotension, vomiting, muscle cramping.
12 hospitalizations, all patients recovered.
First time such event is observed.

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informa
healthcare

BRIEF COMMUNICATION

Portuguese man-of-war (*Physalia physalis*) envenomation on the Aquitaine Coast of France: An emerging health risk

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Table 1. Characteristics of *Physalia physalis* envenomations observed in the Atlantic coast of Southern France by the Bordeaux Poison Centre since 2008.

Man-of-war envenomations		2008	2009	2010	2011
Patients	n	40	0	154	885
	Median age, years (range)	18 (4–55)	/	14 (3–62)	13 (1–86)
	Sex-ratio (M/F)	1.66	/	1.68	1,46
Circumstances	Period of year	Mid-August	/	Mid-July to mid-August	End-June to end-September
	French department codes	40	/	40, 64, 33	40, 64, 33
Clinical feature	Skin burns	40 (100%)	/	154 (100%)	885 (100%)
	Intense pain	40 (100%)		154 (100%)	885 (100%)
	General symptoms including	8 (20%)	/	80 (52%)	133 (15%)
	Respiratory distress	4 (10%)	/	12 (8%)	44 (5%)
	Neurological	4 (10%)	/	42 (27%)	53 (6%)
	Musculoskeletal	4 (10%)	/	39 (25%)	70 (8%)
	Digestive signs	1 (2.5%)	/	29 (19%)	71 (8%)
Medical management	Hospitalization	8 (20%)	/	18 (12%)	71 (8%)
	Decontamination and local treatments	40 (100%)	/	154 (100%)	885 (100%)
	Intravenous medications	4 (10%)	/	11 (7%)	88 (10%)
Clinical course	Average local pain duration (range)	4 hours (1–6)	/	3.5 hours (1–4)	4 hours (1–10)
	Definitive dermal marks	11 (28%)	/	45 (29%)	Not available

French administrative department codes: 33 = Gironde; 40 = Landes; 64 = Pyrénées Atlantiques (33 + 40 + 64 = the entire Aquitaine coast). Intravenous medications were central analgesics (opioids), benzodiazepine and/or corticosteroids. In the clinical course, the dermal marks were considered as permanent after 6 months with no improvement.

Portuguese Man-of-War (*Physalia*) envenomation :

Do not forget that death induced by *Physalia* are reported in the origin distribution of the species (Brazil +++).

Do not forget that some tropical jellyfish species are able to induce life-threatening situations…

Second example of Invaders:

LESSEPSIAN TOXIC FISHES

Lagocephalus sceleratus from the Red Sea contains tetodotoxin. This fish is now present in eastern Mediterranean Sea.

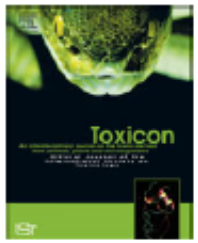
Publication from Israel in 2008, 13 poisoned patients including 2 respiratory arrest quickly after the meal.

Toxicon 54 (2009) 50–55

Contents lists available at ScienceDirect

Toxicon

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



First report on toxicity assessment of the Lessepsian migrant pufferfish *Lagocephalus sceleratus* (Gmelin, 1789) from European waters (Aegean Sea, Greece)

Panagiota Katikou[a,*], Dimitrios Georgantelis[b], Nikolaos Sinouris[c,1], Anastasia Petsi[a], Theodoros Fotaras[d]

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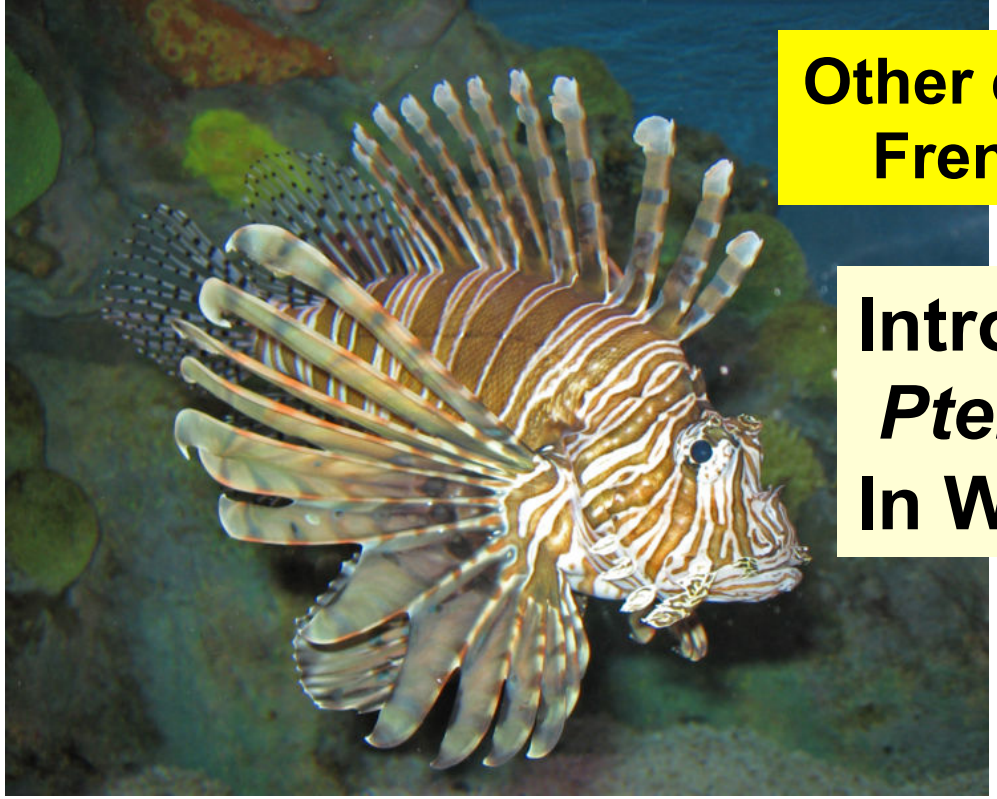
[b] *North Aegean Sea Canneries, Industrial Area of Stavrochori, 61100 Kilkis, Greece*
[c] *Ministry of Rural Development and Food, Veterinary Public Health Directorate, Division of Milk, Eggs, Milk Products, Fish, and Fish Products, 2 Acharnon Street, 10176 Athens, Greece*
[d] *Department of Fisheries, Prefectural Authority of Dodecanese, 2 Georgiou Mavrou Street, Rhodes, Greece*

In Europe, the situation changes very fast…

The presence of the rabbit fish *Siganus luridus* was for the first time reported in July 2008 near Marseille: this species is venomous and can induce hallucinations too (reported in Israel).

Third example of Invaders:

Venomous LionFish...



Other envenomation problem in French overseas territories

Introduction of the lionfish *Pterois volitans* In Western Atlantic Ocean.

CLINICAL TOXICOLOGY, 2016
http://dx.doi.org/10.3109/15563650.2016.1143100

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RESEARCH

Envenomation by the invasive *Pterois volitans* species (lionfish) in the French West Indies – a two-year prospective study in Martinique

Dabor Resiere[a], Laura Cerland[a], Luc De Haro[b], Ruddy Valentino[a], Anne Criquet-Hayot[a], Cyrille Chabartier[a], Stephane Kaidomar[a], Yanick Brouste[a], Bruno Mégarbane[c]* and Hossein Mehdaoui[a]*

[a]Department of Critical Care & Emergency Unit, University Hospital of Martinique, Fort-de-France, France; [b]Marseille Poison Centre, Sainte Marguerite Hospital, Marseille, France; [c]Department of Medical and Toxicological Critical Care, Lariboisière Hospital, Paris-Diderot University, Paris, France

Figure 1. The dassical grades of lionfish sting as observed in three of our patients, with pale and cyanotic wound surrounded by an indurate violate and erythematous inflammatory zone (grade I, A); centimeter-sized vesides surrounding the sting and containing venom (grade II, B); and local necrotizing injury sometimes requiring surgical excision (grade III, C).

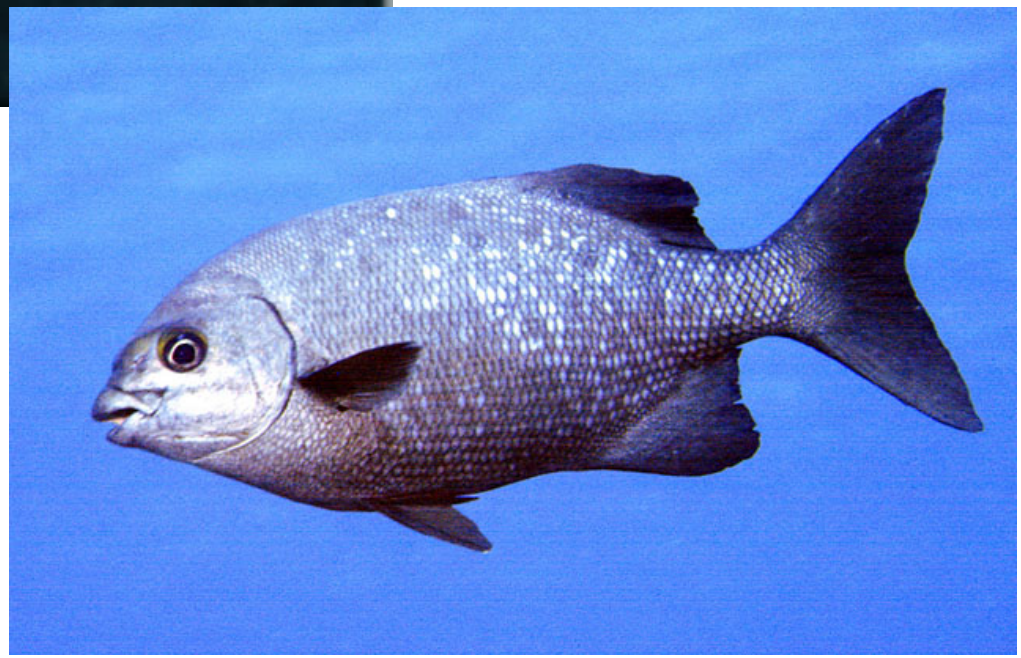
Fourth example of invaders:

CAULLERPA SPECIES INVASION in the MEDITERRANEAN SEA

The number of cases of hallucinations after *Sarpa salpa* ingestion is increasing : role of *Caulerpa taxifolia* (introduced in 1984) and of *Caulerpa racemosa* (present in the Mediterranean sea since 1990) is evoked…

Saupe
(*Sarpa salpa*)

Dream fish
(*Kyphosus sp.*)

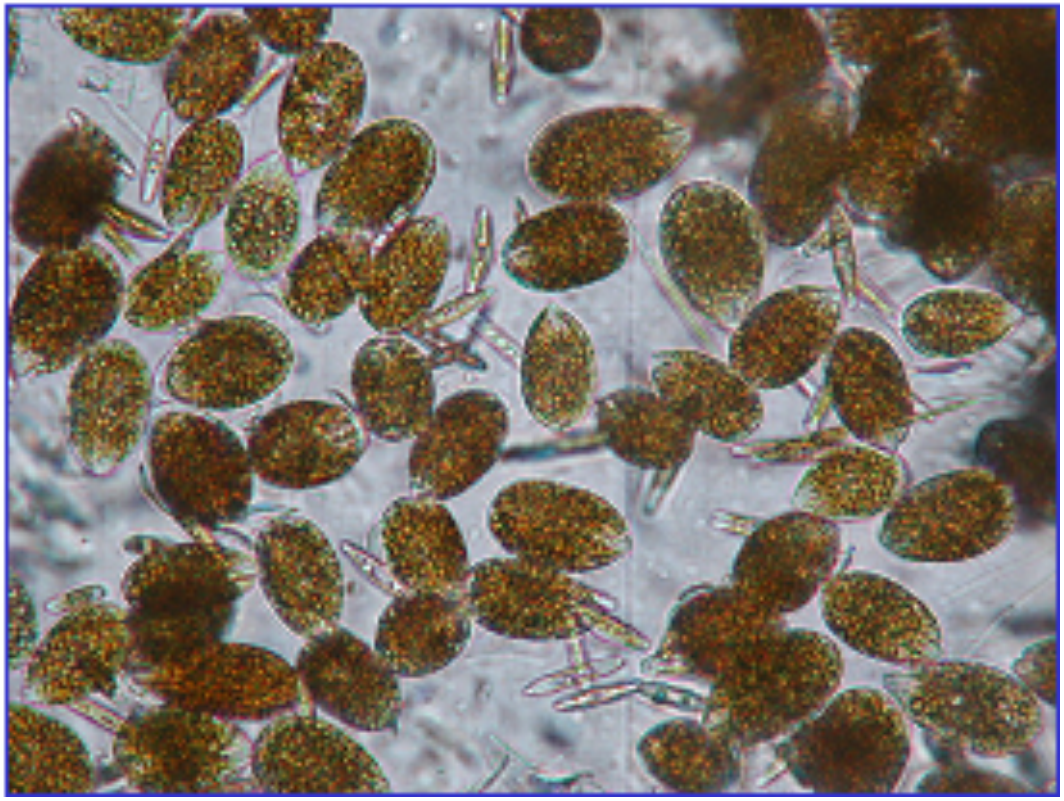


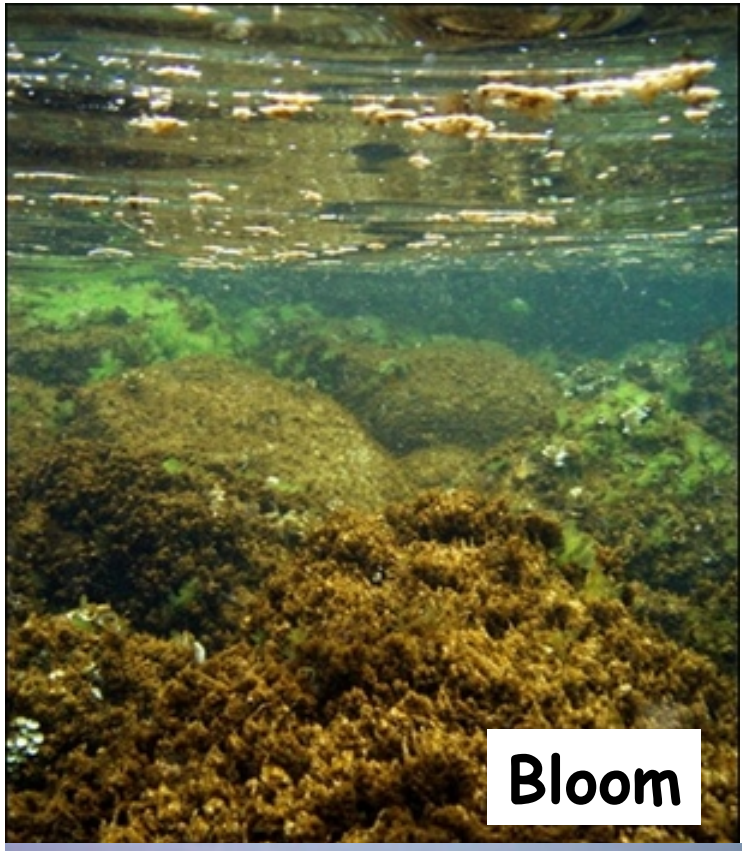
Hallucinations after eating fish: Ichthyoalleinotoxism

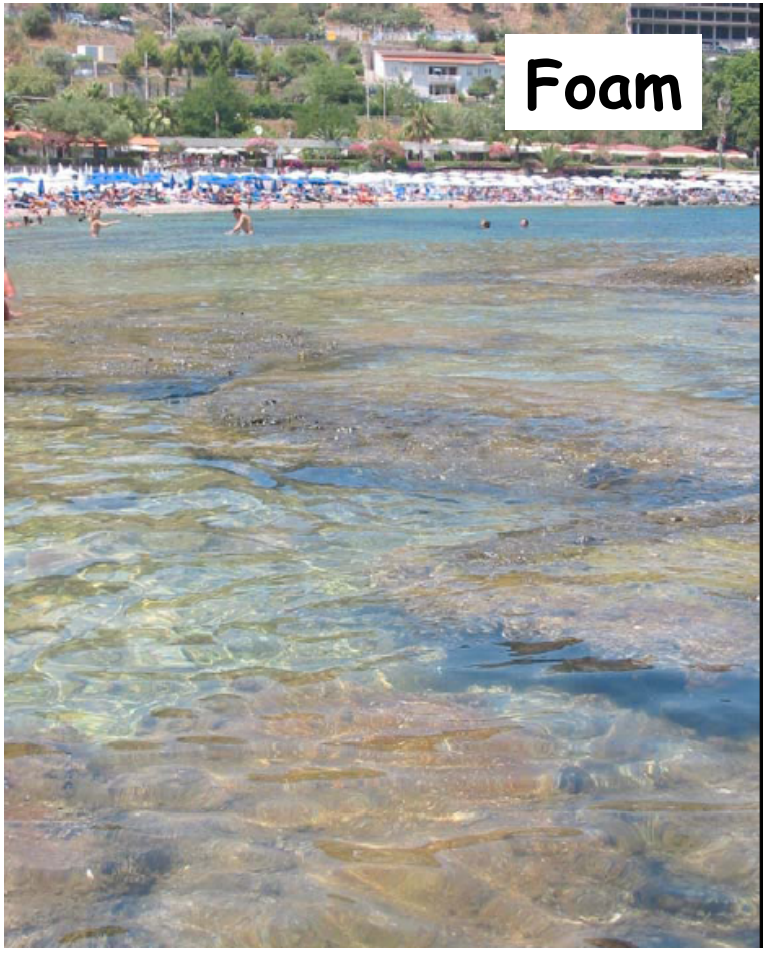
Fifth example of Invaders:

Ostreopsis species in the Mediterranean Sea.

Ostreopsis ovata blooms in the Mediterranean Sea.



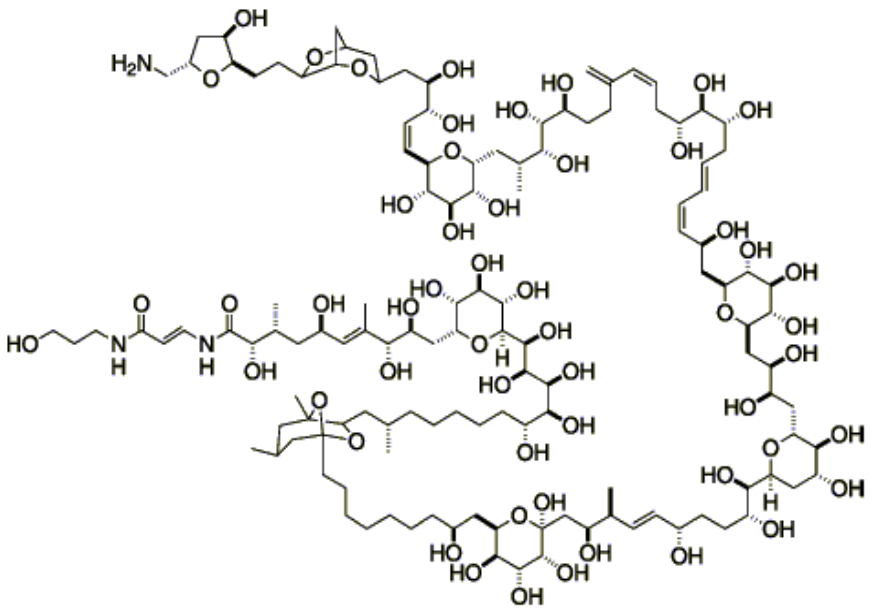




First observation of *O.ovata* in the Mediterranean in 1972. First blooms in 2002, due to high temperatures.

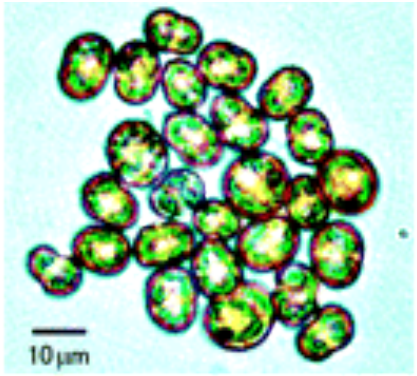
All the species of the genus *Ostreopsis* are able to produce toxins. In the Mediterranean Sea, it produces Palytoxin-like compounds (PTX-like).

Effects on sea urchins observed after *Ostreopsis ovata* bloom in the Mediterranean Sea.



Palytoxine and PTX-like compounds are powerful vaso-constrictive molecules at the origin in tropical seas of severe human poisonings called palytoxicosis : observed after ingestion of contaminated seafood (crabs and fish).

Palythoa sp.

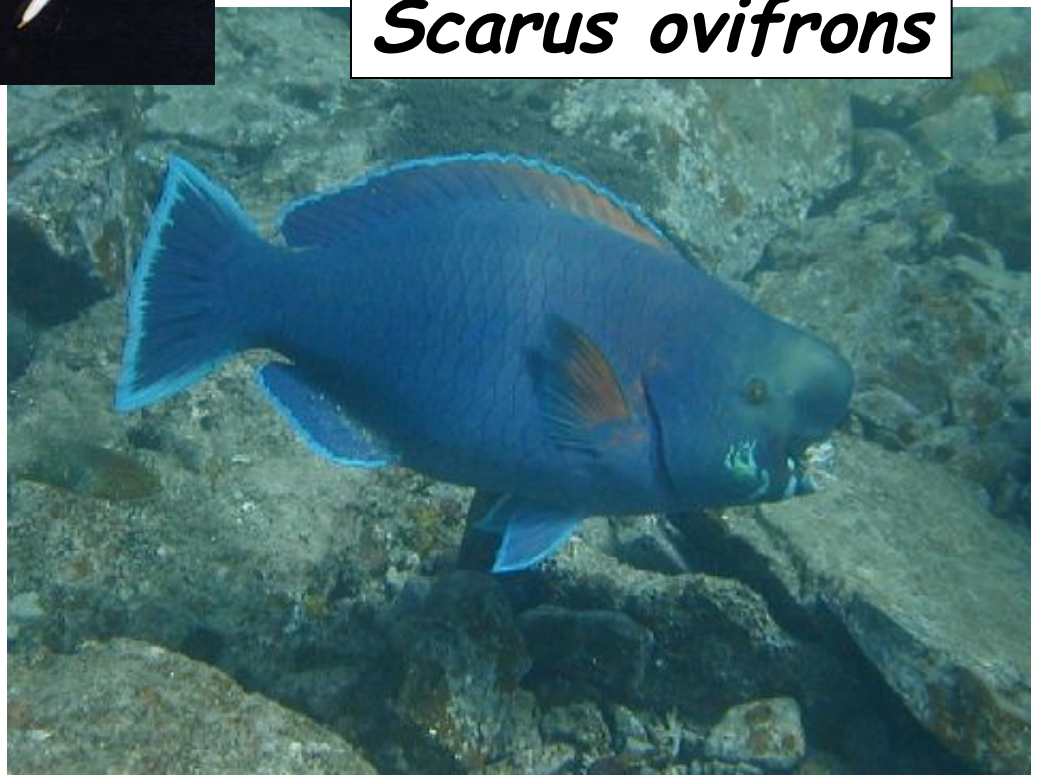


Symbiodinium sp. HA3-5

In tropical seas, one problem : food chain contamination. NO BLOOMS

Demania toxicus

Scarus ovifrons



+ 80 crabs species

Medical consequences of the development in the Mediterranean Sea of *Ostreopsis* :

⇒ For the moment, only symptoms due to sea spume inhalation : since 2002 in Adriatic Sea, 2004 in Spain, 2006 in France.

⇒ No cases of poisoning after ingestion of contaminated seafood.

Every summer since 2007, protocol of vigilance between the 1st of June and the 30 of September.
The Marseille Poison Centre is associated with local and regional authorities to react as soon as possible in case of bloom.

During the critical period, several water analysis every week

Diffusion des résultats de la surveillance OSTREOPSIS
Département des Bouches du Rhône

Ifremer
Centre de Méditerranée

Laboratoire Environnement Ressources Provence Azur Corse (LER/PAC)

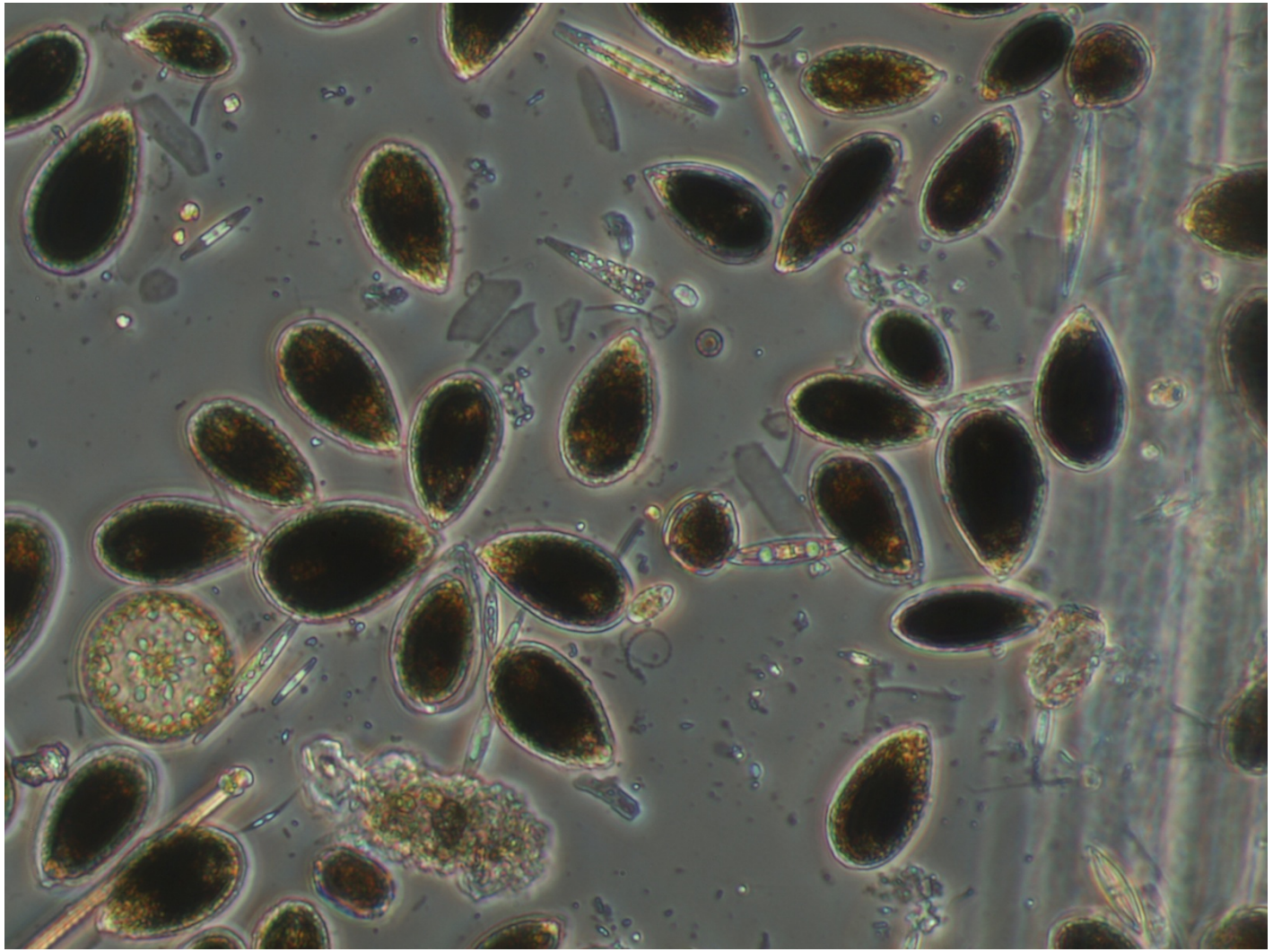
LER/PAC ***Ostreopsis sp.*** **- Bulletin n°08-20** **date 14/08/08**

Ostreopsis sp. :

- Eau : nombre de cellules par litre
- Algue : nombre de cellules par gramme (poids humide)

POINTS (nom)	SUPPORT (eau/algue)	du 21 au 25/07 (semaine 30)	du 28/07 au 1/08 (semaine 31)	du 4 au 8/08 (semaine 32)	du 11 au 14/08 (semaine 33)
Marseille *Endoume*	Eau	0	100	900	4 200
	Algue	32	1 022	3 460	Pas de prélèvement (météo défavorable)
Marseille (Ile du Frioul) *Morgiret*	Eau	0	0	**11 600** (06/08/08) 800 (08/08/08)	**19 200** (12/08/08) 3 400 (13/08/08)
	Algue	96	2 018	91 800 (06/08/08) 163 400(08/08/08)	105 900 (12/08/08) 186 500 (13/08/08)

21st august 08, anse Méjean Toulon (R. Kantin, IFREMER)



Bloom week 34 and 35 (August 2008) Frioul Island: 2 present species *Ostreopsis ovata* and *Ostreopsis siamensis* (Photo Roger Kantin, IFREMER).

Villefranche sur Mer: Fermeture de la plage des jeunes par AM

du 23/07/08

Summer 2008, forbidden beach area in Villefranche su Mer

Date: 13/07/2008
OJD: 95391
Page: 9
Edition:(FRA)
Suppl.:
Rubrique:

Aujourd'hui en France

Plages

Alerte à l'algue toxique à Monaco

NICE (ALPES-MARITIMES)
DE NOTRE CORRESPONDANT

UN NUAGE dans le ciel presque trop bleu de la Côte d'Azur : des analyses d'eau de mer ont révélé la semaine dernière la présence, jusque-là limitée aux plages de Monaco, d'une algue très toxique, l'« Ostreopsis ovata ». Elle émet des gaz qui provoquent des affections allergiques, cutanées ou respiratoires, qui peuvent être sérieuses notamment pour des sujets vulnérables comme les personnes âgées ou les jeunes enfants. C'est grâce à la surveillance des eaux de baignade que la présence de cette algue microscopique a été détectée.

« Pas d'interdiction de baignade »

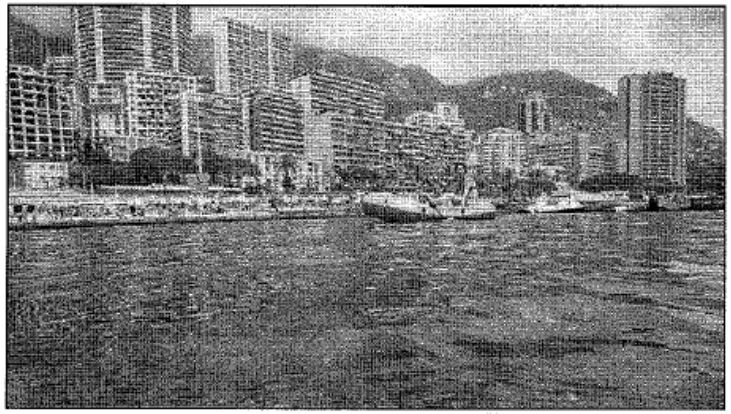
Mardi, le seuil de préalerte et de vigilance sanitaire a été largement dépassé : environ 30 000 cellules par litre d'eau de mer devant les plages monégasques du Larvotto ont révélé les autorités sanitaires de la Principauté. Elles se voulaient plus rassurantes vendredi soir, en indiquant qu'un nouveau prélèvement faisait apparaître un retour à des niveaux de concentration de l'algue « en dessous des valeurs normalement constatées sur les rivages méditerranéens ».

« Nous allons rester très mobilisés avec une surveillance et une vigilance renforcées », a annoncé le docteur Christiane Garcin, médecin inspecteur de la Ddass de Monaco, précisant qu'il n'y a « pas d'interdiction de baignade ».

Pendant l'été 2005, la présence de cette algue tropicale en Italie, sur les côtes génoises, avait provoqué l'intoxication de 200 personnes, dont une vingtaine avaient dû être hospitalisées. Des intoxications avaient également été signalées l'année suivante chez des baigneurs en région marseillaise, près des îles du Frioul.

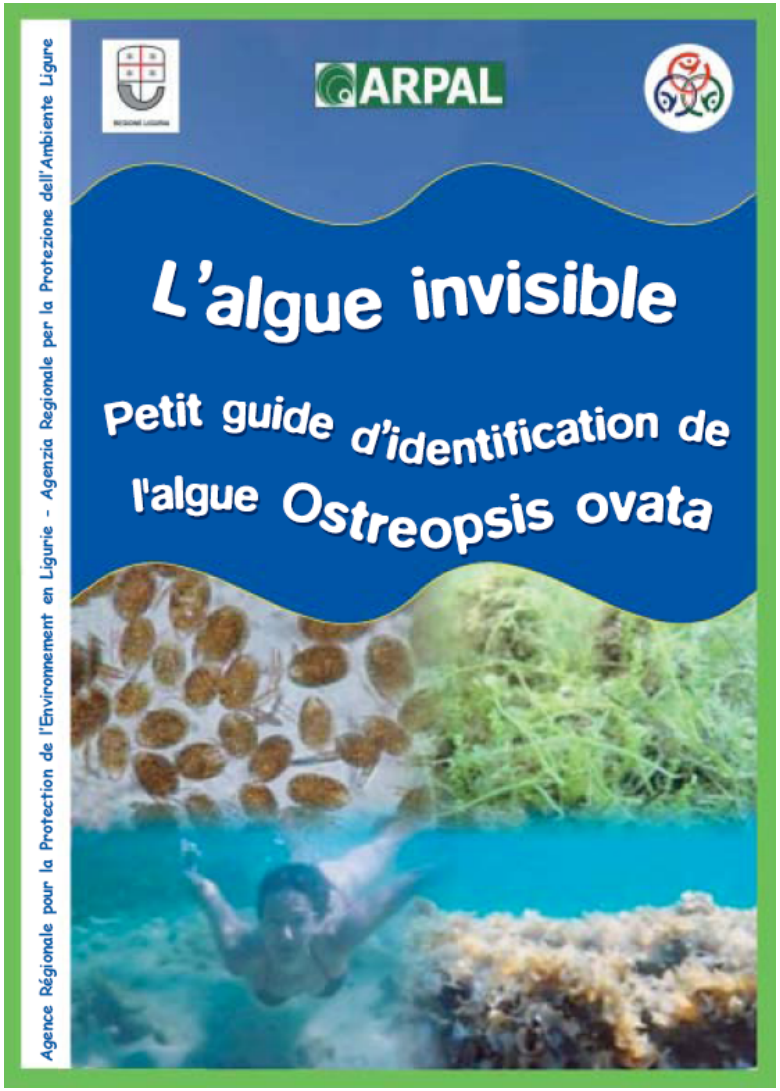
Les scientifiques estiment que cette très petite algue de 40 micromètres générant une palytoxine — essentiellement localisée jusque-là en Polynésie française, aux Caraïbes et en Nouvelle-Calédonie — a proliféré en Méditerranée en raison du réchauffement climatique. Flottant en surface sous la forme d'une membrane gélatineuse ou se fixant sur des rochers comme une mousse brunâtre, elle génère des gaz toxiques lorsqu'elle se détache après avoir été chauffée au soleil. Bien entendu, le risque d'une dérive de cette algue vers les plages françaises toutes proches n'est pas écarté. Ce qui a déclenché l'alerte pour les chercheurs de la station de Villefranche-sur-Mer, entre Menton et Nice. Des analyses y sont en cours.

ANDRÉ LUCCHESI

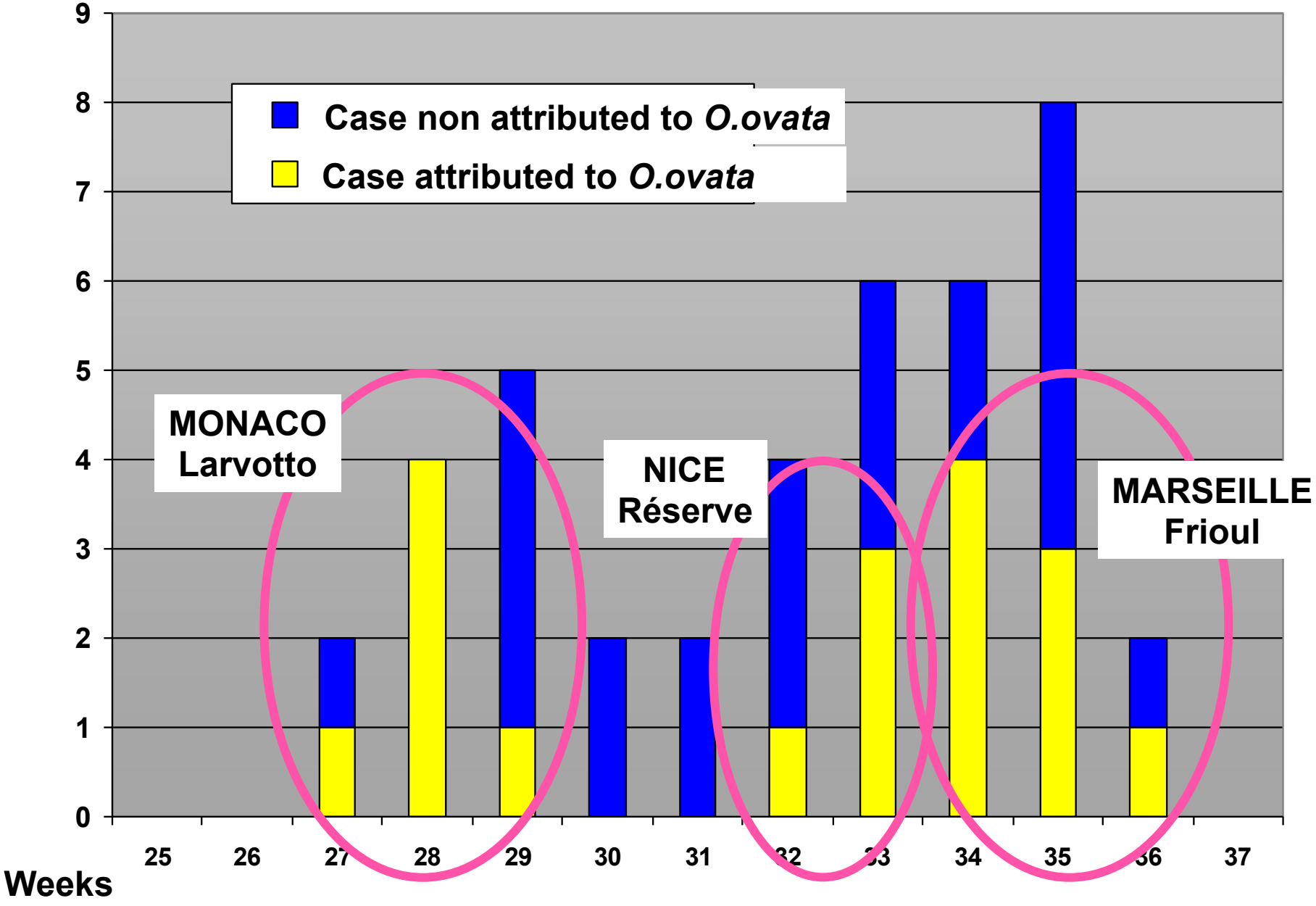


MONACO, JEUDI. *Flottant sous la forme d'une membrane gélatineuse ou se fixant sur des rochers, l'« Ostreopsis ovata » génère des gaz toxiques.* (PHOTOPQR/« NICE MATIN »/M.MEHRAN.)

Information for the public



O.ovata files in the Marseille poison Centre during summer 2008



Cases in Monaco, Larvotto beach

Day	Patient	Expo	Onset	Symptoms	Evolution
10/7	F,67	Cut	30’	Rash	R in 2D
2/7	F,42 M,43	Cut	30’	Rash, rhinitis	R in 12 H
11/7	F,3	Cut	10’	Rash, fever	R in 2D
12/7	F,8	Respi	20’	Burn	R in 8 H (hospit)
7/7	M,3	Cut	1H	Rhinitis	R in 3D
19/7	M,38	Diving	30’	Rash	R in 12 H

Human exposure to Ostreopsis blooms

Clinical Toxicology (2010) **48**, 839–844

ISSN: 1556-3650 print / 1556-9519 online
DOI: 10.3109/15563650.2010.513687

informa
healthcare

ARTICLE

Health impact of unicellular algae of the *Ostreopsis* genus blooms in the Mediterranean Sea: experience of the French Mediterranean coast surveillance network from 2006 to 2009

LUCIA TICHADOU[1], MATHIEU GLAIZAL[1], ALEXIS ARMENGAUD[2], HUBERT GROSSEL[3], RODOLPHE LEMÉE[4,5], ROGER KANTIN[3], JEAN-LUC LASALLE[2], GENEVÈVE DROUET[1], LOÏC RAMBAUD[6], PHILIPPE MALFAIT[2], and LUC DE HARO[1]*

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[4]*Université Pierre et Marie Curie – Paris 6, Laboratoire d'Océanographie, Villefranche-sur-Mer, France*
[5]*CNRS, Marine Microbial Ecology Group, Laboratoire d'Océanographie, Villefranche-sur-Mer, France*
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Human exposure to Ostreopsis blooms

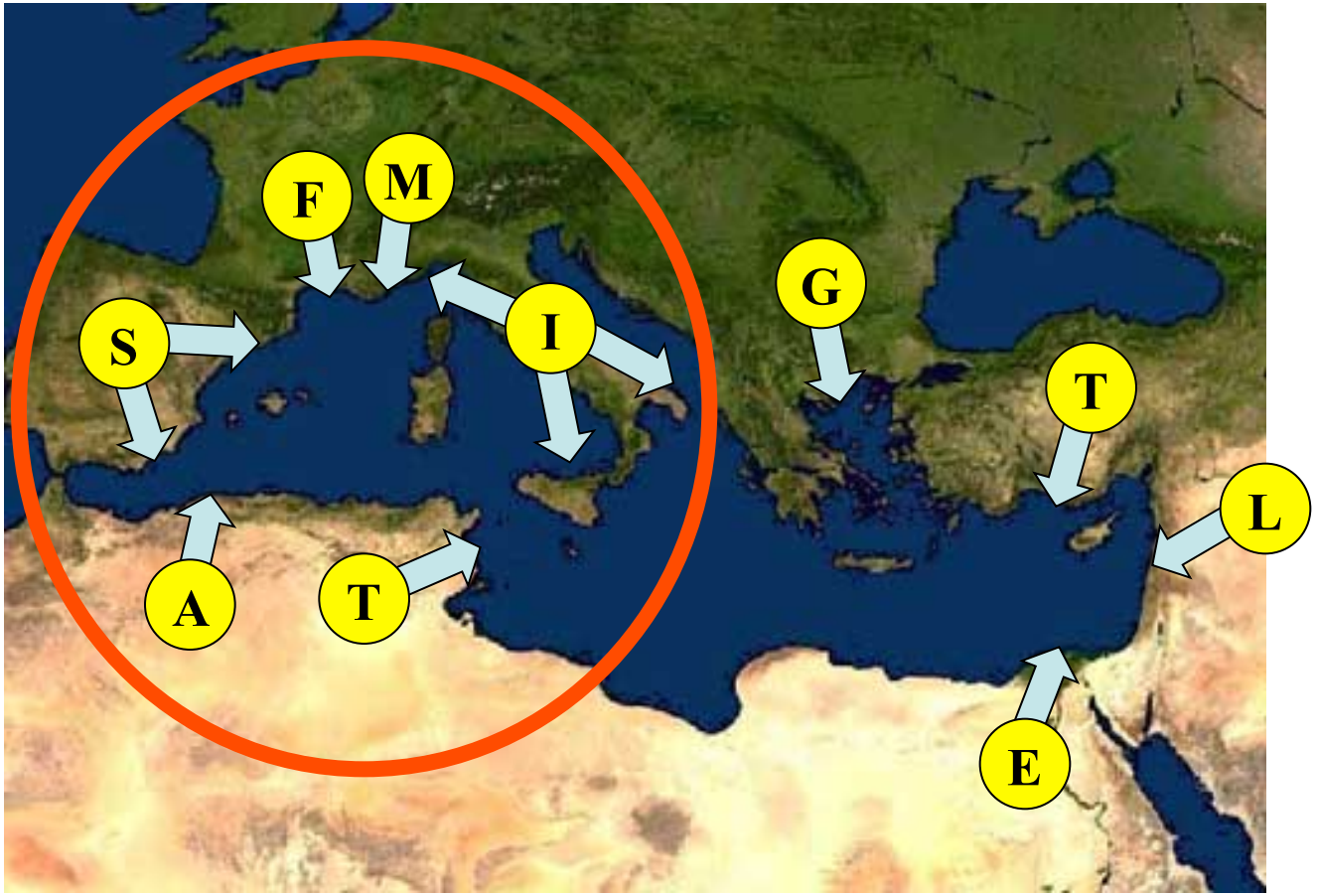

TABLEAU I (*Suite*)

Questions	Réponses		
	Oui	Non	Total
Nécessité d'une présence/disponibilité PM et PNM	6		
Envisageable uniquement pour certaines interventions	3		
Difficulté de trouver un accompagnant pour une personne seule	1		

Vu le différentiel entre le financement d'une nuit d'hôpital et celui d'une nuit d'hôtel, la collectivité devrait sans trop de problème envisager positivement ces prises en charge [2].

Déclaration d'intérêts : les auteurs déclarent ne pas avoir de conflits d'intérêts en relation avec cet article.

Références

[1] Gaucher S, Bouam S, Cappiello F, Aissat A, Béthoux JP. Hôtel hospitalier : une alternative à l'hospitalisation conventionnelle. Presse Med 2012;41:1301-3.

Conséquences sanitaires d'efflorescences d'algues du genre *Ostreopsis* en Algérie au cours de l'été 2009

Health impact of unicellular algae of the *Ostreopsis* genus blooms in Algeria during summer 2009

TABLEAU I

Circonstances des épisodes collectifs induits par les algues du genre *Ostreopsis* du 16 au 18 juillet 2009 en Algérie

Site	Plages	Durée du bloom	Nombre de personnes symptomatiques et prises en charge
Corso (50 km est d'Alger)	1 plage	48 h	200 consultations aux urgences (150 à l'hôpital de Boumerdès, 50 à l'hôpital Rouiba)
Alger	Plage Bainem (7 km ouest d'Alger) Plage Ain Benian (17 km ouest d'Alger)	24 h	250 consultations aux urgences de l'hôpital Bainem
Ain Temouchent (500 km ouest d'Alger)	5 plages	24 h	163 consultations aux urgences d'Ain Temouchent dont 48 hospitalisations de 24 h et 3 hospitalisations de 72 h

Human exposure to *Ostreopsis* blooms

Ostreopsis still on macrophytes	Dermal exposure: mild to severe skin irritation, no general symptoms
Ostreopsis in free water	Inhalation +/- dermal exposure: mucosal (eyes, nose, mouth) and skin irritation, dyspnoea with hypersecretion
Clusters of *Ostreopsis*	+ general symptoms: fever, arthralgias, digestive troubles, bronchoconstriction… (Divers, long exposures)

Good response to anti-inflammatory drugs +++ (good argument for non-specific reaction).

Human exposure to *Ostreopsis* blooms

Respiratory exposure = easy medical management (no links with vasoconstriction consequences treatment)

One BIG problem: epidemic development with numerous patients arriving in the emergencies in few hours (size problem) !!!

ELSEVIER

Toxicon 51 (2008) 418–427

TOXICON

www.elsevier.com/locate/toxicon

First episode of shellfish contamination by palytoxin-like compounds from *Ostreopsis* species (Aegean Sea, Greece)☆

Katerina Aligizaki[a,*,1], Panagiota Katikou[b,**,1], Georgios Nikolaidis[a], Alexandra Panou[b]

[a]*Department of Botany, School of Biology, Aristotle University of Thessaloniki, P.O. Box 109, Thessaloniki 54124, Greece*
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Received 23 October 2007; received in revised form 27 October 2007; accepted 29 October 2007
Available online 6 November 2007

Mussels contamination with palytoxin-like compounds after one bloom of *Ostreopsis ovata* in the Aegean Sea : Shells were in good health but the were able to accumulate high quantities of toxins …

"Tropicalization" of the Mediterranean sea :

- development of southern species like *Thalassoma pavo*.

- breeding of the turtle *Caretta caretta* with first eggs laying in southern Corsica in 2003 and in the "Côte d'Azur" in 2006