

EFFECT OF MUSSELS CONSUMPTION ON HUMAN HEALTH

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Using science and the technology, efforts to improve people's standards of living is increasing day by day. This causes increase of the pressure on the natural resources.



Water is the most important natural resource for human beings can not give up. Aquatic living things are great food resources for all habitat.



- With the increase of global food production, people are consuming them by increasing the activities of raising food resources in the aquatic environment.
- It is an up-to-date and sustainable application in the sense that living things are brought to the aquaculture environment for the damage given to natural stocks is minimized and economic gain is increased by this way.

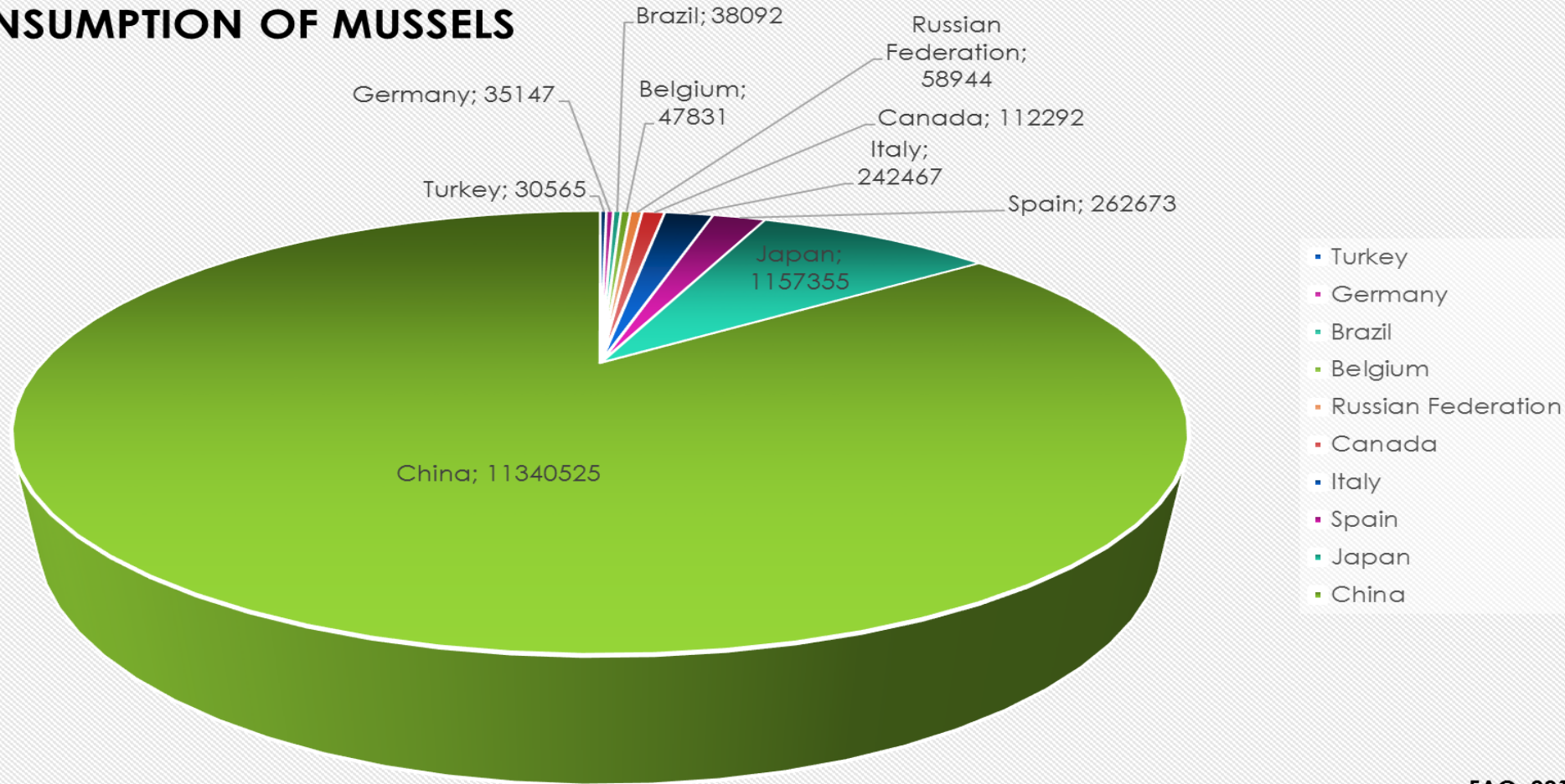


The mussel growing in recent years is an important aquatic product. People tend to pay attention to diet in developed countries.



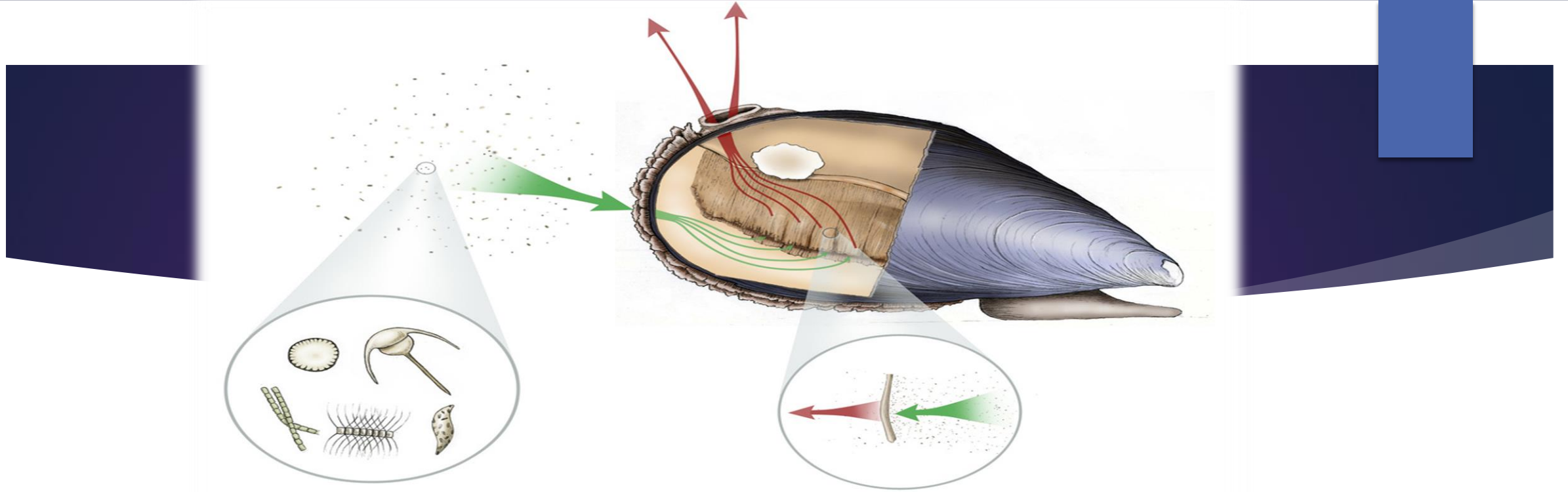
The mussels are preferred food by humans for obtain the nutritional needs in recent years. Also mussels take place in diet products because it contains high protein and low lipid levels.

CONSUMPTION OF MUSSELS



FAO, 2011

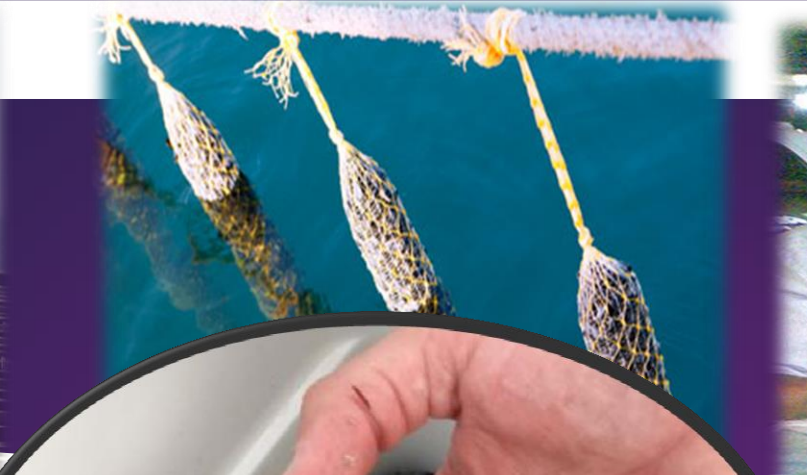
In Turkey, Mussel consumption is lower than the other EU countries. But, In recent years, in Turkey, especially at the Black Sea region, some researchers made studies on mussel cultivation and they get positive results .



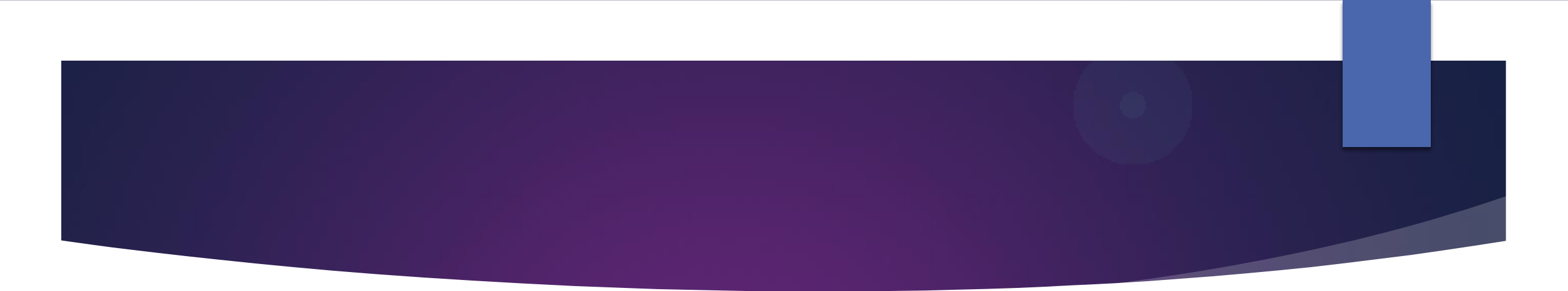
- ▶ In addition, the mussels are fed by filtering the water
- ▶ Mussels have an open circulatory system
- ▶ Planktonic organisms are the most important source of nutrients for the mussels
- ▶ The mussels take the toxin together with the planktonic organism and accumulate it in their bodies.



- **The demand for the consumption of mussels is increasing day by day due to its different aromatic flavors and high nutrition value.**
- **It is inevitable that mussel poisonings may increase in the face of increased demand.**



It is very important to pay attention to the hygiene conditions in the process from hunting to harvesting of mussels obtained by hunting and cultivation and to reach the consumers with the most reliable food.

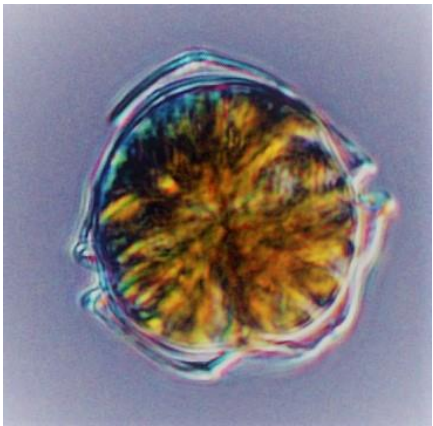


Otherwise, various poisoning cases can be seen;

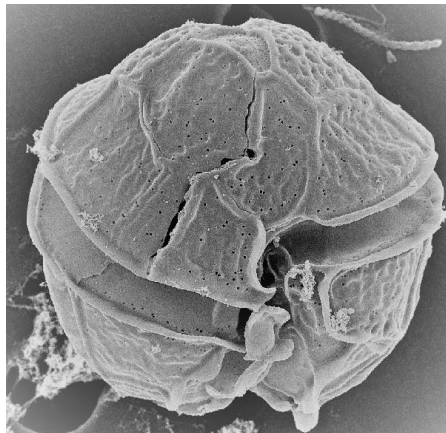
- ▶ Paralytic Shellfish Poisoning (PSP)**
- ▶ Diarrhetic Shellfish Poisoning (DSP)**
- ▶ Neurotoxic Shellfish Poisoning (NSP)**
- ▶ Amnesic Shellfish Poisoning (ASP)**

Paralytic Shellfish Poisoning (PSP)

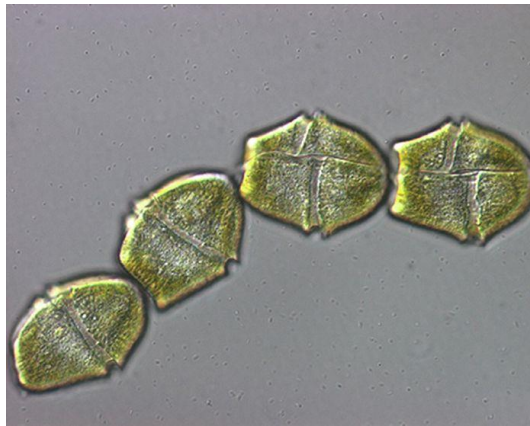
- ▶ Paralytic shellfish poisoning is the result of consuming seashells fed with toxic dinoflagellates.
- ▶ It is a serious disease that causes gastrointestinal and neurological symptoms in humans.
- ▶ The main cause of Paralytic shellfish poisoning is dinoflagellate toxins:



Alexandrium catanella



Alexandrium minutum

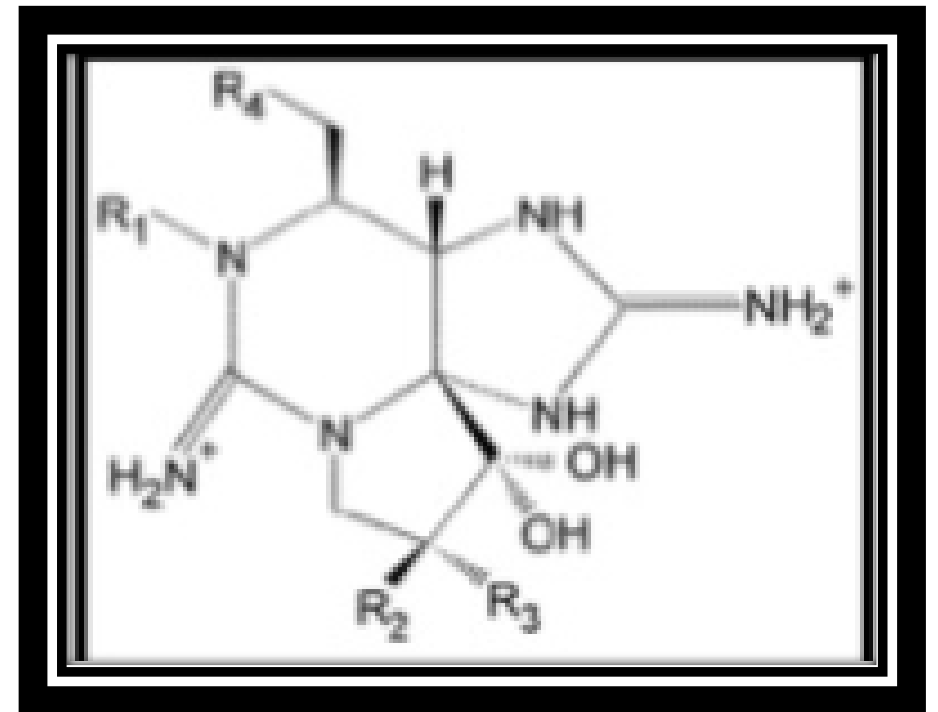


Gymnodinium catenatum

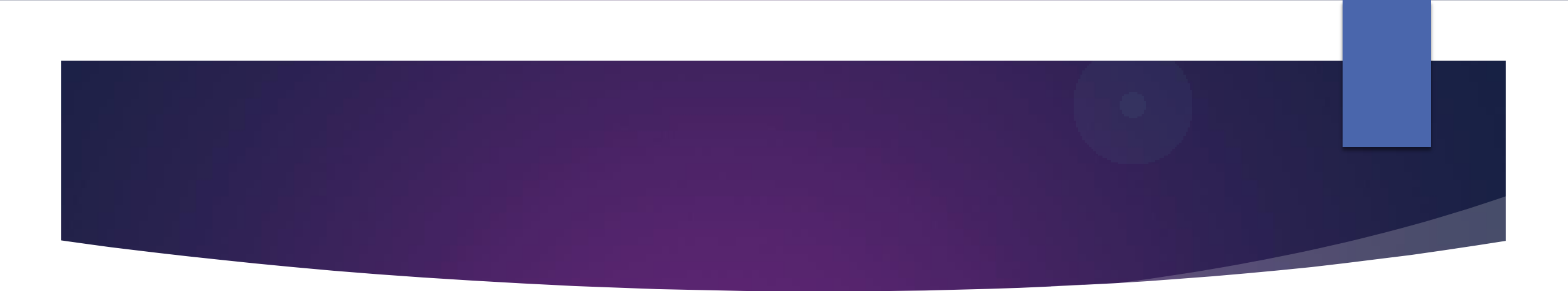


Pyrodinium bahamense

- ▶ Saxitoxins are produced by dinoflagellates of the species Gonyaulax and Pyrodinium.
- ▶ These toxins are **heat resistant**,
- ▶ **Soluble** in water,
- ▶ Non-flammable in basic environment,
- ▶ **Acid resistant** to the environment.
- ▶ **Cooking is resistant to boiling and steam.**



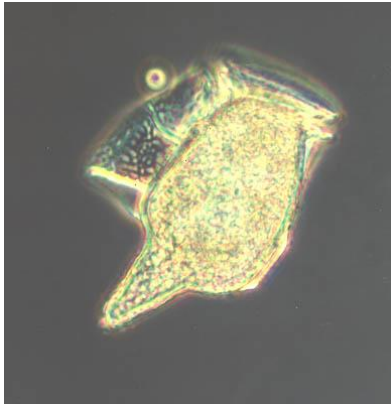
Structure of Saxitoxin

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- ▶ *Alexandrium catenella* is sufficient to kill 1 mg of the toxin produced by the named dinoflagellates
 - ▶ 5-30 minutes after consumption of contaminating shellfish
 - ▶ burning in mouth,
 - ▶ tingle,
 - ▶ numbness that progresses to face and neck,
 - ▶ in serious cases; numbness in arms, legs and fingers,
 - ▶ uncoordination
 - ▶ and respiratory distress develops.

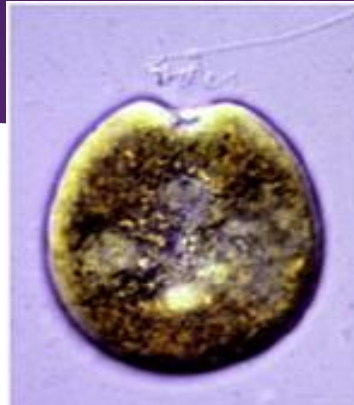
Diarrhetic Shellfish Poisoning (DSP)



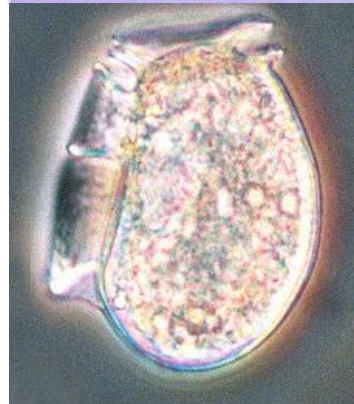
Dinophysis acuminata



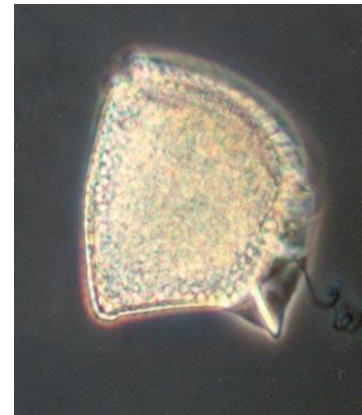
Dinophysis caudata



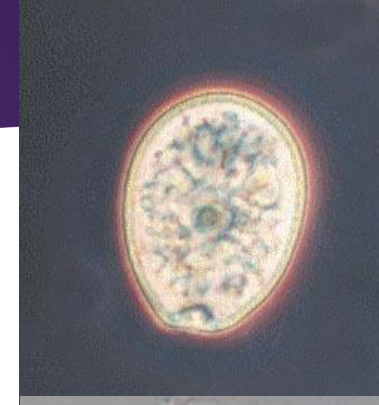
Prorocentrum concavum



Dinophysis fortii



Dinophysis mitra



Prorocentrum lima



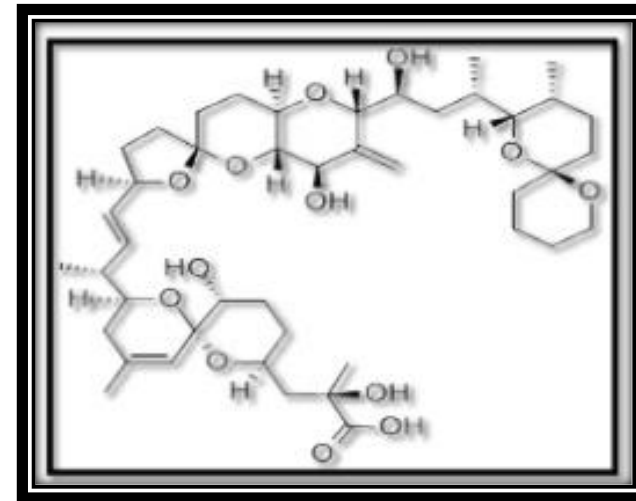
Prorocentrum hoffmannianum

- ▶ Diarrhetic shellfish poisoning; *Dinophysis* sp. and *Prorocentrum* sp. are caused by toxins produced by dinoflagellates

- ▶ Among the toxins that lead to shellfish poisoning, the most important is okadaic acid.
- ▶ These toxins are compounds in the oil-soluble polyether structure.

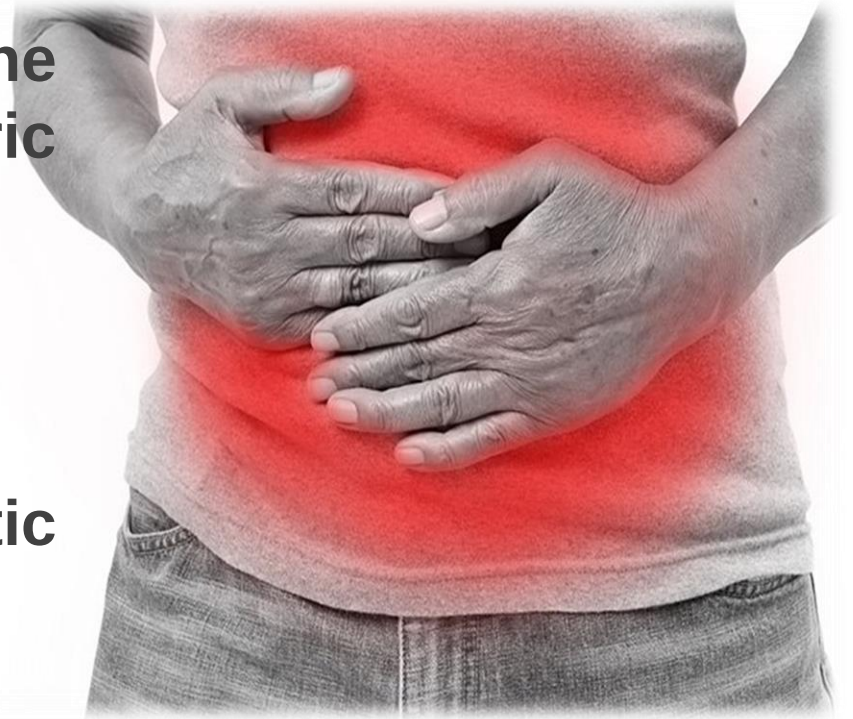
TOXINS:

- ❖ Okadaic acid,
- ❖ Pectenotoxin,
- ❖ Yessotoxin,
- ❖ Dinophysyl toxin.



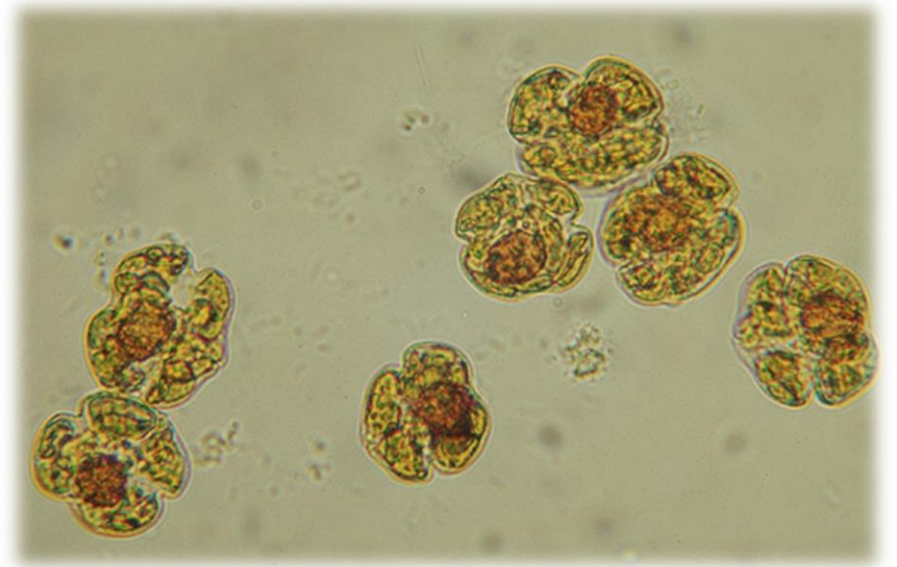
Structure of Okadaic acid

- ▶ The consequence of chronic exposure to the agent has been reported to be a rare gastric tumor in patients
- ▶ No deaths have been reported for Diarrhetic Shellfish Poisoning



Neurotoxic Shellfish Poisoning (NSP)

- ▶ Neurotoxic shellfish poisoning is caused by a dinoflagellate called *Karenia brevis*.
- ▶ It was first isolated in the Gulf of Mexico and the Florida coast.

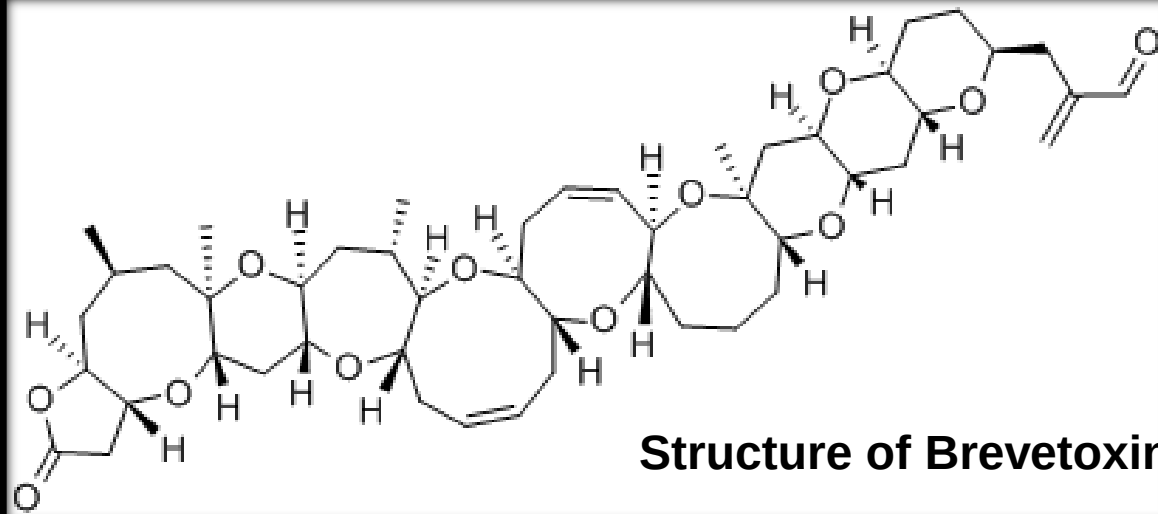


Karenia brevis

► Brevetoxin produced by *Karenim brevis* ;

► Non-protein **soluble in fat**,

► **Heat and acid-resistant** polyether is a neurotoxic agent in construction

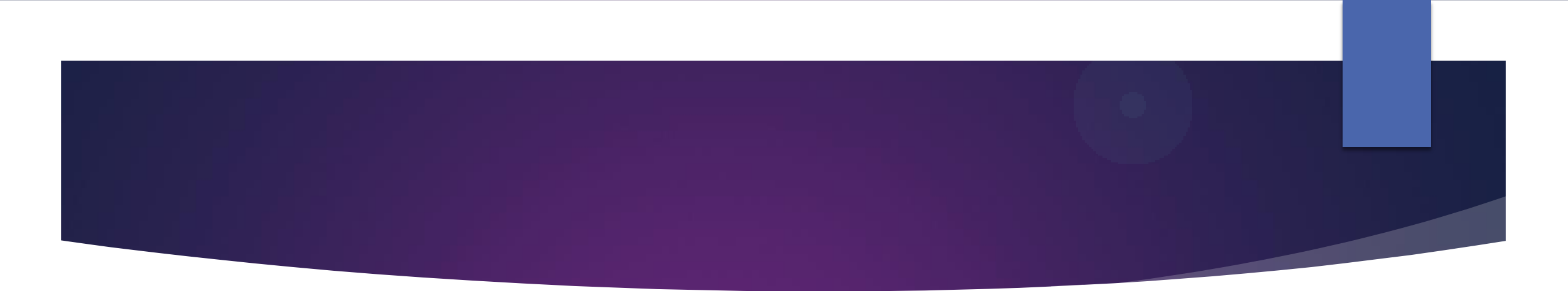


Structure of Brevetoxin

As a result of consumption of seashells contaminated with *Karenim brevis*;

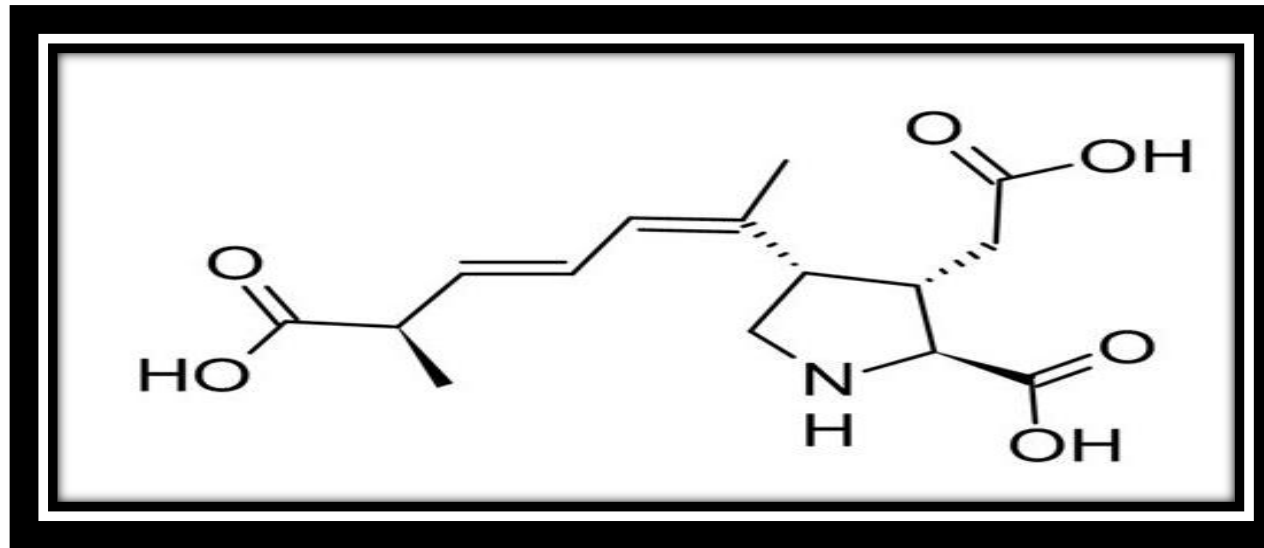


Symptoms such as gastrointestinal and respiratory distress develop in humans

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- ▶ Affinity to sodium channels of brevetoxin is high
 - ▶ Normally closed sodium channels are opened
 - ▶ Neuromuscular transmission is inhibited in skeletal muscles.
 - ▶ As a result, neurotoxic symptoms occur in humans

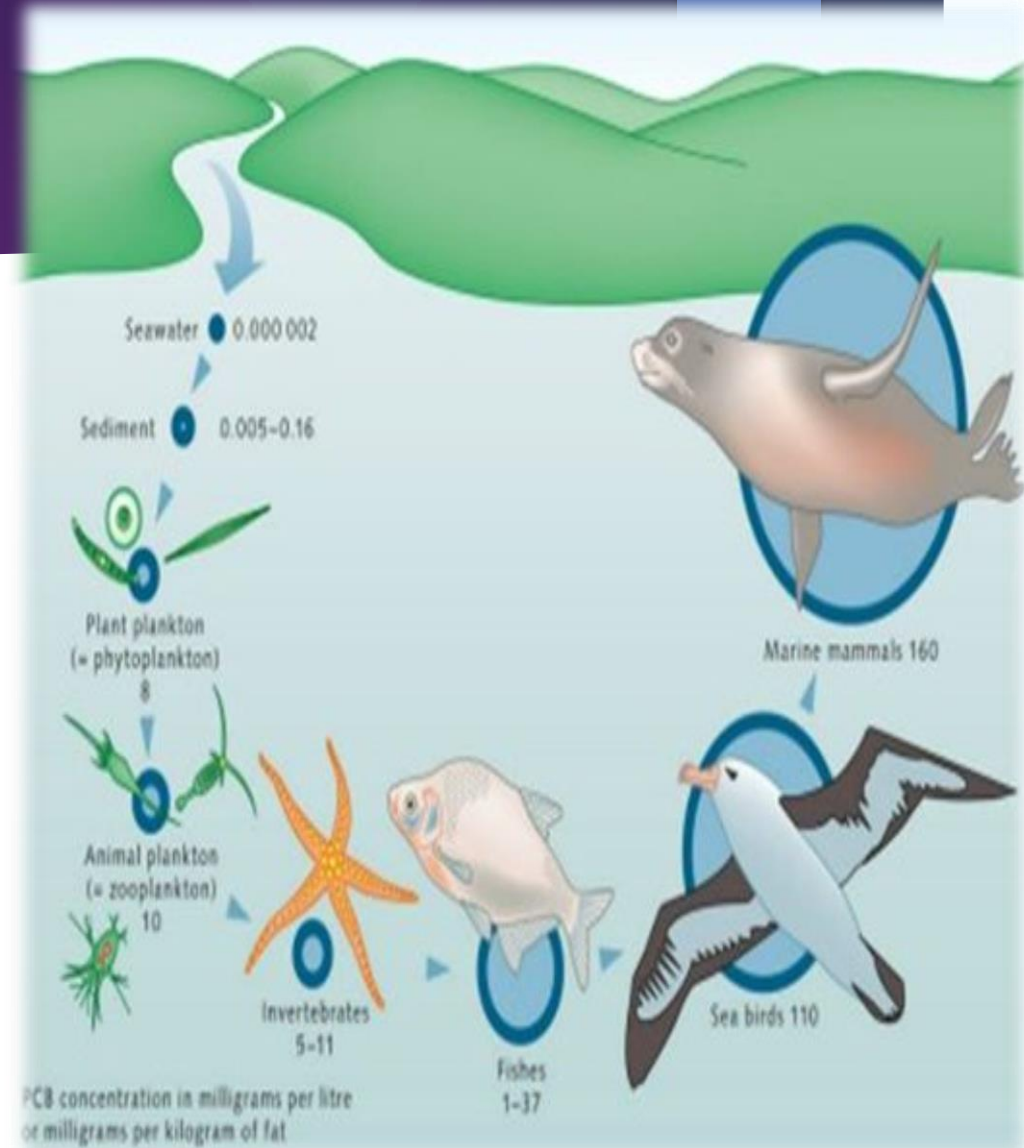
Amnesic Shellfish Poisoning (ASP)

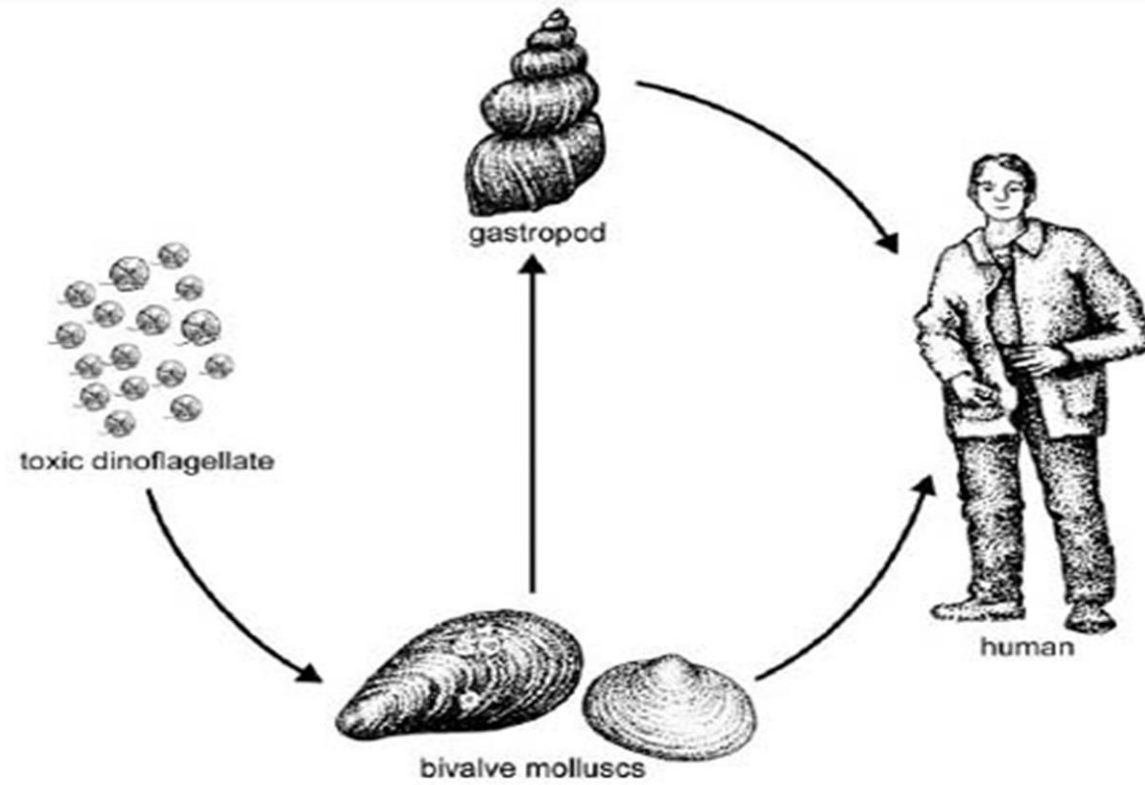
- ▶ Amnesic shellfish poisoning, which causes **memory loss** in humans, is caused by "**domoic acid**" produced by diatoms with single-cell algae.



Structure of domoic acid

- ▶ The first domoic acid poisoning occurred **in Canada in 1987**.
- ▶ In this case, it was reported that over 150 people were exposed to toxin and 4 of them died
- ▶ However, it wasn't until 1998 that domoic acid toxicosis was first diagnosed in marine mammals by the Marine Mammals Center.





- ▶ Toxins that cause poisoning from mussels in humans do not show any toxic effects on the mussels.
- ▶ However, the consumption of these mussels, which carry the toxin, causes poisoning which can result in death in humans.

How Control Should Be Done



- It is useful to investigate toxic samples of samples taken from areas where seafood has been caught.

- Obtain mussels from waters that have been approved for harvest.



**THANK YOU FOR YOUR
ATTENTION**

