



**Eating fish that hasn't been kept on ice can make you very sick! This is because of the build-up of enzymes\* and bacteria\* – see Teachers' Resource Sheet 11: Fish spoilage.**

**But there are other forms of fish poisoning that are not caused by poor handling and are not caused by bacteria. These include ciguatera\* fish poisoning and what is broadly called shellfish\* poisoning. These forms of poisoning are caused by harmful algal blooms – a dramatic increase in the numbers of very small plants (the phytoplankton)\* that float in the sea.**

## Harmful Algal Blooms (HABs)

Populations of phytoplankton periodically go through massive increases in numbers. These increases are referred to as plankton\* blooms and a few species\* produce strong toxins.\*

The main culprits are dinoflagellates,\* small and very abundant members of the marine plankton; they consist of single cells with two whip-like threads or flagella, which they use to move through the water.

These blooms of toxic species (called Harmful Algal Blooms or HABs) are responsible for fish and shellfish poisoning in humans in many parts of the world.

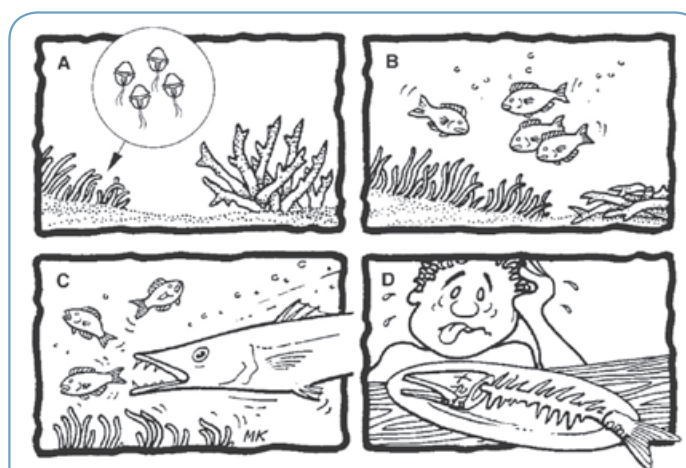


### Myths about ciguatera

One common belief is that toxic fish can be recognised by exposing a fillet of the fish to flies or ants – the flesh is regarded as poisonous if the flies avoid it. Another belief is that a toxic fish can be recognised by placing a silver coin on the flesh – if the coin turns black, the flesh is not safe to eat. Unfortunately these tests and many other widely trusted ones, do not work.

## Ciguatera fish poisoning

Ciguatera Fish Poisoning (CFP) is common across the tropical Pacific. CFP results from the consumption of fish that have accumulated toxins produced by several organisms including the bottom-living dinoflagellate, *Gambierdiscus toxicus*. The sequence of events leading to ciguatera is shown in the following figure.



**A cartoon used to raise community awareness of ciguatera in Pacific Island countries.** The sequence of A) to D) is described in the text. From: King M. 2007. Fisheries biology, assessment and management. UK: Wiley Blackwell. 400 p.

- A** The toxic dinoflagellates (shown greatly magnified in the circle) occur as a film on corals and seagrass. Their numbers increase dramatically when there are high levels of nutrients\* in the sea – such as during the wet season when nutrients are washed from the land by rain and released from coral reefs damaged during cyclones. Sewage\* and agricultural fertilisers entering coastal waters also add to the load of nutrients. Outbreaks of ciguatera have been associated with activities such as harbour dredging and the illegal use of explosives for fishing.
- B** Small grazing fish feed on the dinoflagellates and toxins build up in their flesh.
- C** Large predatory fish eat the smaller fish and the toxins become more concentrated in the flesh of the larger fish. By magnification up the food chain, the toxins reach dangerous levels in top carnivores such as some emperors, snappers, trevallies, barracudas, moray eels and large spanish mackerels.
- D** People eating these usually edible fish suffer from tingling, numbness, muscle pains and a curious reversal of temperature sensations (cold objects feel hot to touch). In extreme cases, death occurs through respiratory failure.

Unfortunately, the toxins cannot be destroyed by cooking or freezing. And in spite of widespread folklore on the subject, there is no reliable, cheap test to determine whether or not a particular fish is ciguatoxic before consumption.

## Shellfish poisoning

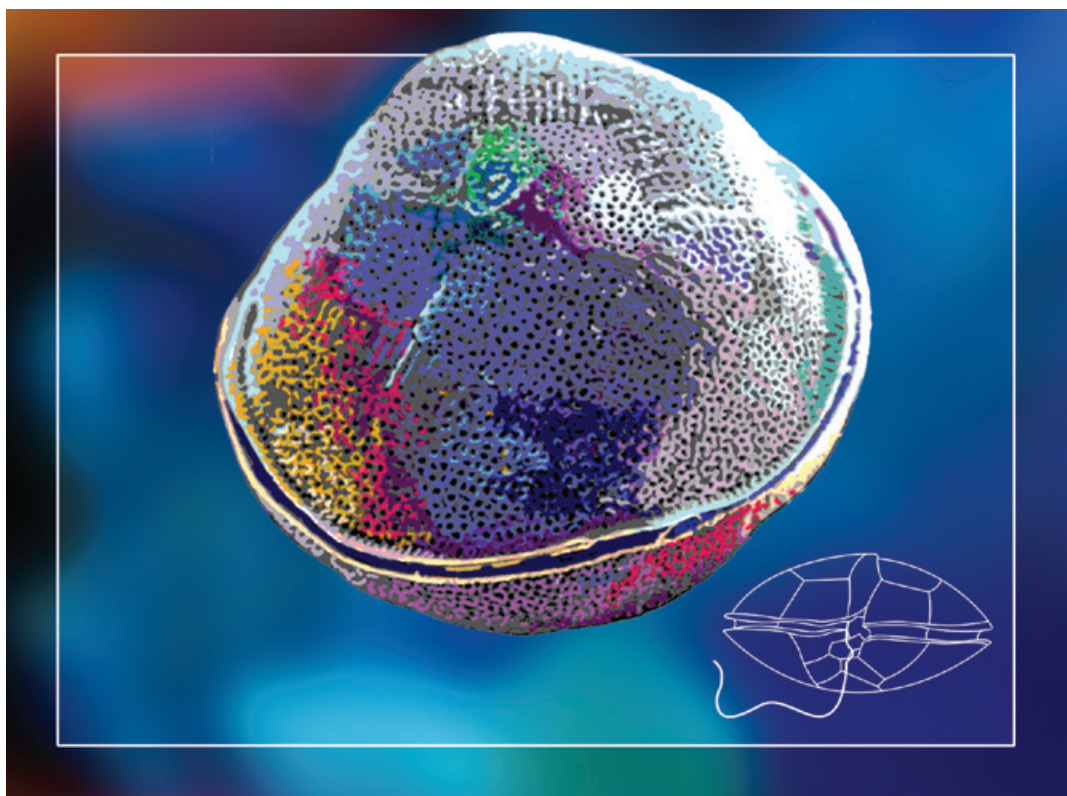
Other harmful algal blooms cause several conditions collectively called shellfish poisoning. The poisoning is mainly caused by eating filter-feeding shellfish (such as clams, oysters and mussels) that sieve the toxic phytoplankton from the water. Each type of poisoning is caused by different species of toxic phytoplankton and is often named after the symptoms caused.

- The condition called paralytic shellfish poisoning may cause people to stagger about and have trouble talking.
- Neurotoxic shellfish poisoning affects nerves and may cause dizziness, fever and a reduced heart rate.
- Amnesic shellfish poisoning can result in confusion and amnesia (loss of memory).
- Diarrhetic shellfish poisoning is characterised by severe diarrhoea and vomiting.



### Did you know?

*Some harmful algal bloom toxins can become airborne (as toxic aerosols) because of wave action and cause people swimming and even just walking on the shoreline to suffer respiratory asthma-like symptoms from inhaling the airborne droplets.*



***Gambierdiscus toxicus.***

From: SPC/IRD Ciguatera field reference guide:

<http://www.spc.int/coastfish/en/component/content/article/340-ciguatera-field-reference-guide.html>