

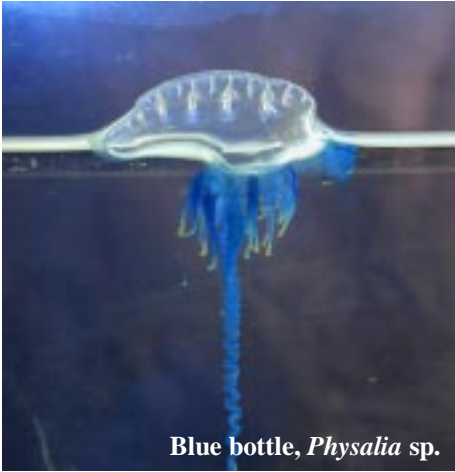
A man in a blue shirt and khaki shorts is fishing with a rod and reel. The scene is split horizontally: the top half shows him on a gravel bank under a clear blue sky, and the bottom half shows a large, translucent jellyfish with long tentacles in the water. The text 'Stingers in the North' is overlaid in orange.

Stingers in the North

STINGERS/BOX JELLYFISH/ *Chironex fleckeri*

History:

Until the early 1940's all deaths from marine stings were attributed to *Physalia* sp. or blue bottle jellyfish. It was not until



Blue bottle, *Physalia* sp.

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1943 that Frank McNeill first suggested that a cubozoan or box jellyfish was more likely to be responsible. Dr Hugo Flecker and Dr Ron Southcott together traced the records and incidences of fatal stings to an unknown box jellyfish later named by Dr Southcott as *Chironex fleckeri* (after Dr Flecker).



Chironex fleckeri

Jamie Seymour

Although reports of human deaths by jellyfish in Australia have been recorded since the late 1800s the first official confirmed death, where the animal responsible was captured and identified, was at Cardwell in 1955. In 1958 Dr Jack Barnes was approached to continue the work into marine stings and it is from his preliminary investigations and observations that the foundations of knowledge on these box jellyfish

are built.

Although these animals have been responsible for over 60 deaths in Australia up until 2000, we still know surprisingly little about their biology.

Biology:

Stingers are related to true jellyfish, or scyphozoans. How-



Scyphozoan *Cyanea* sp.

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ever, unlike these round and often multicoloured species, *Chironex fleckeri* is cuboidal in shape and almost totally transparent. The best way to spot them in the water is usually by their shadow cast on the sandy substrate. An adult animal may have up to 15 tentacles on each of the four corners of its body or bell. Each of these tentacles can be up to 3 metres long when the animal is hunting for food. On each of the four sides of the bell, *Chironex fleckeri* has a sensory niche, which contains 3 eyes and a balance organ, so the animal is able to see where it is going and tell if it is upside down or not.

Seasonality:

Stingers first turn up in late **October/ early November**, depending on local weather conditions. They are then **present in**

northern waters until May but occasionally this may stretch into



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early June. It was not until the early 1980's that a researcher from JCU, Dr R. Hartwick solved the puzzle of the breeding cycle of these animals. Near the end of the season, as the animals become sexually mature, male and



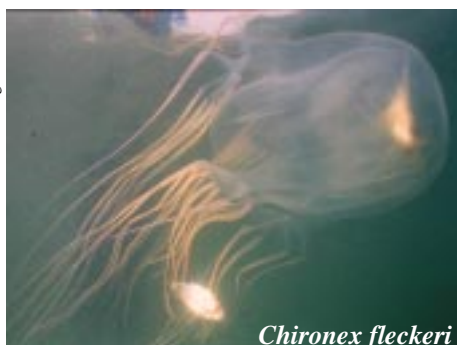
female *Chironex fleckeri* shed millions of eggs and sperm into the water column where the eggs are fertilised. These fertilised eggs grow into small planula and settle on the under surface of rocks in creeks. Here the planula metamorphoses into a small polyp and feeds on planktonic organisms in the water. During the dry season (June to October), these small polyps feed and bud, producing more polyps. At the

start of the season (November), each polyp buds off a single baby box jellyfish, approximately 1.5 mm in size, which makes its way to the creek mouth and then along



Shrimp, *Acetes australis*

the sandy beaches. Here it feeds primarily on small shrimp (*Acetes australis*) when they are small, but switch its diet to include



Chironex fleckeri

small bait fish as it matures. Once fully mature, it starts the breeding cycle over again.

Growth:

Unlike most animals, box jellyfish can undergo degrowth, that is, in times when food is scarce they shrink in size and then regrow when food becomes available again. Because of this, the size of a jellyfish is not a good indication of its age. However, the organs that box jellyfish use for balance, statoliths, contain growth rings. By sectioning sta-



Statolith with daily growth rings

toliths, daily growth rings can be seen and individual animals aged. From this, we now know that when food is plentiful, box jellyfish can grow between 1-2 mm a day and reach a maximum size of over 35cm across the bell.

Distribution:

Chironex fleckeri occurs from Exmouth on the west coast of Australia through northern Australia to Gladstone on the east. It is predominantly a near



Australian Distribution of *Chironex fleckeri*

shore animal, seldom found more than a few kms offshore, although it is found around some coastal islands such as Magnetic Island near Townsville. Their preferred habitat is calm shallow water with a gently sloping sandy bottom, however it is not restricted to these areas, being often found in creeks or around rocky headlands even when seas are rough.

Habits:

Chironex fleckeri can be found as solitary animals or in schools numbering in the hundreds of individuals. They are active hunters, using their speed and sensory organs to locate and capture prey. It is not unusual to see large animals searching for food at the edges of light beams cast on the water from jetty wharf lights.

Predators:

Although *Chironex fleckeri* is armed with one of the most lethal venoms known, it still has a

bevy of predators. The major species are marine turtles, which appear to show little if any side effects to box jellyfish venom. Several species of fish are also known to attack and feed on box jellyfish, but unlike the turtles, these predators feed predominantly on the bell and not the tentacles.

Are *Chironex fleckeri* numbers increasing?

The simple answer to this question is that we just do not know. We do know that the numbers of stingers present from year to year can vary enormously, but we don't know what causes this. We also know that more people appeared to be stung by *Chironex fleckeri* in recent years compared to the past, but we also know that there are more people swimming now than there were many years ago. There is at present no evidence to suggest that stingers are increasing in numbers and it seems that their numbers are, on the whole, quite stable over several years, but can vary markedly from year to year.

How does *Chironex fleckeri* sting?

Box jellyfish, like all jellyfish, have stinging cells called nematocysts present on the tentacles. These cells contain venom and a hollow shaft that everts (referred to as discharging) and penetrates the prey or the victim when the tentacle comes in contact with it. Although small, these stinging cells number in the

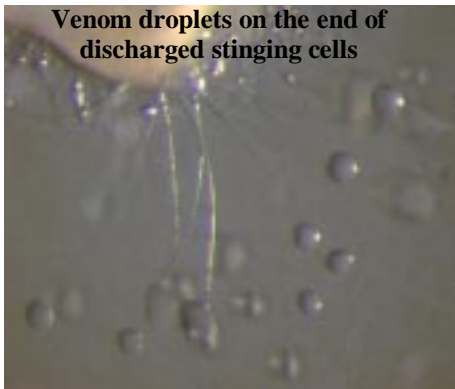


A discharged and non discharged stinging cell or nematocyst

millions per centimetre of tentacle, and in lethal envenoming of victims, many billions of stinging

to eradicate stingers from the water, and even if it were possible, the effects that this may have on the environment are unknown. We need to learn to live with these animals. With the production of real time models that help predict the start and end of the stinger season, and stingers nets, the risk of being stung is incredibly small if the proper precautions are taken, such as swimming within stinger enclosures and/or the wearing of stinger suits.

swimmers and the jellyfish and bathing should be restricted to



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cells deliver venom. Once fired off, these stinging cells cannot be reused and the jellyfish has to produce new cells to replace them.

First aid for *Chironex fleckeri* stings:

For large box jellyfish stings, time is one of the most important factors. Death of a victim can occur within minutes, so any first aid administered must be done quickly. The area of the body on which the sting has occurred should be flooded in vinegar. The victim should be kept calm and CPR administered should their heart stop beating or they stop breathing. Medical assistance should be contacted as soon as possible.

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Stinger nets:

In the early eighties, James Cook University developed stinger nets for the safety of swimmers. These nets act as physical barriers between the



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within these enclosures during the stinger season. No major sting has occurred within these nets since their inception.

Further reading:

J.Seymour & P. Sutherland. 2001. Box jellyfish. *Australian Natural History* (Australian Museum publication) Autumn edition.

Further information:

Contact Tropical Australian Stinger Research Unit (TASRU) at James Cook University, Cairns 07 40421111



What does vinegar do?

Vinegar will not alleviate the pain or help with scarring. Vinegar causes total inactivation of any undischarged stinging cell rendering them incapable of firing. This is important, as at the initial time of the sting only a small proportion of the total number of stinging cells fire off. Over time, more and more stinging cells fire off, delivering more venom into the victim. The application of vinegar will prevent this from occurring.

Can we control Stingers?

It is practically impossible

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Chironex fleckeri