

Do box jellyfish sleep at night?

A novel tagging technique has uncovered some surprising information about jellyfish behaviour

If you spend any time at all in tropical Australia, especially in the water, you will know about box jellyfish. You will also know that they have a major effect on the way people use the water, that they are capable of killing humans within minutes, and that vinegar is the first aid treatment of choice.¹ But did you know that they “sleep”?

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diameter). Using these for tracking marine animals is not new, but tracking jellyfish with them — that's certainly never been done before. Normally, when tracking marine organisms (such as fish), you open the body cavity, insert the transmitter, suture the wound and let the fish go.

With jellyfish, it's not that simple.

Firstly, jellyfish don't have a body cavity (they only have two cell layers, an ectoderm and an endoderm, with a non-cellular layer, the mesoglea, between these). Secondly, suturing jellyfish is not easy. In fact, it's impossible! After many failed attempts to attach transmitters, we finally struck upon a simple but effective method. We glued them on using histoacryl, a superglue used by surgeons. All you need to do is catch a box jellyfish without getting stung (an art in itself!), glue a transmitter to it (Box 1), release it, and follow it with an underwater directional microphone. You can then work out where they go and how active they are.

In the last jellyfish season, we managed to track several tagged box jellyfish (Box 2), and came up with some staggering results. It seems that these jellyfish show marked diurnal behaviour. During daylight hours (from about 0600 to 1500), they moved in straight-line distances of about 212 m an hour. However, from about 1500 to 0600, they moved an average of less than 10 m an hour.² During these periods of “inactivity”, the jellyfish lie motionless on the sea floor, with no bell pulsation occurring and with tentacles completely relaxed and in contact with the sea floor (Box 3). Shining lights on the jellyfish while they are inactive on the sea floor, or causing vibrations close by on the seabed,

1 Attaching a tag to the most venomous marine creature in the world — it's easy when you have the right glue!



2 A large box jellyfish with its tag attached, off in search of food



3 A tagged box jellyfish lying motionless on the sea floor — the first time this sort of behaviour has been recorded in jellyfish



causes the animals to rise from the sea floor, swim around for a short period, and then fall back into an inactive state on the sand.

If you have any interest in animal biology, this type of action in a lower invertebrate should immediately raise the question of “Why?”. We believe it is related to the way the jellyfish collect food. The box jellyfish is an active visual hunter of vertebrates. It has four sets of six eyes, some of which are image-forming with lenses and retinas, lying around the four facets of the bell (body) of the animal.³ Box jellyfish are also extremely active, with metabolic rates at least an order of magnitude greater than those of any other jellyfish we know of.⁴

So, at night — when vision is limited and you cannot see your prey or your predators (turtles for box jellyfish) — rather than burn a lot of energy swimming around, it makes a lot of sense to become inactive, decrease your energy used in locomotion and divert it to growth (these animals can grow at 2–3 mm across the bell per day). A really simple strategy, but one we had not thought box jellyfish used.

All we need now is for someone to design a tag small enough to put on Irukandji box jellyfish (*Carukia barnesi*) — which are about as big as your thumbnail — and then we will really make some progress!

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