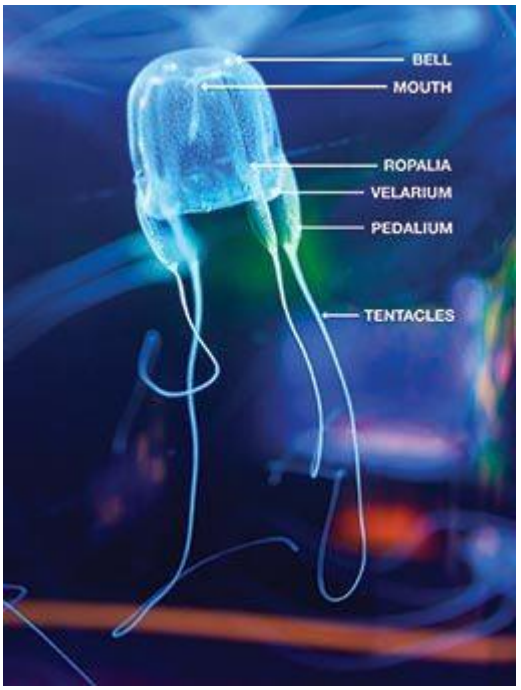
# Box Jellyfish




Box jellyfish (cubozoans) are cube-shaped medusa notorious for having one of the most potent venoms known. Certain species can kill an adult human in as little as three minutes, scarcely enough time for any rescue response.

Medusas are the migrant forms of cnidarians. In the case of box jellyfish, their belllike bodies are cube shaped with tentacles extending from each corner. Box jellyfish are complex animals with a propulsion mechanism and a relatively sophisticated nervous system for a jellyfish. They have up to 24 eyes, some of them with corneas and retinas, enabling them to not only detect light but also to see and circumnavigate objects to avoid collision. While some jellyfish live off of symbiotic algae, box jellyfish prey on small fish, which are immediately paralyzed upon contact with their tentacles. The tentacles are then retracted, carrying the prey into the bell for digestion. Some species hunt during the day and can at night be observed resting on the ocean floor.

## Mechanisms of Injury

From 1884 to 1996 there were more than 60 reported fatalities from box jellyfish stings in Australia. There are species of box jellyfish in almost all tropical and subtropical seas, but life-threatening species seem to be restricted to the Indo-Pacific.

Here are some notorious species to be aware of.

- **Sea Wasp (*Chironex fleckerii*):** Found in the coastal waters of Australia and Southeast Asia, the sea wasp is the common name for the most dangerous cnidarian. The scientific name of this monster is *Chironex fleckerii*. *C. fleckerii* is the largest species of cubozoan. Sea wasps have a bell approximately 8 inches (20 centimeters) in diameter and tentacles ranging from a few centimeters to up to 10 feet (3 meters). Contact with these animals triggers the most powerful and lethal envenomation process known to science. Sea wasp envenomation causes immediate excruciating pain followed by cardiac failure. Death may occur in as little as three minutes. Recent studies have identified a component of the venom that drills a hole in red blood cells, causing a massive release of potassium, possibly responsible for the lethal cardiovascular depression. The same study may have also identified a way to inhibit this effect, which in the coming years could prove to be clinically promising.
- **Four-Handed Box Jellyfish (*Chiropsalmus quadrumanus*):** The four-handed box jellyfish ranges from South Carolina to the Caribbean, the Gulf of Mexico and as far south as Brazil. The four-handed box jellyfish can inflict extremely painful stings and is the slightly smaller American cousin to the Australian sea wasp. There is one documented case of a four-year-old boy who was stung in the Gulf of Mexico and died within 40 minutes.
- **Bonaire Banded Box Jellyfish (*Tamoya ohboya*):** *Tamoya ohboya* is a newly discovered, highly venomous species found in the Dutch Caribbean. Since 1989 there have been roughly 50 confirmed sightings, primarily in Bonaire, with the remainder on the shores of Mexico, St. Lucia, Honduras, St. Vincent and the Grenadines. There have only been three reported cases of envenomation, which led to intense pain and skin damage; only one case required hospitalization.
- **Carukia Barnesi & Malo Kingi:** Tiny box jellyfish found near Australia, *Carukia barnesi* and *Malo kingi*, are responsible for the infamous and extremely painful symptomatic complex known as Irukandji syndrome. These small cubozoans' bells measure only a few millimeters and their tentacles may be as long as 3 feet (1 meter). Fortunately, fatalities from these smaller species are rare, but stings are extremely painful and can cause systemic symptoms including cardiovascular instability that should prompt immediate medical attention. Survivors have reported a feeling of impending doom, claiming they were certain that they could

not survive such intense, generalized pain; however, it is important to note that a single sting should not be fatal. Though stings from lesser-known species of cubozoans are not necessarily lethal, they can still be very painful. An immediate medical evaluation is always recommended.

## Prevention

- Properly research the areas where you intend to dive or swim. Some jellyfish are seasonal or nocturnal.
- Avoid known box jellyfish habitats if you are not sure the dive site or swimming area is safe. If you are stung, cardiovascular stability can rapidly deteriorate with very little time for any effective field intervention.
- In northern Queensland, Australia, net enclosures are placed in the water where box jellyfish are known to be during summer months (November to May), but these cannot guarantee safety.
- Minimize unprotected areas. Wear full exposure suits, hoods, boots and gloves. Something as simple as nylon pantyhose worn over the skin can prevent jellyfish stings.
- Carry sufficient household vinegar with you to all dive sites.

## First Aid

If stung by any jellyfish, follow these procedures in this order:

- Contact local emergency medical services.
- Avoid rubbing the area. Jellyfish tentacles can be cylindrical or flattened, but they are coated with stinging cells (cnidocytes). Rubbing the area before removing any remaining tentacles will cause these tentacles to roll over the skin, significantly increasing the affected surface area and the envenomation process.
- Monitor the victim's circulation, airway and breathing. Be prepared to perform CPR at any moment (particularly if you suspect a box jellyfish sting).
- Apply household vinegar to the area. Generously pour or spray the area with vinegar for no less than 30 seconds to neutralize any invisible remnants. You can pour the vinegar over the area or use a spray bottle, which optimizes application. Let the vinegar stand for a few minutes before doing anything else. This will not do anything to the pain or the venom already injected, but it is intended to

stabilize any remaining unfired nematocysts on the diver's skin before you try to remove them.

- Wash the area with seawater (or saline). Use a syringe with a steady stream of water to help remove any tentacle remains. Do not rub. Do not use fresh water; this could cause and worsen the discharge from the tentacle.
- Apply heat. Immerse the affected area in hot water (no hotter than 113°F/45°C) for 30 to 90 minutes. If you are assisting a sting victim, test the water on yourself first to assess the heat level. Do not rely on the victim's assessment, as intense pain may impair their ability to evaluate tolerable heat levels. If you cannot measure water temperature, a good rule of thumb is to use the hottest water you can tolerate without scalding. Remember that different body areas have different tolerance to heat, so test the water on yourself on the same area where the diver was injured. Repeat if necessary. If hot water is not available, apply a cold pack or ice in a dry plastic bag. Application of heat has two purposes: 1) It may mask the perception of pain, and 2) it may assist in breaking down the venom molecules. Since we know the venom is a protein that has been superficially inoculated, application of heat may help by denaturing the toxin.
- Always seek an emergency medical evaluation.

For additional information about marine life injuries, check out the **Hazardous Marine Life Medical Reference Book**.
https://dan.org/health-medicine/health-resources/diseases-conditions/box-jellyfish/