Venomous sea creatures and how to treat their stings

Jennifer Stock - Dive Magazine - 18 November 2024

Jenny Stock ranks the venomous creatures that lurk underwater, and details the treatment if you're unlucky enough to get stung.

I lifted the article and made it a PDF so you can print and keep onboard.

Lionfish are among our favourite venomous creatures (Photo: Jenny Stock)

First up are venomous marine animals, graded by their peculiar attributes. Strap in for a ride, guys, these creatures are astonishing, with hidden, deadly superpowers.

'Venomous' and 'poisonous' are often confused. Both cause harm, but the main difference is the delivery method. Poisonous toxins are small enough to be inhaled, swallowed or absorbed through the skin. Venom contains protein toxins that are too large to absorb in this way, so must be injected or delivered via a wound.

An easy way to remember this is the saying If you bite it and you die, it's poison; if it bites you and you die, it's venom.

Not all venomous animals originate from a common venomous ancestor. The ability to produce venom is typically the result of a random mutation that subsequently provided the species with an advantage.

Stingrays safely swimming around tourists in the Cayman Islands (Photo: Jenny Stock)

New venomous abilities arise as a reaction to limited prey, need for defense, or environmental change. Natural selection of advantageous mutations is the cornerstone of Darwinian evolution theory. This is where altered conditions in the environment exert a 'selection pressure' on animals.

For this reason, different animal species evolve the same type of ability independently. This phenomenon is called 'convergent evolution' and explains the presence of venom in many distant or unrelated animals.

An animal that develops venom cannot relax and rely on its weapon. Prey that are more resistant are more likely to survive and have offspring that carry this trait, breeding this beneficial genetic heritage through their progeny.

This puts pressure back on the venomous animal to 'up their venom game' again. Prey and predators continue to compete in this never-ending chemical arms race.

While their beaks are large, their venom glands are small,
making the giant cuttlefish relatively benign (Photo: Jenny Stock)

The ability to be venomous can also disappear over time. The marbled sea snake changed its diet from fast-swimming fish to static fish eggs and lost its venom.

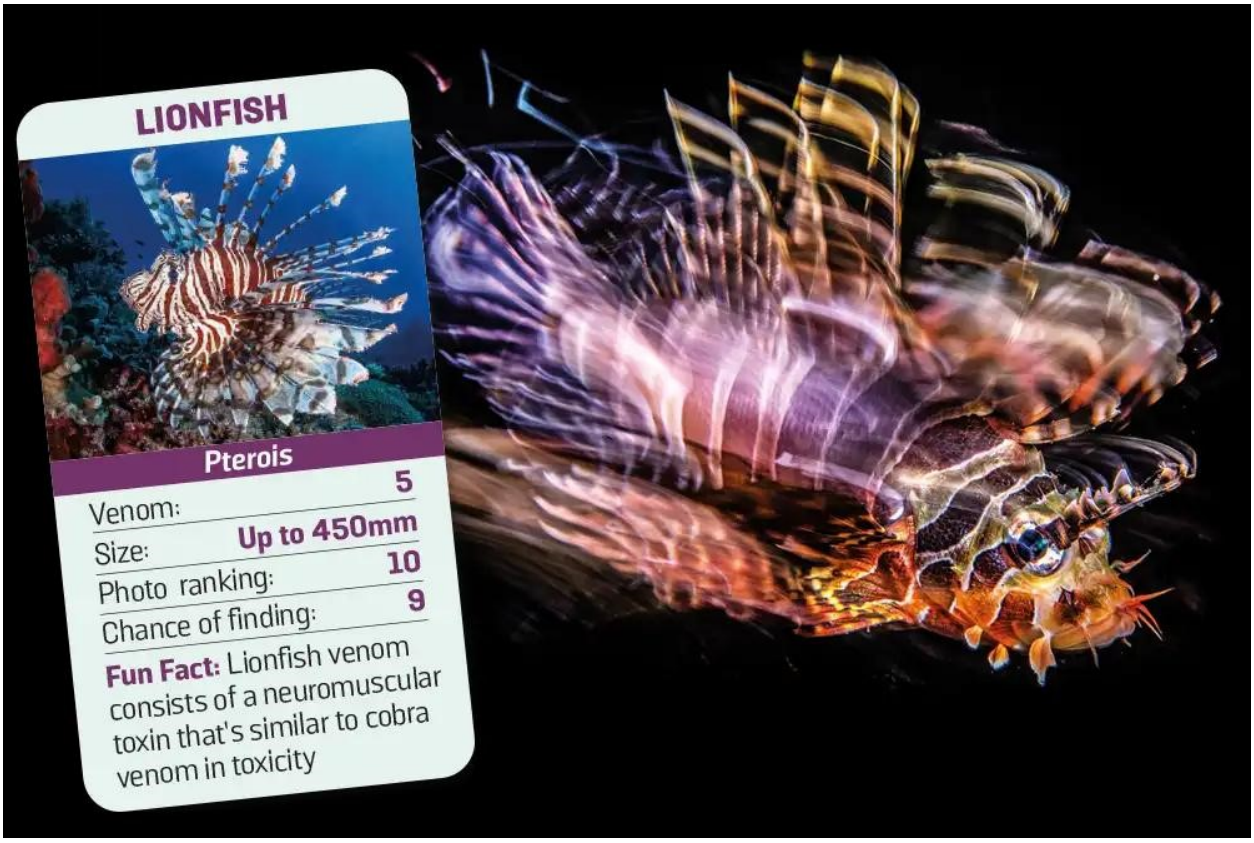
More than two hundred thousand venomous animal species are known to science, and as divers, we cross paths with more venomous animals than your average wildlife spotter.

Here are a few of the standouts you might meet underwater, and what to do if you come a cropper.

1 SCORPAENIDAE FAMILY

Over fifty per cent of all venomous vertebrates are fish. The fish family that tops the venom scales for divers is the Scorpaenidae. Their stings get progressively more severe, from lionfish to scorpionfish to stonefish.

1.1 LIONFISH



(Photos: Jenny Stock)

Lionfish typically have long, slender spines and the smallest venom glands of the family, which produce the weakest venom.

Nevertheless, lionfish spines hold a toxin that's similar in potency to cobra venom.

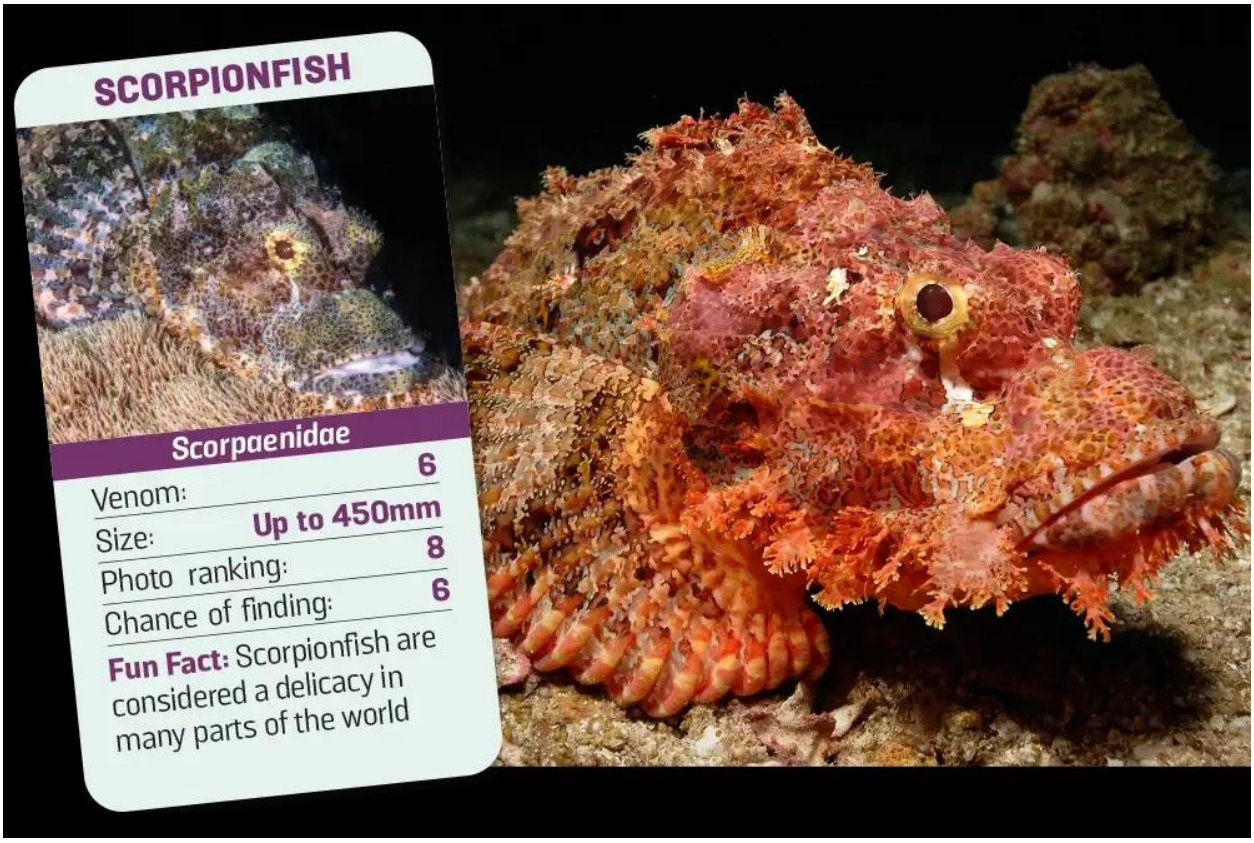
'Handsome but deadly' was their description as the supervillain's supervillainous pet in The Spy Who Loved is a common subject for underwater photographers and it has made it to Wildlife Photographer of the Year awards on several occasions.

Accidents usually occur when divers inadvertently prong themselves. Lionfish stings are very painful, but most can be managed without a trip to hospital. Symptoms develop in minutes, to hours, and can include swelling, tenderness, hot skin directly surrounding the wound, sweating, muscle weakness, and a tingling sensation.

A lionfish sting involving multiple spines increases the risk of infection and body-wide symptoms such as changes in heart rate, sweating, and fainting.

Deaths from lionfish stings are rare, but symptoms can last anywhere from eight hours to thirty days, depending on the severity of the sting.

1.2 SCORPIONFISH



Scorpionfish have shorter but sturdier spines and larger venom glands, thus the potential to deliver a more potent sting.

Any wound area initially has a lack of blood circulation, so it discolours to a purple hue. Blisters may form, followed by cellulitis and intense, excruciating local pain radiating throughout the affected limb.

Unlike with most venomous fish, a scorpionfish spine injury can affect multiple body systems, resulting in malaise, hallucinations, seizures, crawling skin, and fibrous soft-tissue defects.

The elaborately camouflaged Rhinopias frondosa – the weedy scorpionfish (Photo: Jenny Stock)

1.3 STONEFISH

Stonefish have the shortest and strongest spines and the biggest venom glands, and therefore can deliver the largest dose of potent venom. Stonefish spine envenomation can cause death.

(Inset: Jenny Stock; Main photo: Shutterstock)

Stonefish are found in the Indo-Pacific region in both the sea and rivers. As their name suggests, they are often mistaken for an encrusted stone, which explains why people inadvertently step on them.

When a stonefish is touched, it injects venom proportional to the amount of pressure applied to it. Pain is usually immediate, with one patient reporting it felt like 'being hit with a sledgehammer'.

1.4 SCORPAENIDAE VENOM TREATMENT

Wear gloves and use tweezers to remove spines from the wound carefully. Wash the wound with soap and fresh water. Hot water (at least 40°C/113°F) applied to the injured area has been found to denature the venom.

An adult should test the water to ensure it is not too hot for children, and it should be applied for 90 minutes. Over-the-counter medications can help; antivenom should be used in extreme cases.

Make sure your tetanus immunisation is up to date. An X-ray may be needed to ensure that no broken spines are left in the victim. Visit an urgent care centre if symptoms continue.

2 STINGRAY

Stingrays are much less dangerous than the name implies (Photos: Jenny Stock)

Any deadly reputation that the stingray has is greatly exaggerated, but it's difficult to shake when it dates right back to Greek mythology. Odysseus died when speared with the deadly barb of a stingray by his son Telegonus.

In reality, fewer than twenty deaths have been recorded worldwide from stingrays. Tragically, wildlife advocate Steve Irwin was one of those mortalities, although he didn't die from the venom, but from a puncture to the heart, which caused massive bleeding.

In fact, despite their reputation, the stingrays' defense system, which is designed to protect them against sharks, is pretty ineffective. Depending upon the species of stingray, they have up to three caudal (on the tail) barbs. Each is actually a modified scale covered by a layer of skin and mucus.

The venom is kept in grooves on the underside of these barbs, unlike most venomous creatures with venomous glands.

2.1 TREATMENT FOR STINGRAY VENOM

Keep the patient's movement to a minimum to reduce their pulse and immobilise the affected area so venom doesn't spread. Wash the wound with soap and fresh water if available, seawater if not.

Control any bleeding by applying direct pressure to the wound. Gently remove any small pieces of stinger. Do not remove stingers from the chest, neck, or abdomen.

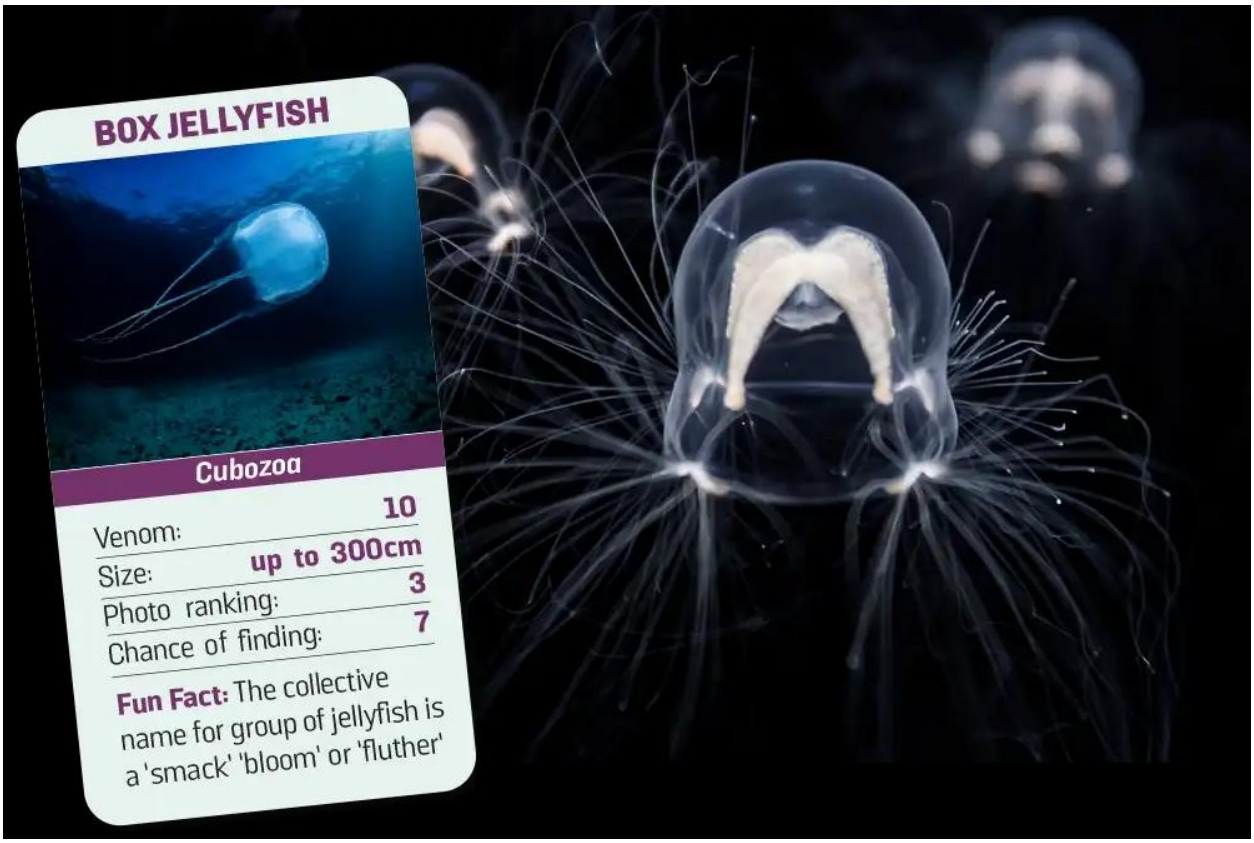
Again, this venom is heat-sensitive, so soak the wounded area in hot water. Go to the nearest urgent care centre for X-rays to ensure no barbs remain in your body.

A tetanus shot will probably be given and painkillers and antibiotics may also be prescribed. Keep the wound clean for the next couple of days to avoid infection.

3 JELLYFISH

Coelenterates, such as jellyfish, are the oldest examples of venomous animals, dating back as far as six hundred million years.

3.1 BOX JELLYFISH



Box jellies can be lethal (Photos: Shutterstock)

Named for their body shape, and considered the most deadly marine animal, they are responsible for seventy-nine recorded deaths since 1883.

They have tentacles covered in darts containing nematocysts (stinging cells). If injected with their toxin, you could experience paralysis, cardiac arrest, and possibly death, all within a few minutes.

The most lethal variety of box jellies is found in tropical Australian waters, and encounters are more likely to occur between November and April, between 3 pm and 6 pm during an outbound tide.

Chironex fleckeri is the largest of the box jellyfish, reaching up to 30cm in diameter, with bootlace-like tentacles of up to three metres long. Interestingly, box jellyfish can swim at speeds approaching four knots, unlike most other jellyfish that float wherever the current takes them.

Box jellyfish can also see, with their surprisingly sophisticated clusters of eyes on each side of their box body. Their speed and vision has led some researchers to believe that box jellyfish actively hunt small fish.

3.2 TREATMENT FOR BOX JELLYFISH STINGS

Carefully take the injured person out of the water, avoiding contact with any tentacles as you don't want to be stung. Apply vinegar to the wound for at least two minutes – many beaches in Australia have clearly marked stations offering vinegar for the public for this purpose.

If you don't have access to vinegar, you should wash the area with seawater as rinsing with fresh water can lead to another discharge of more nematocysts.

Wearing gloves, pull off any tentacles on the skin, using tweezers. Regularly check the person's pulse and breathing. Start resuscitation if the person stops breathing, and call an ambulance.

Antivenom does exist for the box jellyfish. Applying hot water on the affected area may relieve pain. There is an urban myth that you should pee on a jellyfish sting – don't do it. It can provoke jellyfish stingers to release even more venom (and from my own experience, I can tell you it doesn't work).

Don't apply pressure bandages. Don't rub the area where the sting happened.

3.3 IRUKANDJI

(Photos: Inset from Adobe Stock and main picture by Lisa-ann Gershwin/Wikimedia Commons)

Irukandji is the smallest and one of the most venomous jellyfish, with a bell of 25mm and four long thin tentacles, which are up to one metre in length.

They inhabit northern Australia and cost their government three billion dollars a year in medical costs associated with stings and tourism losses.

A zinger from an Irukandji can produce severe pain, muscle cramping, hypertension, and potentially life-threatening cardiac complications, alongside ‘an impending sense of doom’, involuntary grunting, a ‘creepy-skin’ feeling, and in some cases, priapism (a prolonged erection in males).

3.4 TREATMENT FOR IRUKANDJI STINGS

No antivenom exists for the Irukandji. If stung, remove the patient from the water to prevent further stings. Life-support measures should be performed quickly if needed.

Wear gloves and use tweezers to remove any remaining Irukandji from the patient. Wash the wound with seawater, as rinsing with fresh water could lead to another discharge of more nematocysts (the stingy bits).

Transport patient to hospital. Respiratory failure will prompt the need for oxygen, positive pressure ventilation, or even endotracheal intubation.

3.5 PORTUGUESE MAN O' WAR

The Portuguese man o' war resembles a jellyfish but is actually a siphonophore, a colonial organism made up of many smaller units called zooids.

The tentacles of a Portuguese man o' war can leave terrible stings (Photos: Shutterstock)

Their detached tentacles can sting just as painfully as those of live organisms and remain potent for days after death. Man o'War stings usually cause severe pain, lasting between one and three hours and producing red, whip-like welts.

In some cases, the venom may travel to the lymph nodes and can result in breathing difficulty, cardiac distress, and in extremely rare cases, death. The species is responsible for up to 10,000 human stings in Australia each summer.

3.6 MAN O' WAR STING TREATMENT

As with jellyfish, the stinging tentacles need to be carefully removed. Apply vinegar. If that is not available, rinse with seawater (not fresh). Later, hot water can relieve pain.

4 NUDIBRANCHS

'Nudibranch aren't venomous' I hear you shout! One exception is *Glaucus atlanticus* – the blue dragon sea slug. These eye-catching wonders feed on Portuguese man o'war, then store their stinging nematocysts in their own tissue, meaning contact with one can result in similar symptoms (nausea, pain, vomiting, blistering, erythema etc).

4.1 TREATMENT

Vinegar and hot water. In 2023, Julian Obayd, an Australian TikTokker, went viral after picking up lots of blue dragon sea slugs on the beach, then releasing them in the sea, where they got washed back onto his torso. He had to go to the hospital where staff described him as 'stupid'.

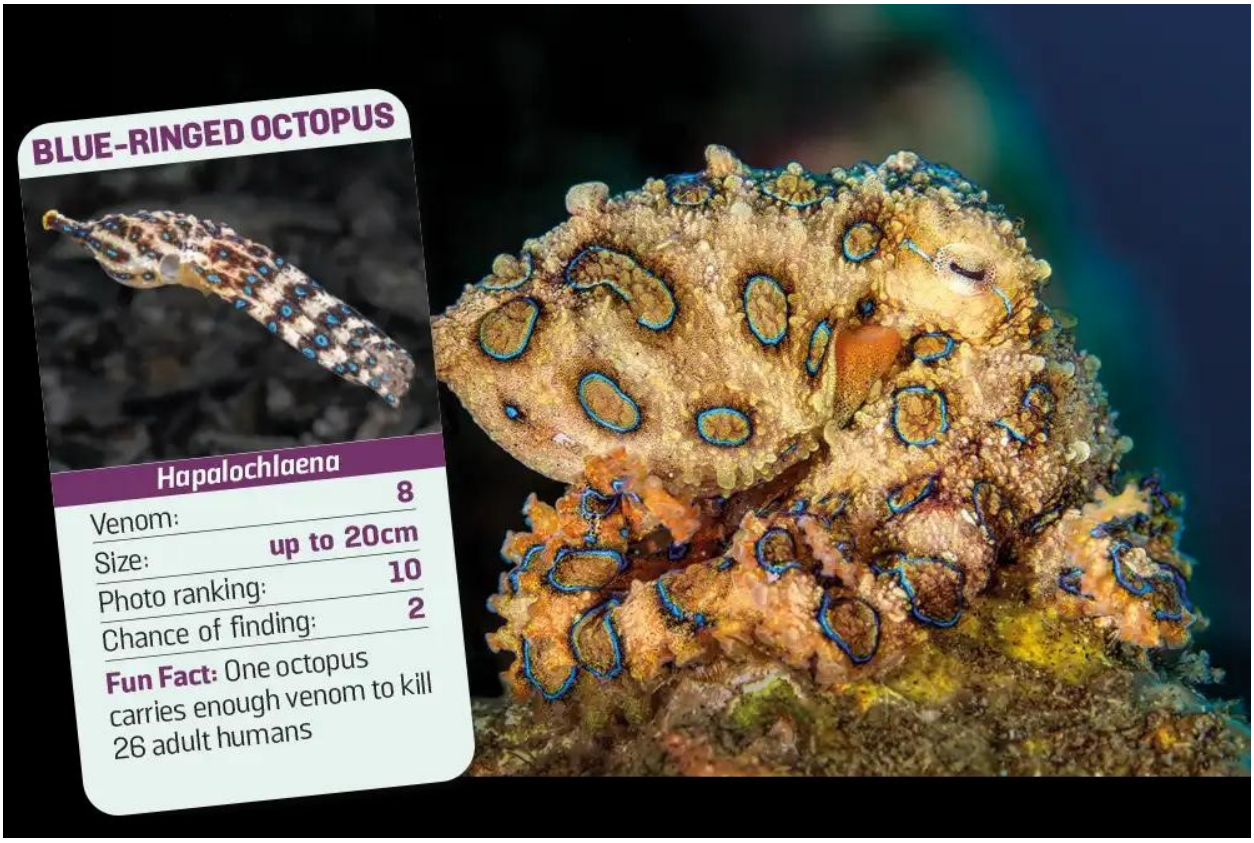
5 CEPHALOPODS

With the exception of the handful of nautilus species, all cephalopods are thought to be venomous. Cuttlefish, octopuses and squid all evolved from a common ancestor.

However, there's not much to worry about with cuttlefish and squid. There is an inverse relationship between the size of the beaks and the size of the venom glands.

In cuttlefish and squid, the beaks are huge, and the venom glands are tiny. Conversely, octopus beaks are proportionally much smaller, but venom glands are much larger.

5.1 BLUE-RINGED OCTOPUS



The bite of a blue-ringed octopus is painless – but deadly
(Photo: inset – Shutterstock; main photo by Jenny Stock)

The showman of the octopus world is the blue-ringed fella. It is found in the Pacific and Indian oceans, often in shallow tide pools, coral reefs, shells and marine debris.

When threatened, bright blue rings appear all over its body as a warning signal to potential predators (this cautionary display is called aposematism).

This octopus's venom is more toxic than that of any land animal, one thousand times more powerful than cyanide, and each octopus has enough venom to kill 26 humans.

The blue-ringed octopus seizes prey, such as a crab, pulls it towards its beak with its tentacles, then pierces through its victim's exoskeleton and releases its venom.

The toxin causes paralysis in the victim's muscles, which leads to death. Similarly, if you are stung, the venom will block your nerve signals, causing muscle paralysis, blindness, and loss of motor skills, which eventually leads to the muscles you need to breathe ceasing to work, causing your respiratory arrest and possible death.

5.2 TREATMENT FOR BLUE-RINGED OCTOPUS BITES

A blue-ringed octopus bite is usually painless, so you might not know you've been bitten until it's too late. If you think you've been bitten, tell someone immediately, as soon you may not be able to communicate. Get to a medical facility.

Pressure immobilisation may delay the systemic absorption of venom.

There is no known antidote, but patients can be saved if artificial respiration is administered. Fortunately, the blue-ringed octopus isn't aggressive; it's only likely to bite humans if cornered or handled.

In fact, there have been no known deaths from its bite since the 1960s. You should be fine if you keep your hands to yourself.

5.3 CONE SNAIL

Cone snails hunt using a flexible proboscis (Photos: Shutterstock)

There are over seven hundred species of the fearsome cone snail, and lab testing reveals them to be 'the most venomous creatures on earth'.

They hunt by extending a proboscis (a long, flexible tube) and firing a venomous harpoon-like tooth (radula) down this, to inject a rapid-acting toxin.

This toxin triggers all of the prey's nerves to fire at once, debilitating the fish and preventing it from swimming away. Cone snails rely on quick, dramatic results, as they can't swim to catch a fish. If a fish swims even a foot away and dies, it might as well have gone through a wormhole and be on the other side of the universe. So, the snail has evolved an extraordinarily fast-acting venom.

All cone snails are venomous – the sting of the smallest is no worse than a bee sting, but that of the larger tropical fish-eating species can be fatal.

The *Conus geographus* is colloquially known as the ‘cigarette snail’ because ‘once stung, the victim will have just enough time to smoke one cigarette before dying’.

More than 140 envenomations have been recorded, resulting in at least 36 human deaths. Their ‘harpoon’ can penetrate gloves and wetsuits.

Symptoms of a serious bite and stings can be immediate or be delayed by days, and include severe pain, numbness, tingling, vomiting, muscle paralysis, changes in vision, difficulty speaking and respiratory failure which can lead ultimately to death.

Cone snails use their venom to immobilise fish into hypoglycemic shock, which is caused by extremely low blood sugar. Scientific testing has discovered that one potentially useful human medicine can be developed from the venom, which is a fast-acting insulin.

Additionally, ziconotide (Prialt) has been developed from the cone snail, which is a more powerful pain inhibitor than morphine, but it isn’t addictive, and people don’t build a tolerance to it.

Bizarrely, patients have reported that an odd side effect of this drug is that they hear phantom music in their heads. Researchers continue to study this drug as it could be a powerful tool for solving the opioid crisis. Prialt is now priced at about $800 per millilitre, which makes cone snail venom farming a lucrative business.

5.4 CONE SNAIL TREATMENT

If stung, avoid movement so as not to increase lymphatic liquid movement or increase heart rate (which can spread the venom around internally).

Pressure to the affected area may help, and seek medical attention ASAP.

6 SEA SNAKE

Banded sea kraits are common and deadly venomous, but bites are rare (Photos: Shutterstock)

The majority of deaths have been from beaked sea snakes, as they are most commonly encountered by commercial fishermen.

The Dubois sea snake is reportedly the most venomous sea snake, and the second most venomous snake in the world. They live entirely in the ocean and have been found at up to 80 metres deep.

With their fangs being only 2mm long, and only 8 reported deaths since 1935, statistically your own envenomation is unlikely. Sea snake venom has been sold for $4,000 per gram in the medical research industry.

6.1 TREATMENT FOR SEA SNAKE BITES

Attempts to kill or capture any snake should be avoided, as the bite reflex persists for up to an hour even after the snake is decapitated, making it possible for dead snakes to inflict a serious bite.

There is an antivenom and it works equally well against all sea snakes, so identifying the snake may be interesting but not necessary. Pressure immobilisation of the bitten extremity may impede venom spread.

7 PLATYPUS

The duck-billed platypus is found in rivers and lakes in eastern Australia and Tasmania. The male has sharp barbs on the heels of its hind feet, used as a weapon during competition with other males, and also as a defensive weapon against predators.

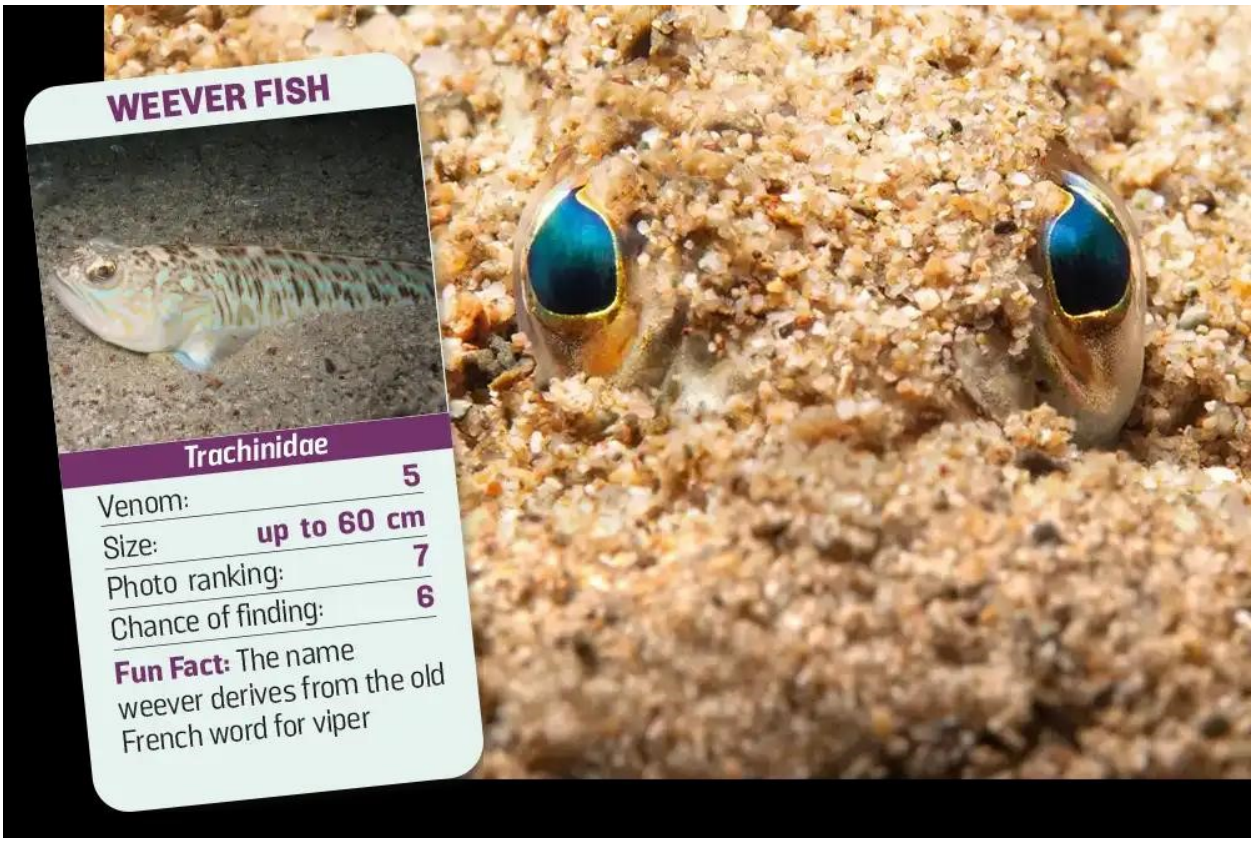
To envenomate, it wraps its hind legs around the target and drives its spurs into flesh. The venom does not appear to be lethal to other platypuses and there have been no human deaths recorded.

7.1 TREATMENT

Those who have been attacked report nausea, swelling, and excruciating 'whole-body' pain that lasts for weeks. Seek medical assistance immediately.

The pain cannot be alleviated by morphine. Instead, nerve blockers must be used, which suggests that platypus venoms may contain compounds that could be clinically useful.

8 WEEVER FISH



(Photos: Osman Temizel/Shutterstock; JGA/Shutterstock)

One of the few venomous animals found in the United Kingdom, this ambush predator buries itself in sand with only its eyes popping out. When its prey passes, it bursts out and snatches it up.

However, if an unfortunate beach-goer stands on the hiding fish, the weever's spines will inject its venom into their foot. Spines can pierce wetsuit boots.

8.1 TREATMENT

Their sting may be painful, but they are seldom dangerous. However, the venom may lead to the destruction of muscle tissue and nerve cells, and infection could lead to long-term damage comparable with stonefish injuries.

Soak any wound in hot water for as long as can be tolerated. Use tweezers to remove visible spines, as symptoms may not go away until all have been removed. If the patient has breathing difficulties, seek emergency help, especially for people who are susceptible to allergies.

9 DISCLAIMER

I am not a doctor! An allergic reaction can happen even with the most innocuous interactions (peanut allergies, for example). Seek professional medical treatment if you are having a severe

reaction to envenomation! Statistically, diving is one of the safest sports, and in my opinion, the joy it brings far outweighs the risks we take to see incredible animals.

Go and have fun in the water, but try to be safe. Good luck out there…!

With thanks to: • Guy Thomas, Director of Safety Programs, DAN Europe • Professor Bryan G Fry, Professor of Toxicology, University of Queensland, • Dr Ronald Jenner, venom specialist at the Natural History Museum, UK.

Jenny Stock is a documentary maker who shoots and directs wildlife films around the world. Her photography has featured in *National Geographic*, Ocean Geographic and on the BBC. This year she was crowned British Underwater Photographer of the Year – the first woman to receive the accolade.

Jenny has worked as an underwater stunt diver in Hollywood films and as a safety diver on UK television dramas. Originally from the north of England, Jenny spent ten years in Australia directing television shows. See more from Jenny on her website www.jennystockphotography.co.uk, Facebook @jennystockphotography and Instagram @jenniferjostock