

QUICK LINKS**Marine Hazards—TRAVELER INFORMATION**

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Traveler Information

MARINE HAZARDS**INTRODUCTION**

Coastal waters around the world can be dangerous. Swimming, diving, snorkeling, wading, fishing, and beachcombing can pose hazards for the unwary marine visitor. The seas contain animals and plants that can bite, wound, or deliver venom or toxin with fangs, barbs, spines, or stinging cells. Injuries from stony coral and sea urchins and stings from jellyfish, fire coral, and sea anemones are common. Drowning can be caused by tides, strong currents, or rip tides; shark attacks; envenomation (e.g., box jellyfish, cone snails, blue-ringed octopus); or overconsumption of alcohol. Eating some types of potentially toxic fish and seafood may increase risk for seafood poisoning.

RISK

Risk depends on the type and location of activity, as well as the time of year, winds, currents, water temperature, and the prevalence of dangerous marine animals nearby.

- In general, tropical seas (especially the western Pacific Ocean) are more dangerous than temperate seas for the risk of injury and envenomation, which are common among seaside vacationers, snorkelers, swimmers, and scuba divers.
- Jellyfish stings are most common in warm oceans during the warmer months.
- The reef and the sandy sea bottom conceal many creatures with poisonous spines.
- The highly dangerous blue-ringed octopus and cone shells are found in rocky pools along the shore.
- Sea anemones and sea urchins are widely dispersed.
- Sea snakes are highly venomous but rarely bite.
- Shark attacks are unpredictable.

HAZARDS OF THE BEACH

Cutaneous larva migrans is a slowly migrating, itchy rash caused by hookworm larvae that penetrate the skin. These larvae are natural to domestic and wild animals, especially cats and dogs. Humans become infected while walking barefoot or lying down on warm, moist soil where infected animals have deposited feces. Larvae can penetrate swimming suits and towels. The tide line of tropical and sub-tropical beaches where dogs run free at night is a common place to acquire the infection.

Gastrointestinal infections: Untreated sewage outlets are common on the beaches of tourist resorts in developing countries as well as some developed countries. Polluted water contaminates nearby beaches and infects local shellfish, such as crabs, oysters, and mussels. Undercooked shellfish is a common source of gastrointestinal infection.

Envenomation: Wading in shallow water carries risks of encounters with jellyfish, sea urchins, and sting rays. Box jellyfish invade shallow coastal tropical waters seasonally. Playing in rock pools in the Indo-Pacific seas carries the risk of an encounter with the highly venomous blue-ringed octopus.

Drowning: More than 1 in 10 deaths due to injury among U.S. citizens abroad are due to drowning, especially among travelers to island nations. Strong ocean currents, tides, rip tides, scuba diving, surfboard accidents, and diving headfirst into shallow pools are common causes. Drinking alcohol increases risk.

Prevention

- Choose a beach and picnic site away from river mouths, sewage outlets, and signs of dogs.

Watch for tentacles of jellyfish, especially on shores where box jellyfish may be common; do not handle jellyfish or enter the water if jellyfish are present. (See "Jellyfish," below.)

- Check for notices about regulations and local dangers.
- Wear suitable footwear while wading.
- Shuffle rather than high-step on a sandy bottom if stingrays may be present.
- Observe standard precautions for swimming. (See the article, *Swimming* and the water safety section of the article, *Safety and Security*.)
- Do not handle a very small octopus, as it could be venomous.

First Aid

- Spines of coral, starfish, and sea urchins:
 - Leave the water at once; extract as many spines as possible; apply topical disinfectant.
 - If a secondary infection develops, treatment with an antibiotic may be necessary.
 - Encysted spines may require surgical removal later.
- Jellyfish stings:
 - Douse box jellyfish stings with vinegar, if available; scrape off adherent tentacles.
 - It may be necessary to visit a hospital.
- Blue-ringed octopus bite:
 - Persons bitten by this octopus need to be transported to a hospital.

ANIMALS THAT BITE OR WOUND

Sharks

About 100 shark attacks on humans are reported each year worldwide, leading to about 15 deaths—half in swimmers and half among surfers and divers. The risk of a shark attack is much less than that of drowning or being killed by a falling coconut.

Two-thirds of attacks are by great white sharks, tiger sharks, and bull sharks. Hit-and-run attacks occur near the shoreline or on a reef flat. Territorial defense and feeding attacks occur further out to sea and are more serious.

- Great white sharks migrate long distances but surface in cool seas around the coasts of New Zealand and non-tropical Australia, the west coast of the Americas, the east coast of Asia as far south as Korea, southern African coasts, the Mediterranean, and the east coast of North America as far south as Florida.
- The tiger shark inhabits estuarine, coastal, and coral reef waters throughout the tropics.
- The bull shark inhabits fresh and marine waters of rivers, lakes, estuaries, and coasts throughout the tropics, migrating to temperate waters in the summer.
- Carpet sharks are bottom-dwellers, resting on sand or gravel or under rocky ledges around tropical coasts and are a hazard to divers and fishermen. They are small, flattened, camouflaged, and bad tempered. When disturbed, they may bite and not let go.

Crocodiles

Crocodiles eat all kinds of animals, including humans. They run and swim fast and can strike with their tails. Three species of saltwater crocodiles inhabit coastal swamps, estuaries, and saltwater and freshwater lakes, and may travel out to sea.

- The American crocodile is found on the coasts of Central America, some Caribbean Islands, and Florida.
- The Nile crocodile may be found in freshwater rivers and lakes, and along all the coasts of tropical Africa.
- The estuarine crocodile or Australian "salty" inhabits the northern coasts of Australia, Papua New Guinea, the islands of the Malaysian archipelago, the Philippines, Southeast Asia as far as Bangladesh, and the eastern coast of India.

Seals and Sea Lions

Seals and sea lions are usually docile, but males may attack if provoked during the mating season.

Stingrays

Stingrays can both stab and envenomate. See "Stingrays and other venomous fish," below.

Fish

Barracuda may bite accidentally, attracted by speared fish, glinting jewelry, or a watch face. Their teeth are long and sharp and can sever an artery or tendon or mangle fingers. The great barracuda inhabits all tropical seas except the eastern Pacific. The less dangerous blackfin barracuda inhabits the tropical Pacific.

Trigger fish attack intruders seasonally while defending their nests on the sea floor beside coral reefs. Their heavy jaws and 4 cm-long (1.5 in) teeth can remove chunks of flesh. They inhabit all tropical seas, but the largest and most aggressive species are found in the Indian and western Pacific Oceans.

Moray eels are common throughout tropical and warm temperate seas, including the Mediterranean, from intertidal rocky shores to depths of 300 m (1,000 ft). They are bottom-dwellers, hiding by day in holes and rock crevices. Some species grow more than 2 m (6 ft) long. Divers and lobster fishermen can be bitten on the hand as they reach into a hole. The black-cheeked moray of Comoros, Seychelles, southeastern Africa, and the Coral Sea is spontaneously aggressive. Wide, strong jaws and dagger-like teeth inflict severe wounds.

Needlefish swim in shoals on the surface of all temperate and tropical seas, and may grow more than 1 m (3 ft) long; they have spear-like jaws capable of penetrating the chest. At night they may rush towards a bright light and can impale any swimmer in their path.

Giant and *goliath groupers* range the tropical oceans, growing up to 2-3 m (4-10 ft) long, weighing more than 300 kg (660 lbs). Divers are in danger of being stunned by a head-on collision, especially around wrecks, or may be held in the mouth of the grouper until drowned.

All tropical and warm temperate seas contain species of fish with spines that can inflict puncture wounds, for example, the facial spines of *squirrel fish*, the fine spines and scalpel blades on the tail of *surgeon fish*, the prickles that cover *puffers* or *blow fish*, and the longer spines of *porcupine fish*. The danger is through handling, usually by cooks or fishermen. The ferocious puffer of the Great Barrier Reef is aggressive and will attack and bite humans.

Prevention

- Take note of any posted or radio warnings concerning risks of sharks or crocodiles. Shark behavior is difficult to predict.
- Do not swim, boat, or fish in any estuarine or river waters of northern Australia or the Indo-Pacific coasts without obtaining local advice on the risk of saltwater crocodiles.
- Stay away from seals, sea lions, and fish that are very large or nesting on the reef.
- Do not touch or tread on spiny fish.
- Look before searching rocky crevices and holes with bare hands.
- Do not try to feed large fish; they may eat fingers.
- Remove jewelry and watches if swimming where there are barracuda.

First Aid

- *Bites from sharks and crocodiles*: If a person is bitten, help him or her get out of the water; resuscitate if necessary, and transport to a hospital.
- *Bites from fish and eels*: Stop the bleeding and clean the wound with topical antiseptic. An antibiotic may be needed.

ANIMALS THAT ENVENOMATE

Sponges

Sponges are found on the sea bottom from shallow intertidal beaches to the deep ocean. Some species have prickly spicules

containing toxic chemicals that cause severe dermatitis. Notable are the fire sponges and touch-me-not sponges of the Caribbean, Atlantic coast of the U.S., The Bahamas, and Canada as far north as Nova Scotia. They attach to rubble and rock and are found in sea grass and oyster beds.

Avoidance: Look carefully on rocky or coral sea bottoms if swimming, wading, or diving. Do not touch sponges unless wearing rubber gloves.

Hydroids, Fire Coral, Men-of-War, and Jellyfish

Hydroids, fire coral, men-of-war, and jellyfish have nematocysts (stinging cells). On contact, the nematocyst fires a barbed, hollow dart (through which venom is injected) into its prey or into human skin. In many species, the dart is too short or the venom too weak to cause significant symptoms in humans; however, envenomation by some species may be fatal.

Hydroids look like ferns, feathers, fans, algae, or tufted, branching weeds attached to any hard structure, especially wrecks in turbid, plankton-rich coastal waters, but also on reefs and in caves. Dangerous species occur throughout tropical and warm temperate seas, including the Mediterranean. Swimmers, snorkelers, and divers who are unaware of the risk can brush against a hydroid and get stung around the wrists and ankles. Envenomation causes a burning sensation, pain, redness, swelling, and blisters.

Fire corals have a hard skeleton and look like drab mustard-yellow or pale-brown stony coral. Their harmless-looking appearance and abundance just under the surface of shallow waters result in many painful injuries to swimmers, snorkelers, and divers getting in and out of boats around shallow reef margins. Envenomation causes transient burning pain followed by redness, swelling, and blisters that may last for weeks. Venomous species are found on all tropical reef systems except Hawaii.

Avoidance: If swimming, snorkeling, or fishing in tropical and warm temperate seas, do not brush against fernlike growths or branching coral attached to rocks, especially close to the shore. Be careful if handling seaweed or fishing nets.

Men-of-war and their tiny cousins the *swimming bells* are not single animals like a jellyfish, but a conglomerate of polyps and medusae, each with individual functions, linked by a common digestive tube. They float but cannot swim.

- The Portuguese man-of-war occurs primarily in the Atlantic but not in the Mediterranean. A visible 30 cm (12 in) gas-filled, bluish-purple float drifts in the current and wind, trailing invisible tentacles up to 20 m (66 ft) long that are covered in nematocysts. Their presence locally may be seasonal. Winds may collect huge colonies that drift onto the shore.
- The blue bottle and other, less dangerous, smaller species are found throughout the Indo-Pacific region.

Swimmers are especially at risk in choppy, windy conditions, when tentacles can get wrapped around an arm or leg. Waders, beachcombers, and divers who may see the float but not the tentacles are also at risk. Envenomation causes instant severe pain, local wheals, blisters, and necrosis of skin. General symptoms include nausea, vomiting, cardiac and respiratory difficulties, and loss of consciousness leading to drowning. Deaths have occurred on the Atlantic coast of the U.S. (including Florida) and some Caribbean islands.

Avoidance:

- Look on the shoreline for beached colonies of jellyfish or their tentacles.
- Avoid swimming, wading, or walking barefoot if jellyfish are present.
- Do not handle the tentacles.
- Learn to recognize the iridescent purple-blue float of the Portuguese man-of-war, with its sail-like crest and long purple-blue tentacles. It is the only jellyfish that floats on the surface. If one is visible, do not swim.
- A wet suit or stinger suit will provide some measure of protection.

Jellyfish are found in all seas at varying depths. There are more than 250 species, in varying sizes and colors, with varying formations of their tentacles—all of which are covered with nematocysts. They propel themselves by rhythmic contractions of their bells, but in strong winds may be blown together and dumped on shore. Their appearance locally is often seasonal or associated with a full moon. Swimmers, waders, and beachcombers are at greatest risk.

- The *true* or *bell jellyfish* have tentacles arranged regularly around the bell. Many are mild, but some species cause severe and painful stings and sometimes systemic symptoms similar to those caused by the man-of-war, though very rarely fatal. Dangerous in this group are the Chinese sand jellyfish, the large lion's mane jellyfish of polar waters, the compass jellyfish of the North Atlantic and Mediterranean, and *Sanderia malayensis*, which extends from eastern Africa to Japan.
- *Box jellyfish* or *sea wasps* are box-shaped with tentacles arising from their 4 corners. Included in this group are the Australian

Caruki barnesi or *Irukandji*, about 1.3 cm (0.5 in) across, with a single, fine, almost invisible tentacle up to 2 m (6-7 ft) long and *Chironex fleckeri* (about 25.5 cm [10 in] across with tentacles extending 3 m [10 ft]), the most dangerous of all marine creatures.

- *Chironex fleckeri* is strictly tropical, extending from the northern coast of Australia as far north as Korea and west to India. It breeds in estuaries; at the beginning of the rainy season (October-May in Australia), swarms of juveniles emerge to mature in shallow coastal waters and migrate close to the coast. Children are especially at risk, as are adults who are wading, launching boats, or fishing. The Australian *Chironex* season ends in May, but a few remain and the risk never entirely disappears.
 - *Chironex fleckeri* envenomation causes instantaneous burning and excruciating pain, vivid redness, and wheals. Unconsciousness may follow in minutes, and death from cardiovascular or respiratory collapse. Without prompt first aid, deaths are common, especially in the Philippines.
- The related *Chrisopsalmus* box jellyfish inhabits the tropical coastal waters of the Americas and West Africa.
- Irukandji breed on the reef and are more widely dispersed and less seasonal than *Chironex*.
 - *Irukandji* stings are barely noticed at first, but over the next hour pain spreads over the whole body becoming excruciating, accompanied by severe backache, headache, nausea, vomiting, cough, and tightness of the chest, all of which last for up to a week; rarely, death occurs from cardiac arrest.
- Less dangerous box jellyfish occur throughout all temperate seas.

Avoidance:

- Be aware of the type and seasonality of jellyfish that inhabit the area.
- Heed warning notices, especially during the *Chironex* season in Australia.
- Look out for jellyfish at sea and their tentacles along the shoreline. Some jellyfish may be too small to be seen.
- Do not wade or swim if potentially dangerous jellyfish are present.
- A wet suit or stinger suit will provide some measure of protection.
- When fishing, be careful when handling the contents of fishing nets.

Sea Bather's Eruption

At certain times of year, blooms of microscopic organisms appear in the sea. They are concentrated by onshore winds and tend to get trapped in swimming suits. Initially they prickle or sting and later may cause dermatitis.

Coral and Sea Anemones

Coral reefs harbor myriads of animals, plants, and microorganisms, some of which may be harmful. True corals rarely sting, but the colonizing fire coral may cause dermatitis. Stony coral is razor sharp.

- Coral cuts are common and may contain spicules of coral and soft tissues including nematocysts; cuts are slow to heal and often lead to secondary bacterial infection.
- Soft corals contain minute spicules within their skeleton, which, with prolonged contact, can penetrate skin and cause an itchy rash.

Sea anemones are polyps that are permanently attached to rock or rubble on the sea bed. There are more than 1,000 species in a great variety of shapes, sizes, and colors; however, all have tentacles that surround the mouth and wave above them or are laid out around them. Sea anemones are widely distributed, and all swimmers are at risk of contact.

- Contact with anemone tentacles may cause light burning, redness, or transient wheals.
- Some species in the Caribbean, east Atlantic, and Mediterranean cause more painful, severe stings.
- Dangerous species are mostly found in a range of habitats in the Indo-Pacific region, including the Red Sea. They cause severe local reactions and sometimes generalized symptoms; rarely, they can cause death.

Fire worms and *scale worms* inhabit reefs and coastal flats. They are covered in toxic bristles that break off in the skin, causing pain and blistering.

Avoidance:

- Swimmers and snorkelers on the reef should avoid touching corals with bare hands or feet.
- Beware when searching with bare hands, especially at night.
- Watch for colonizing fire corals and sea anemones in crevices and on rocks, often partially hidden in sand.

Cone Snails

Cone snails are highly decorated and collectable, but some are among the most deadly creatures in the sea and have caused many human deaths. Cone snails are tropical, and the dangerous species (notably the geography, textile, striated, and marbled cones) inhabit the tropical Indo-Pacific. They occupy a variety of habitats on and around the reef and hunt at night, stalking prey across the sandy bottom, shooting it with a barbed dart through which paralyzing venom is injected.

- Humans are at risk when they pick up a shell.
- Envenomation causes pain like a bee sting (although the onset may be delayed for hours or days) followed by numbness that spreads over the limb and body and leads to muscular and respiratory paralysis.

Avoidance: Cone shells are distinctive and attractive, but do not pick them up if found on the reef, the sandy sea bottom, or in a tidal pool.

Blue-Ringed Octopus

The blue-ringed octopus is less than 5 cm (2 in) in size. It is perfectly camouflaged by its coloration in its natural surroundings on shallow rocky pools or coral reefs. Only when alarmed does the blue-ringed octopus light up its defensive electric blue rings.

- These octopi range the Indo-Pacific from Sri Lanka to southern Japan, Vanuatu, and the entire coast of Australia; divers on reefs and beachcombers of rocky pools are at risk when they pick up a blue-ringed octopus.
- All octopi have venomous saliva to paralyze their prey. However, the venom of the blue-ringed octopus contains tetrodotoxin, the lethal toxin of puffer fish.
- The bite hardly leaves a mark and may go unnoticed. Minutes later, tingling starts in the face followed by numbness. Victims cannot speak or swallow, are soon paralyzed, and may die of asphyxia.

Avoidance: Do not pick up any small octopus in tropical Indo-Pacific seas. The classical blue ring may not be lit up.

Starfish and Sea Urchins

Starfish have short, sharp spines covered in venomous slime. Most are harmless, except the crown-of-thorns starfish (measuring about 0.3 m [1 ft] across), which lives at the bottom of reefs throughout the Indo-Pacific area.

- Snorkelers are at risk walking on the reef, especially at night, or jumping onto the reef from a boat.
- Starfish wounds cause intense pain, bluing of the skin, and sometimes nausea and vomiting. Spicules retained in the skin cause persistent painful cysts.

Sea urchins resemble balls with a hard shell covered in long, fine, sharp spines. They are found in all marine habitats of tropical and warm temperate seas. Risk is greatest at night.

- Anyone entering the sea where sea urchins occur is at risk, especially barefoot swimmers and waders. Even wet suits may not prevent penetration of the spines.
- Most sea urchin-induced injuries cause only local problems from broken and retained spines, but the spines of some tropical species are venomous, causing pain, swelling, redness, and numbness (which last a few hours) and discoloration from pigment in the venom.
- Venom of the flower urchin and fire urchin of the tropical Indo-Pacific may additionally cause psychotic reactions and paralysis.

Avoidance: Wear appropriate footwear when wading the rocky shoreline, reef, or the entrance to underwater caves, especially around Indo-Pacific reefs.

Stingrays and Other Venomous Fish

Stingrays are found in all tropical and temperate seas. In the U.S., there are about 1,500 stings from rays each year. Most species live on the sea bed or in shallow estuaries and are often obscured by sand. Eagle rays swim long distances, high in the water. The ray's flat body carries a whip-like tail that is armed with a barbed spine capable of injecting venom and used in self-defense. Rays do not intentionally attack swimmers, but they flail about if they are caught or feel trapped, and their barb can penetrate anyone nearby; they

may also jump into a boat.

- The main risk is to waders who step accidentally on a ray, fishermen handling a caught ray, and overcurious divers.
- The spine, which may be up to 0.3 m (1 ft) long in large rays, makes a deep stab wound that turns blue and swollen and may later necrose. Severe pain lasts for hours. General symptoms of nausea, vomiting, diarrhea, sweating, and shock may follow envenomation. Penetration of the chest wall by the spine may be fatal.

Venomous fish: Spines on the fins, tail, and gill covers of many fish contain venom that causes severe pain, local inflammation, occasional systemic symptoms, painful muscle spasms, and—rarely—death.

In tropical Indo-Pacific seas, extending as far north as Japan:

- *Catfish* inhabit muddy coastal and estuarine waters; eel catfish inhabit sandy areas and sea grass and are a hazard for persons fishing.
- *Scorpion fish* are most common in the Indo-Pacific, but the western Atlantic species cause about 300 envenomations around the U.S. each year. They are well-disguised bottom-dwellers on coral or rocky reefs, whose venomous dorsal spines are hidden among tassels.
- *Lionfish* are elegant, with wide pectoral fins and decorated dorsal fins; they hover above the bottom, sometimes in small groups. They will attack to defend territory and are a risk to snorkelers.
- Closely related to lionfish, the *wasp fish* inhabits soft bottoms in shallow waters and is a risk to fishermen who get them in their nets.
- *Stonefish* are masters of disguise, immobile among rock or reef or buried in sand. Divers and waders may tread on them, resulting in excruciating pain and severe local inflammation.
- *Devilfish* bury themselves in sand and rubble on reef flats, where divers and swimmers might tread on their dorsal spines.

In the Atlantic:

- Some species of *lionfish* migrated through the Suez Canal and are established in the Mediterranean and have reached the East Coast of the southern U.S.
- *Toadfish* inhabit sediment of the rivers of the Amazon basin, the Atlantic coast of South America, and the Pacific coast of Costa Rica, and are a hazard to waders and fishermen.

Avoidance: Individuals who are in tropical and warm temperate seas should:

- wear appropriate footwear when wading or swimming and stepping on or among underwater rocks; shuffle rather than stride or stamp the sandy bottom
- avoid lionfish and stingrays
- beware the contents of fishing nets

Sea Snakes

Distinguished from eels by a flat tail and absence of gills, sea snakes range from 0.5 to 3 m (1.5-10 ft) long and have short, fixed, front fangs. Sea snakes are venomous, but most bites do not inoculate venom and are harmless. Few species have fangs long enough to penetrate a wet suit. Almost all the dangerous species are in Indo-Australian waters, but 1, the yellow-bellied sea snake, ranges through tropical and temperate seas from east Africa to Central America.

Sea snakes hunt for prey in reef crevices or on the sea floor and may also be seen surfacing to breathe. Most sea snakes ignore swimmers and divers but may approach out of curiosity. They are not aggressive unless provoked. Danger comes from handling them, and fishermen are at risk when sorting their catch. Depending on the species, venom is either myotoxic (dissolving muscles and leading to tender, stiff muscles, red urine, shock, and collapse) or neurotoxic (leading to muscular weakness and respiratory paralysis). Severe envenomation may be fatal.

Avoidance: Ignore sea snakes; avoid touching or annoying them. Beware the contents of fishing nets.

Prevention

Envenomation may follow contact with jellyfish tentacles in open sea water, from handling a venomous creature, commonly on a coral reef or in fishing nets, from treading on a spiny creature on the reef or the sandy bottom, or from the bite of a sea snake or venomous fish.

- Read warning notices.
- Stay out of the water if box jellyfish are present or during the northern Australian *Chironex* season from October through May.
- Watch for jellyfish tentacles on the shoreline and in the water while swimming.
- Learn to recognize the iridescent gas-filled, purple-blue float of the man-of-war.
- Don't duck-dive in the presence of jellyfish.
- Wear stinger suits, often made from Lycra, to greatly reduce the risk of jellyfish stings.
- Beware the contents of fishing nets.
- Look out for spiny creatures and do not touch them. Some lie well-disguised in sand or rock, so take care and wear appropriate footwear when swimming or diving.
- Watch out for sea urchins around the entrance to underwater caves.
- Look carefully for moray eels, scorpion fish, etc., before reaching into holes or crevices.
- Do not handle a cone shell, a tiny octopus, or a sea snake—even if it appears to be dead—most likely it is not.

First Aid

Spines of coral, starfish, and sea urchins: Leave the water at once. Extract as many spines as possible, and apply a topical disinfectant. Antibiotic treatment may be necessary if a secondary infection develops. Encysted spines may require surgical removal later.

Jellyfish stings: Get out of the water. Douse the skin as quickly as possible with vinegar for at least 30 seconds for box jellyfish or a thick suspension of baking powder or dry sand for *Physalia* and other common Atlantic jellyfish. This will prevent further release of venom from nematocysts but will not relieve pain. Do not apply alcohol, sun cream, water, or other remedies. Remove any remaining tentacles with tweezers or fingers; apply ice packs and/or give opiate analgesics to relieve pain. In the case of *Chironex*, Irukandji, and *Physalia* stings, CPR may be necessary. Transport the victim to the nearest hospital or clinic. Antivenom for *Chironex* is available.

Stonefish and other severe fish spine envenomations: Immerse the stung limb in water that is uncomfortably hot but not above 45°C (113°F). This will inactivate the venom. Antivenom for stonefish, which is also effective against the venom of North American scorpion fish, is available. If a secondary infection develops, treatment with an antibiotic may be needed.

Cone snail envenomation: The victim should be transported to a hospital and may need CPR.

Sea snake and blue-ringed octopus bites: The victim should lie down and not walk. Immobilize the bitten limb and apply a firm, comfortable, compression bandage. The patient should be taken to the hospital on a stretcher. Maintain the airway if paralysis develops. Antivenom for sea snakes is available.

Sea bather's eruption and other mild reactions to stings: Apply a simple antipruritic lotion or hydrocortisone 1% ointment.

ANIMALS THAT ARE POISONOUS TO EAT

See also the article, *Seafood Poisoning*.

Very few marine animals that would normally be eaten by humans are poisonous in their own right. However, many have a diet of plankton or bacteria which may contain toxins that accumulate in that animal's flesh and may be highly poisonous to any human that consumes it. Cooking does not destroy the toxins.

Classic examples of poisoning from eating fish that have become "passively poisonous" in this way are scombroid poisoning from eating certain species of fish that have been improperly stored, ciguatera poisoning from eating large carnivorous reef fish, and tetrodotoxic poisoning from eating puffers freshly caught on the reef or as the Japanese restaurant delicacy *fugu*.

Poisoning may also follow consumption of other "passively poisonous" marine animals. Several forms of shellfish poisoning may follow the consumption of bivalve mollusks, notably mussels and clams that have fed on toxic algae. In addition, some species of marine snails, many species of crabs, and improperly prepared sea cucumbers can be poisonous.

Preventive Strategies: Prevention of ciguatera, scombroid, and tetrodotoxic poisoning is largely a matter of being careful of the type of fish, method of storage, and method of preparation in certain epidemiological settings. Shellfish poisoning is difficult to predict in countries that do not monitor algal concentrations at commercial shellfish beds.

First Aid: see *Seafood Poisoning*.

GENERAL PREVENTION STRATEGIES

Know the risks of the destination, especially at Indo-Pacific locations.

- Do an online search for the intended location using key words such as marine hazards, swimming, and diving.
- Consult local tourist offices, scuba diving operators, lifesaving clubs, and experienced locals for information on safe beaches and dangerous creatures.
- Take precautions to avoid seafood poisoning; see the section on seafood poisoning, above, and the article, *Seafood Poisoning*.

Beachcombers, waders, and swimmers

- Take note of the season, wind, tides, and currents.
- Choose patrolled beaches and avoid deserted beaches, and do not swim in the sea at night.
- Look for signs warning bathers against entering the water because of weather or water conditions, jellyfish, crocodiles, or sharks.
- See also the article, *Swimming* and the section on water safety in the article, *Safety and Security*.

Scuba divers

- Inexperienced scuba divers should take lessons from a PADI (Professional Association of Diving Instructors) or NAUI (National Association of Underwater Instructors) school.
- All divers should note tides and currents.
- Maintain proper buoyancy.
- Look carefully before reaching into holes or crevices.
- Leave rays and large fish alone.
- Do not handle snakes.
- Look carefully for jellyfish, venomous reef creatures, and sea urchins.
- See the sections above for detailed precautions. See also the article, *Diving*.

Travax content represents decision-relevant, expert synthesis of real-time data reconciled with new and existing available advice from authoritative national and international bodies. Recommendations may differ from those of individual countries' public health authorities.

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