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Bites and Stings

Marine Stings

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Dr Adams is an enthusiastic windsurfer and Scuba diver and hence has personally suffered injuries from all the creatures described below, except *Scorpaena* (although he did once put his hand on one in error).

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Issues this article will address

- Stingray injuries
- Venomous fish in New Zealand
- Jellyfish stings
- 'Sea lice'

Salient Points

- Stingrays are very common in New Zealand and may cause penetrating injury or lacerations from the stings at their tail.
- There is one common venomous fish in NZ, *Scorpaena cardinalis.*
- The first aid measure for both is immersion in hot water (45°C).
- *Physalia* is the cause of most significant jellyfish envenomations in New Zealand. Vinegar appears to be the most often recommended first aid measure, although a recent trial suggests hot water is efficacious.
- 'Sea lice' is the colloquial name for stings from microscopic coelentrates. Symptomatic treatment consists of antihistamines and corticosteroid creams.

Key words: Stingray · *Dasyatis* · Scorpionfish · *Scorpaena* · Bluebottle · Portuguese Man-O-War · *Physalia* · Jellyfish · *Cyanea* · *Pelagia* · Sea lice

Introduction

The sea temperature around New Zealand in summer ranges from 25°C in the north to single figures in the south. This temperature range tends to result in a relative paucity of venomous marine creatures, although tropical stragglers may be encountered, especially between Cape Reinga and East Cape. This likelihood may increase with global warming.

Rays

Rays are flat-shaped relatives of sharks and are found in all New Zealand waters. They feed on shellfish and are more common in areas where these are abundant such as mudflats, but may also be seen on any sort of sea floor. The vast majority of injuries result from the short-tailed stingray *Dasyatis brevicaudata* (Fig. 1), but occasionally result from the long-tailed stingray *Dasyatis thetidis*. Many other varieties of rays, including Eagle rays and Skates, have smaller stings.

Fig. 1. Short-tailed stingray *Dasyatis brevicaudata* (courtesy of Kelly Tarlton's Underwater World, Auckland).

The stinq(s) of the stingray (Fig. 2) are found on the tail. They may be multiple and up to 30 cm in length. In response to being disturbed, the sting is driven with the point usually traveling forward and upward. It may penetrate the skin and break off or brush the skin in a saw-like movement, which creates a straight ragged wound. The sting is capable of penetrating most footwear, including Kevlar booties.[1]

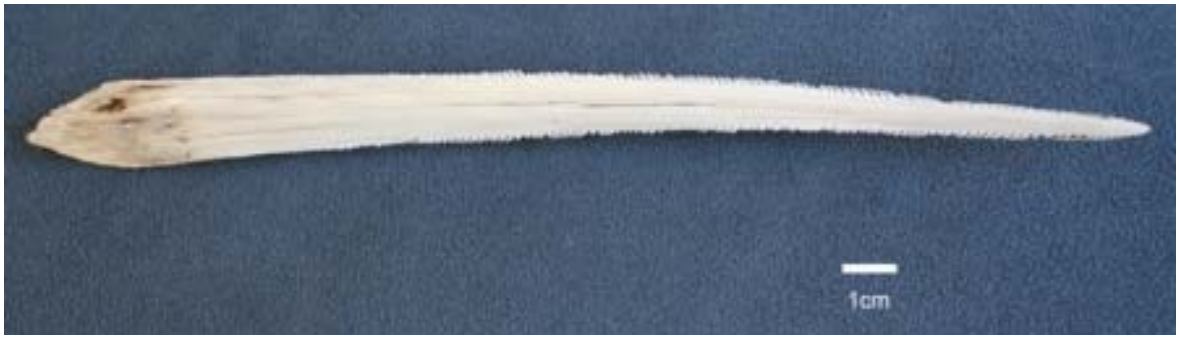

Fig. 2. Short-tailed stingray barb (courtesy of Andrew Christie, Kelly Tarlton's Aquarium).

The sting is usually projected in response to being stood on or to a very close footfall on the bottom where they feed, but swimmers passing above stingrays or those handling them when caught on a line or in a net may also be stung. There are documented examples of stingrays jumping out of the water when disturbed and imparting the sting above the waterline. Chest injuries and abdominal wounds are particularly hazardous as they may penetrate the pleura and pericardium, including the heart,[2] and the peritoneum and viscera.

The offending ray may not be seen but the diagnosis should be considered when a penetrating or cut-like wound with pain out of proportion to the apparent injury occurs in shallow water.

The sting is made of cartilage, as is the skeleton of the stingray. It has a barbed/serrated surface (Fig. 3) which is covered in a tissue-necrotic toxin in a mucous sheath. The sting can cause massive local trauma, while the toxin results in local necrosis and a great deal of pain.

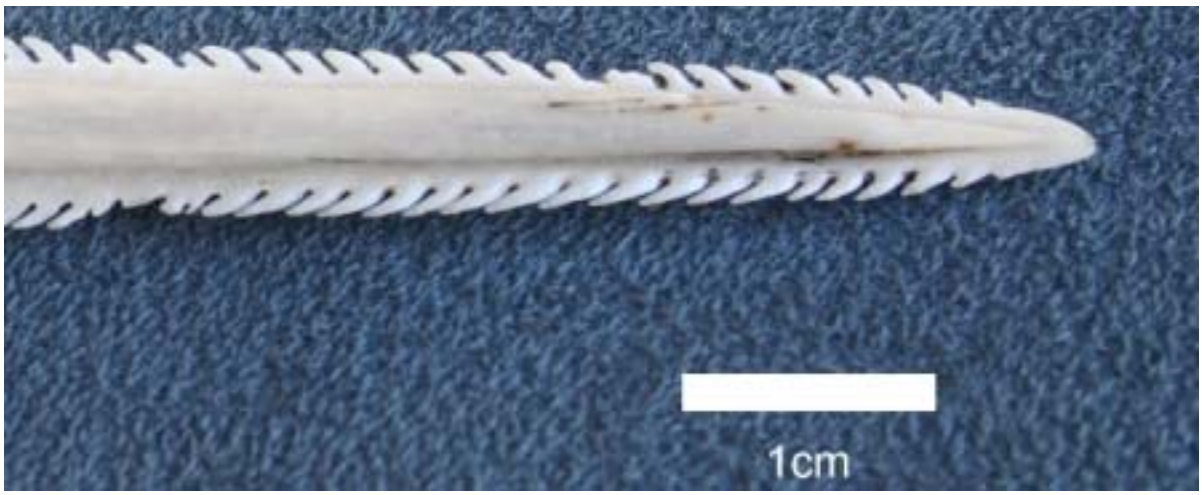

Fig. 3. Detail of barb serrations (dried specimen) [courtesy of Andrew Christie, Kelly Tarlton's Aquarium].

The active components of the toxin include phosphodiesterases, 5’ nucleotidases, serotonin and probably other proteins.[3] The toxin may give rise to both local (pain, necrosis) and systemic (weakness, nausea, vertigo, headache, hypotension, fasciculation, dysrhythmias) effects,[3,4] and is both heat-inactivated and heat-denatured.

Initial treatment of a wound should include stabilisation of any respiratory or cardiovascular compromise and local measures to reduce major blood loss (pressure, tourniquet). Visible loose spine fragments should be removed from wounds immediately and the wound irrigated with saline. Placing the affected part in water as hot as can be tolerated (40-45°C) for up to 45 minutes should be attempted. Pain relief may be rapid but is likely to be temporary if not heat treated for >30 minutes. A hot bath and a warm outboard motor have also been advocated, but in cases of barb retention, this should not delay transport for surgical care. An intravenous line is useful for analgesia and for treatment of shock.

Except for minor injuries, opioid analgesia is quite likely to be needed but infiltration in and around the wound with lignocaine or bupivicaine (without a vasoconstrictor) is likely to give the best level of analgesia. The barb is radio-opaque and formal removal of the barb fragments and surrounding necrotic tissue is advocated.[3]

Scorpaena cardinalis (Scorpionfish, Grandfather Hapuku)

Scorpaena cardinalis (Fig. 4) is the most common representative of the scorpionfish family (which also includes Lionfish and Stonefish) in New Zealand. They are fairly widely distributed and, like other members of the family, have venomous dorsal spines which can administer a very painful sting.

Fig. 4. *Scorpaena cardinalis* (courtesy of Seafriends).

Fig. 5. *Physalia utriculus* (twice life size).

Like most fish venoms, the sting contains a heat-labile toxin. It causes intense pain, and has some haemorrhagic and cardiorespiratory depressive effects.[4] As with stingrays, it should be treated with heat, but the spines do not usually break into the wound. From the available literature, this local scorpionfish variety does not appear to be as much of a hazard as its worldwide relatives, although Lionfish do make occasional incursions into New Zealand waters, particularly around the Poor Knights Islands.

Jellyfish

The most venomous jellyfish found regularly in New Zealand waters is the Bluebottle (*Physalia utriculus*; Fig. 5), a South Pacific species of the *Physalia* group, which includes the Portuguese Man-O-War of the Atlantic Ocean. Technically, *Physalia utriculus* is not a jellyfish but rather a community of hydroid-like organisms with separate populations devoted to stinging, feeding and reproduction. Its sail can be as large as 15 cm in diameter and the tentacles may be as long as 10 m in length,[5] although most seen around New Zealand are significantly smaller. It is wind borne and frequently washes up on New Zealand beaches in onshore winds.

The stinging cells (nematocysts) are attached to the tentacles and, when triggered by contact or chemical influences (including osmotic changes), propel a protein thread tube through the skin.[6] This contains a glycoprotein poison known as physalitoxin, which has neurotoxic and myo-toxic properties.[7]

The appearance of the skin following stinging is usually that of chains of circular erythematous lesions which are initially stinging in character. These usually settle over 24 hours but life-threatening systemic reactions to *Physlia utriculus* have been reported, although not as frequently as those to the Portuguese Man-O-War *Physalia physalia.*

Research into treatment of *Physalia* stings has given rise to varying recommendations. It is agreed that the tentacles should be removed as atraumatically as possible, by picking or washing them off with water. In the past, vinegar has been advocated but this does not seem to consistently improve stings from *P. utriculus.* There is more certainty that alcohol in the form of methylated spirits causes discharge of nematocysts, probably as a result of its osmotic effect. Traditionally, ice has also been advocated to reduce pain but more recent studies have noted that heat improves pain scores better than cold.[8] Local anaesthetic ointments and antihistamines are also useful post-acutely.

Another small blue jellyfish commonly washed up in large numbers is *Velella velella,* the By-the-Wind-Swimmer (Fig. 6). This should not be confused with *Physalia* as it has a negligible sting.

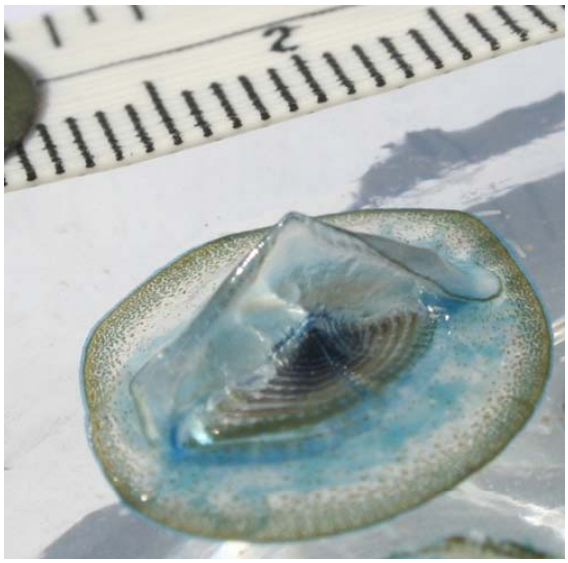

Fig. 6. *Velella velella* (By-the-Wind-Swimmer).

Cyanea capillata (Lions Mane Jellyfish)

This plate-shaped jellyfish (Fig. 7) may be either brown or yellow in colour and have trailing tentacles, which may appear as a mass of mush below the plate (hence the Australian

colloquial name ‘snotties’). They may grow to as much as 1.5 m in diameter but are usually smaller. It has a less severe sting than the Bluebottle sting. Cold packs are advised as treatment with vinegar has been shown to increase the stinging of the tentacles.[9]

Fig. 7. *Cyanea capillata* (courtesy of Seafriends).

Pelagia notiluca **(Mauve Stinger)**

Another true jellyfish, *Pelagia notiluca* is a free-swimming organism about 10 cm diameter[10] that is often found in swarms. It produces ‘wheal-like’ painful marks[7] and, like *Cyanea*, the nematocysts discharge when treated with vinegar. The venom appears to be quite antigenic and may result in sustained or recurrent pruritus.[11] The best treatment appears to be ice acutely, and antihistamines and/or corticosteroids if urticaria becomes a problem.

Fig. 8. *Pelagia notiluca* (courtesy of Seafriends).

‘Sea Lice’

This affliction, which is also known as bather’s itch, is not due to lice at all but to microscopic marine organisms that get caught in bathing suits and give rise to an itchy, stinging urticarial reaction inside the suits.

The responsible organisms may be a heterogenous group including hydroids, larval jellyfish, detached jellyfish stings, and anemone larvae. Larval cnidarians were identified as the cause of at least one outbreak in Florida,[12] and have also been implicated in New Zealand.[13]

The best prevention of this condition is to avoid bathing suits that tend to scoop water and then filter it out through a lycra fabric. As some organisms probably increase stinging with osmotic stress, it is best to remove bathing suits prior to rinsing them in fresh water. In individuals with an established bather’s rash, corticosteroid creams and oral antihistamines are the recommended treatments.[13]

Acknowledgements

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