QM

Cone Shells

Fact Sheet

Introduction

Cone shells (*Conus* spp.) are among the most abundant and beautifully coloured coiled shells (gastropods) inhabiting marine waters. Although some species occur in temperate and subtropical waters, the vast majority live in the tropical regions of the Indo-Pacific. Of the more than 300 species world wide, approximately 80 species occur in Australian waters.

As a group they are popular with collectors, especially the rarer species, such as the Glory of the Sea Cone (*Conus gloriamaris*).This popularity exists even though several of the larger species are dangerous and a small number of human fatalities have been attributed to them. Anyone who wants to collect cones should be aware of the dangers and be **very** careful. In Australia a number of federal, state and local authorities have responsibility for the regulations governing shell collection. In some Queensland Marine Park Zones, collecting any marine animals and fishing are prohibited. In others, some collecting with restrictions on numbers is allowed. It is best to contact the local Queensland Parks and Wildlife Service office to discuss collecting in Marine Parks.

Biology

Cones are active at night. During the day they rest under stones or coral, or bury themselves in the sea-bed.

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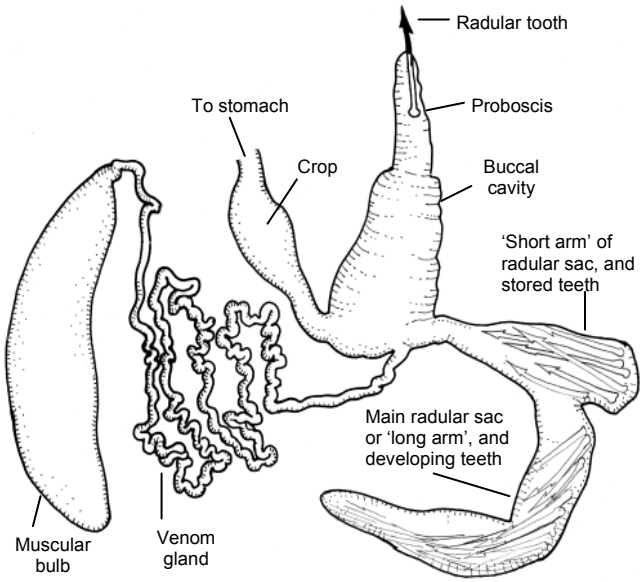
Conus ammiralis

Conus eggs are usually attached under stones or corals. They resemble translucent, flask-shaped capsules and groups of several individuals often lay communally. Some species lay the eggs as clusters, some as trailing ribbons and some as solitary capsules. The hatchlings emerge either as swimming larvae or miniature crawling adults.

Feeding

Most gastropods feed using a rasping, tongue-like organ known as a radula. In cone shells the radula is highly modified to produce a series of venom filled teeth. Only one tooth is used at a time and each acts like a hypodermic syringe injecting venom into prey. The radular teeth are hollow, barbed, spear-like structures and are formed and stored in the radula sac prior to being moved to the pharynx for use. The venom apparatus consists of a muscular bulb connected to the pharynx by a duct. Venom is forced into the pharynx where it coats the radular tooth and fills its hollow cavity. The envenomed tooth is moved to the tip of the proboscis (a tubular process of the head used in feeding) ready for use.



Venom apparatus of *Conus*.

Cones, depending on the species, feed on worms (vermivores), molluscs (molluscivores) or fish (piscivores).
Vermivores are the most common and feed chiefly on polychaete worms. They possess relatively short, serrated radular teeth, often released after injecting and stinging the prey. Vermivores are usually small (as little as 1 cm) and are relatively harmless to humans.
Molluscivores are usually larger in size and have slender, heavily serrated radular teeth which are thrust into the prey and released. The molluscan victims are quickly paralysed and are eaten in their shells. It is presumed either the venom or digestive juices regurgitated from the proboscis assist in breaking down the body tissues of the prey.

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Conus striatus.

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Conus geographus.

The largest cones are piscivorous. Piscivores have elongated teeth (up to 20 mm) with no serrations on the shaft and a prominent terminal barb. The feeding behaviour of one fish-eating species (*Conus striatus*) has been closely observed in aquaria . Chemoreceptors appear to detect the presence of potential prey and initiate 'tracking' behaviour with the proboscis. A radular tooth is forced into the prey on contact and the venom injected. A sphincter muscle at the tip of the proboscis holds the tooth firmly in place. When the fish ceases to struggle it is swallowed through the proboscis, which may dilate up to 2 cm in diameter. Powerful digestive enzymes assist in breaking down the prey. If the first strike is unsuccessful, a second tooth is quickly manoeuvred into place ready for another attack.

Venom

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Conus textile

Several piscivorous and molluscivorous cones are known to be highly dangerous to humans. Of these, the Geography Cone, *Conus geographus*, is one of the most dangerous and responsible for a number of deaths. The species is very active and has a long, extensile proboscis able to reach any part of the shell. The radular teeth are often more than 10 mm long and can pierce thin cloth.

Another species, the Textile Cone *Conus textile*, has also been implicated in fatalities in the past, but it appears that its 'deadly' reputation has arisen as a result of mis-identification and the true culprit was *Conus geographus*. The Geography Cone is piscivorous and, in general, 'fish-eaters' require more potent venoms to paralyse their prey. Other 'fish-eaters' with strong venom include the Striated Cone, *Conus striatus,* and the Tulip Cone, *Conus tulipa*. While no medical problems may be recorded from a sting of a particular species of cone, it does not mean that the species is harmless.

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C. textile with extended proboscis.

All cone shell species should be regarded as dangerous, because of the possibility that certain people may be highly sensitive to the toxins of a particular species.

The venom of piscivores and large molluscivores is neurotoxic and acts in a similar way to that of elapid snakes. Following a sting, there is immediate local pain quickly followed by numbness or tingling in the surrounding area. In as little as five minutes, more generalised symptoms become evident. Nerve action in all the extremities is gradually impaired causing numbness, swelling, redness, dizziness, vomiting and sometimes severe pain. Respiratory difficulties, paralysis, extreme dizziness, inability to focus the eyes is followed by difficulty in swallowing and talking.

The obvious way to avoid the danger is by not handling live animals. When alive, the shell has a horny protective covering known as a periostracum, which obscures colour patterns. **This can make it difficult to distinguish between dangerous and harmless species.** A commonly believed fallacy is that grasping a cone at the 'large end' is safe, but, **there is no safe way to hold cones** because the proboscis of the larger species is capable of reaching any part of the shell. Those interested in observing cones should be extremely cautious and only handle live animals using thick, non-porous gloves. Many cones are more active when removed from their natural environment and are dangerous even out of water. The risk involved in collecting cones in remote areas where medical treatment is not immediately available should also be considered.

Further Reading

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http://www.health.qld.gov.au/poisonsinformationcentre/bites_stings

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