

Aquatic Antagonists: Lionfish (*Pterois volitans*)

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Lionfish (*Pterois volitans* and related species) also are known as turkeyfish, zebrafish, dragonfish, and scorpionfish.¹ They are most common in subtropical and tropical regions of the Pacific and Indian oceans, as well as the Red Sea, but have become widely distributed and are now found in all oceans. Studies of mitochondrial DNA sequences of lionfish of the Pacific and Indian oceans suggest that some related species, such as *P volitans* and *Pterois miles*, actually could be geographically separated populations of a single species.¹

Most incidences of lionfish envenomation occur in the tropics, especially the Indo-Pacific region and Mediterranean Sea,² but stings increasingly are being reported off the east coast of the United States because lionfish have been introduced off the coasts of Florida, Georgia, the Carolinas, and New York.³ Since August 2000, lionfish have been found all along the southeastern coast of the United States from Florida to Cape Hatteras in North Carolina, where they tend to reside in water depths from 85 to 260 ft. Isolated foci have been noted off the coast of New York.⁴

Lionfish belong to the family of scorpionfish (Scorpaenidae), a large family characterized by the ability to envenomate with specialized spines. The 3 major genera of Scorpaenidae are *Pterois* (eg, lionfish)(Figure), possessing long slender spines with small venom glands and a relatively mild sting; *Scorpaena* (eg, “true” scorpionfish, bullrout, and sculpin), possessing shorter and thicker spines with larger venom glands and a more dangerous sting; and *Synanceia* (eg, stonefish), possessing thick spines with highly developed venom glands and a potentially deadly sting. Because all 3 genera belong to the family Scorpaenidae, they are all sometimes



Pterois volitans, also known as lionfish (A and B).

referred to as scorpionfish, though this term perhaps is best reserved for the genus *Scorpaena*.

Lionfish can be identified by their distinctive maroon and white stripes, fleshy tentacles above the eyes and mouth, fanlike pectoral fins, and long poisonous dorsal spines. The venomous spines include the dozen dorsal spines, 2 pelvic spines, and 3 anal spines.

Because of their dramatic appearance, lionfish increasingly are found in home aquariums throughout the United States, and cases of envenomation are becoming more frequent in landlocked areas.⁵ Lionfish envenomation among aquarium owners

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commonly occurs on the upper extremities during tank cleaning or attempts to handle the fish. Pain is the predominant symptom.⁵

The venomous spines of *P volitans* contain a labile nonproteinaceous ichthyotoxin.⁶ Lionfish spines also contain acetylcholine.⁷ Lionfish venom, like that of the soldierfish (*Gymnapistes marmoratus*) and the stonefish (*Synanceia trachynis*), induces pronounced neuromuscular activity. The venom of all 3 genera produces a 2- to 3-fold increase in intracellular calcium. Calcium channel blockers such as nifedipine potentiate the increase in intracellular calcium caused by lionfish and soldierfish venom and attenuate the response to stonefish venom.⁸ The venom produces coronary artery relaxation potentiated by atropine and attenuated by stonefish antivenin.⁹ In rats, the venom produces a decrease in cardiac contractile force followed by an increase. Atropine abolishes the decrease and potentiates the increase. Propranolol does not affect the decrease but attenuates the increase. The accompanying increase in heart rate is attenuated by propranolol in a similar animal model.⁹ These findings suggest that *P volitans* venom produces its cardiovascular toxic effects primarily by acting on muscarinic cholinergic receptors and adrenoceptors. In an experimental model, lesional blister fluid caused aggregation of isolated platelets, which was inhibited by heat treatment.¹⁰

In a report of 23 cases of lionfish envenomation in amateur aquarium owners, symptoms included pain, swelling, redness, bleeding, nausea, numbness, joint pain, anxiety, headache, disorientation, and dizziness.¹¹ One patient developed cellulitis.

No deaths were noted and treatment with immersion of the affected area in hot water at 40°C for 60 to 90 minutes, as well as use of analgesics, tetanus toxoid, and antibiotics, proved effective in all cases.¹¹

Over a 2-year period, 33 cases of envenomation by captive lionfish in aquariums were reported to a regional poison control center in Chicago, Illinois.¹² Ten of these patients (30%) required treatment in an emergency department and 2 (6%) required hospitalization. Most of the symptoms responded to prompt immersion in nonscalding hot water within 90 minutes.¹²

Kizer et al¹³ reported 51 cases of Scorpaenidae envenomation. Immersion in hot water produced either complete (80%) or moderate (14%) symptomatic relief in 48 patients (94%).¹³ Although the pain often can be improved by immersing the affected body part in very warm water (45°C), not all patients respond to warm water immersion.⁵ Narcotic pain relief may be required. Although prescriptions for narcotics usually are appropriate in these cases,

claims of lionfish envenomation also have been reported in patients with drug-seeking behavior.¹⁴

If complicated puncture wounds are present, especially those involving joints or neurovascular structures, consult an appropriate surgical specialist. Wounds should be observed for signs of infection with staphylococci, marine *Vibrio*, or *Aeromonas* species.

To report a lionfish sighting in US waters, contact Paula Whitfield at 252-728-8714 (e-mail: paula.whitfield@noaa.gov).

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