Aquatic Antagonists: Portuguese Man-of-war (*Physalia physalis*)

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Physalia physalis, the Portuguese man-of-war, can be found in the Atlantic, Pacific, and Indian oceans, as well as the Caribbean Sea and Gulf of Mexico. It also is commonly found along the Florida and Gulf coasts and in the Sargasso Sea. In Florida and Texas, it may be found on the beach in great numbers after a storm or strong winds (Figures 1–3). Most Portuguese man-of-wars have floats approximately 3-in long, but they can achieve lengths of 12 in, with tentacles up to 165-ft long. Their locomotion mostly is passive, with the float acting as a sail. Along with other jellyfish, they are a preferred food source for some sea turtles.

The Portuguese man-of-war actually is a colony of polyps rather than a single organism. The pneumatophore, or float, represents one type of polyp; the dactylozooids, or tentacles, are a second type. The remaining types of polyps are the gastrozooids, or feeding polyps, and the gonozooids, which are involved in reproduction. The Portuguese man-of-war feeds mainly on small fish and plankton. Tentacles bear stinging nematocysts (coiled rope and harpoonlike structures) that are used for both catching fish and self-defense. Clownfish and yellow jack can live within the tentacles. Reproduction is both sexual and asexual. Gametes of 2 mature hydroids produce the initial larval form, which then expands by asexual budding.

The Portuguese man-of-war belongs to the phylum Cnidaria (hollow-bodied radially symmetric animals with nematocysts). The phylum includes the man-of-war (class Hydrozoa, or "water animals"), true jellyfish (class Scyphozoa, or "bowl animals"), and sea anemones and corals (class Anthozoa, or "flower animals").

Figure 1. Portuguese man-of-war on a beach in Miami Beach, Florida, after a storm. Nematocysts remain capable of stinging.

Stings from Portuguese man-of-wars produce intense pain and linear erythematous plaques as well as systemic symptoms.[1] Fatal human envenomation has been reported, with respiratory arrest and cardiovascular collapse.[2,3] It should be noted, however, that man-of-war stings are common in southern waters, and severe toxic reactions are rare. Simple ice application can produce pain relief,[4] but because most marine venoms are inactivated by heat, hot water immersion (40–41°C) also can be helpful. Mechanical removal of tentacles can be aided by seawater and sand, but freshwater can trigger nematocyst release and should be avoided. Although vinegar has been used to inhibit discharge of nematocysts from Portuguese man-of-war tentacles, it should not be used for an Australian species of *Physalia* (the single-tentacle *Physalia utriculus* bluebottle jellyfish). Vinegar has been shown to cause discharge of up to 30% of the

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Figure 2. Float details of a small Portuguese man-of-war.

Figure 3. Portuguese man-of-war on a beach in Miami Beach, Florida.

nematocysts from this species, and some authors discourage the use of vinegar for any *Physalia* species.[5] Various jellyfish sting inhibitors have been marketed, but there have been questions about their efficacy.[6]

P physalis nematocysts occur in 2 sizes (10.6 and 23.5 nm). The smaller nematocysts are more common and contain venom that is lethal to chick embryonic cardiocytes at doses of 0.6 μg. In contrast, 20 μg of protein from the larger nematocysts was innocuous in the same model.[7] Low doses of *P physalis* venom cause a linear increase in intracellular calcium accumulation and porelike structures in the cell membrane, leading to osmotic swelling and lysis.[8,9] In a rat model, *Physalia* envenomation caused gross morphologic changes in internal organs, including the liver, spleen, gallbladder, heart, and lungs.[10] The venom exhibits neurotoxicity in experimental models.[11] In sufficient quantity, Portuguese man-of-war stings also are cardiotoxic in humans.[12] A high molecular weight toxin from *P physalis* blocks glutamate-evoked neuron potentials in a dose-dependent manner.[13] Leukotriene inhibition can reduce vasopermeability from *Physalia* venom if administered 5 minutes prior to challenge.[14] Portuguese man-of-war venom causes vascular dilatation in vitro, probably by stimulation of endogenous prostaglandin synthesis.[15] The value of systemic therapy remains largely untested.

Delayed reactions are immune in nature. Portuguese man-of-war venom cross-reacts with other jellyfish venom, and the immune response can be modulated by sun exposure. Mouse lymph node and spleen cells immunized with *Chrysaora quinquecirrha* (sea nettle) venom demonstrate a proliferative response to Portuguese man-of-war venom. UV irradiation to the skin either before or after venom sensitization was capable of suppressing the proliferative response.[16] Erythema nodosum and arthralgia have been reported following jellyfish envenomation and have been associated with marked elevation of immunoglobulins G and M against *P physalis*.[17]

For local residents and tourists who travel to southern waters, Portuguese man-of-war stings may be an unpleasant reality. Most stings are innocuous and the discomfort most easily is managed with a simple application of ice. Delayed immune reactions are complex in nature and some reactions respond to corticosteroid therapy.

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