Vinegar As a Disarming Agent to Prevent Further Discharge of the Nematocysts of the Stinging Hydromedusa *Olindias sambaquiensis*

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Olindias sambaquiensis, *known as agua viva, is an endemic hydromedusa that is distributed from latitude 23° to 42° south in the southwestern Atlantic Ocean and is known to cause severe stings. This is the first report of the use of vinegar in disarming* O sambaquiensis *nematocysts and includes preliminary observations on its use in managing the stings of hydromedusae.*

Olindias sambaquiensis (Figure 1) is an endemic hydromedusa distributed from latitude 23° to 42° south in the southwestern Atlantic Ocean.[1,2] This species is known to cause severe stings, adversely affecting the tourist activities on Monte Hermoso beaches in Argentina[3,4] every summer.

The particular thin shape and adherent properties of the species' tentacles (Figure 2) cause difficulties when they are removed from the patient's skin because of the occurrence of further discharge of nematocysts and further envenomation. Skin damage and subsequent dermatitis have been described in other species of the genus[5]; however, severe skin damage from stings of O *sambaquiensis* has been described by Kokelj et al,[6] and clinical skin signs can persist for up to a week.[4] The presence of adherent tentacles invariably implies undischarged nematocysts that may continue to fire and increase the envenomation. Thus, a practical method for treating patients who have been stung will be of great use for Argentine medical authorities.

Figure 1. *Olindias sambaquiensis* (agua viva).

Prevention of further discharge requires rapid nematocyst inhibition, usually by chemical means.[7] In other studies, vinegar (4%–6% acetic acid) proved to be effective in preventing further discharge of

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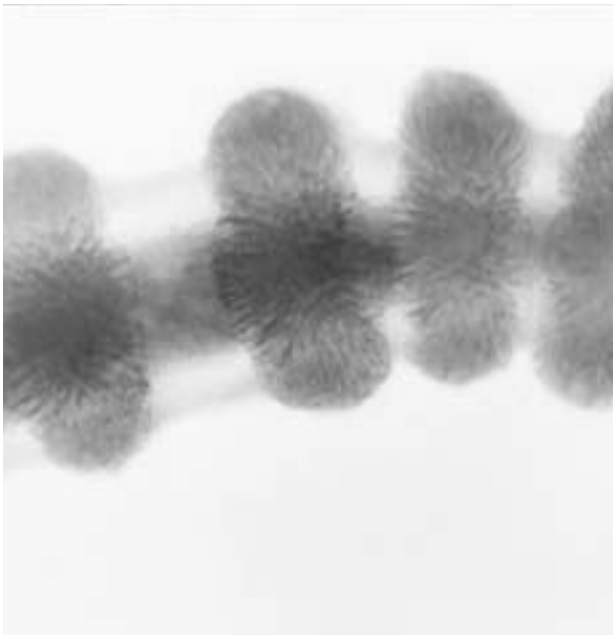

Figure 2. Fresh tentacle of *Olindias sambaquiensis*.

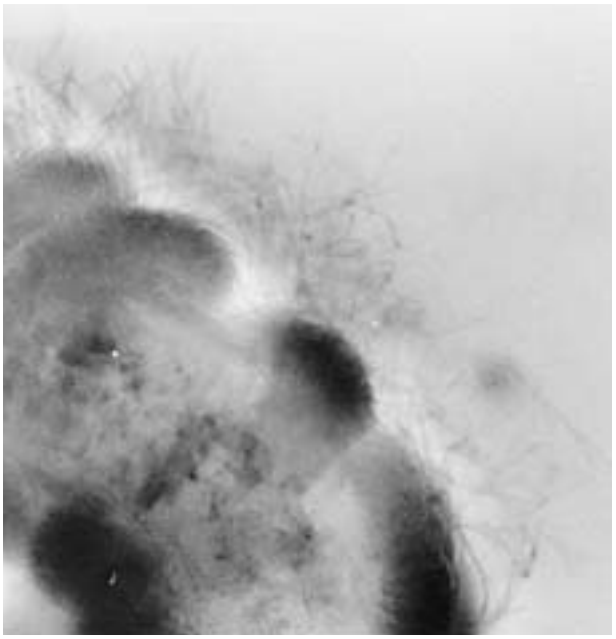

Figure 3. Discharged nematocysts from a piece of *Olindias sambaquiensis* tentacle submerged in 99% acetic acid.

nematocysts from all known species of box jellyfish,[5] including *Chironex fleckeri*,[8] *Carybdea rastoni*,[9] *Carukia barnesi*,[10] and *Tamoya haplonema*.[11] The method is inexpensive, and vinegar is readily available.

With some other dangerous species of Siphonophora, Scyphozoa (Semaeostomeae), and Hydroids,[5] vinegar actually causes nematocyst discharge and is therefore contraindicated in *Cyanea capillata*[12] and possibly *Physalia physalis*,[7,13] for which the opinions are contradictory.[7,14] Its use in treating stings of *Chrysaora* and *Pelagia*[5,15] is also uncertain.

Prior to our research, no experiments had been conducted to show the effect of vinegar on the nematocysts of the hydromedusa *O sambaquiensis*. Using the facilities of the Natural History Museum in Monte Hermoso and INIDEP in Mar del Plata, we prepared an experiment to test the benefit of the use of vinegar as first aid in treating patients who have been stung by this species.

Methods

We removed fresh tentacles from 12 live specimens of *O sambaquiensis* kept in an aquarium at the Natural History Museum and from one housed at INIDEP, in February 1995 and April 1997, respectively. Employing the methods mentioned in Williamson et al,[5] we used different concentrations of acetic acid to test the response of fresh tentacles and isolated nematocysts. The solutions consisted of 10% to pure (99%) acetic acid, commercial vinegar (4%–6% acetic acid), and ethanol (96%).

Half of the tentacles were submerged in vinegar and half in seawater. Small pieces of both treated and untreated tentacles then were applied to 10 human volunteers. We performed this experiment twice.

To obtain free nematocysts, tentacles also were soaked in distilled water at 4°C for 3 hours to induce their release by osmotic shock. Following filtration (mesh-size 100 µm), the suspension was centrifuged 6 times at 700 g for 10 minutes and the final pellet was soaked in distilled water (1:1 ratio) following the procedures described above.[16,17]

Comment

Soaking the tentacles and isolated nematocysts in pure acetic acid caused most of the nematocysts to discharge (Figure 3). The same result was observed with ethanol. Solutions of less than 10% acetic acid that were diluted with distilled water proved to be effective in deactivating the firing capabilities of the nematocyst. Common vinegar (4%–6% acetic acid in water) was also effective.

Human response to the envenomation of *O sambaquiensis* with the untreated tentacles varied from a mild sting to an extremely painful, almost shocklike sensation. Skin manifestations varied greatly. Blisters appeared less than 5 minutes after exposure to tentacles (Figure 4).

In the tests with the vinegar-treated tentacles, none of the volunteers showed pain or skin symptoms (Figure 4), even when tested on sensitive areas such

Figure 4. Human skin after exposure to *Olindias sambaquiensis* tentacles. Shown with vinegar soaked (+) and normal (-) tentacles.

as the eyelids. Visual analysis of the tentacles under a light microscope showed that none of them had discharged nematocysts.

Vinegar proved to be useful in preventing the discharge of nematocysts of *O sambaquiensis* in less than 60 seconds. This is an effective and inexpensive treatment, especially because this species has very fine and highly adherent tentacles that are difficult to remove from human skin. After the application of vinegar, which can be applied as a spray, it is possible to keep any adherent tentacle off the skin, with no risk of additional firing.

Vinegar is the most widely acceptable first aid solution to prevent the discharge of unfired nematocysts of Cubozoa species tentacles still present on the patient's skin. However, the effectiveness of vinegar treatment on the stings of dangerous species of other gelatinous groups is uncertain. It may be asked why the compound is so effective in managing the stings of certain species but ineffective with others, and why it is effective for the first aid of stings of hydromedusae such as *O sambaquiensis*.

The most common nematocyst of the tentacles of *O sambaquiensis* is the *microbasic p-mastigophore*, which makes up 70% of the total.[6,17,18] The same type of nematocyst is also the most common in *Chironex fleckeri*[19]and other Cubozoa involved in human envenomation, for which the use of vinegar has been proven.[5] We infer that vinegar may inactivate the discharge of one or a few particular types of nematocyst—in this case, the *microbasic p-mastigophore*.

Although vinegar has been suggested to have some analgesic properties,[20] in our experiments, it proved to be totally ineffective in pain relief for *O sambaquiensis* stings. The use of cold packs, recommended for the skin pain of the stings of others species,[5] would probably be effective.

Acknowledgments—The authors wish to thank Mr. V. DiMartino of the Museo de Historia Natural, Monte Hermoso, Argentina, and also the volunteers for their aid with this report. This in INIDEP contribution No. 1112.

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