

## WHAT ARE MEDUSOZOANS, AND WHY DO THEY STING?

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Medusozoans are marine animals without backbones that live near the coasts, or in the depths of the oceans. Some of them are large, but others are even tinier than a seed. Medusozoans have been living on Earth for more than 600 million years. Their bodies are 95% water. Some medusozoans live attached to a surface, but others can swim freely. All medusozoans have tentacles, armed with stinging cells called nematocysts. When the nematocysts are triggered, the tiny stingers inside them can travel at speeds up to 67 km per hour. Around 3% of medusozoans are harmful to humans. Therefore, when visiting beaches where these harmful medusozoans live, it is necessary to take some precautions. Wearing protective clothing and not touching a medusozoan stranded on the beach will help you stay safe and healthy, so you can enjoy your beach day!

## INVERTEBRATES

Animals that do not have backbones.

## POLYP

Tubelike animal with tentacles armed with nematocysts that surround its mouth opening.

## EXOSKELETON

External protective structure used by some medusozoans.

## MEDUSOZOANS AT FIRST GLANCE

Medusozoans are **invertebrate** animals (those without backbones) that live in the sea. Jellyfish and the Portuguese man-of-war may be the medusozoans you are most familiar with, but we will tell you about other kinds, too! Some medusozoans live near the coasts and others live in the depths of the oceans. They are close relatives of corals, sea anemones, and sea pens. Medusozoans do not have heads, brains, hearts, or bones. They often feel soft and gooey. Some medusozoans are quite large, up to 47 m, while others are as small as a tiny seed: <0.5 mm [1]! All medusozoans have tentacles, which may be long or short. The name “medusozoan” comes from one of the most famous characters in Greek mythology: Medusa. This mythical being is known to have snakes instead of hair. The image of snakes waving from her head reminds people of the tentacles of medusozoans.

Here are ten interesting facts about medusozoans:

- They have been living on Earth for more than 600 million years; they were here long before dinosaurs or humans.
- About 95% of their bodies are made out of water.
- Medusozoans do not have heads, but some jellyfish have eyes.
- Of the almost 4,156 known species of medusozoans, only around 3% cause injury to humans [2].
- The stingers released by their stinging cells travel at a speed of 67 km per hour.
- On June 5, 1991, NASA delivered twenty thousand baby medusozoans to space, for 9 days [3].
- The sea wasp, an Australian box jellyfish, is one of the world’s most venomous animals.
- Medusozoan’ stings do not electrocute people, as you may have seen on TV or in movies.
- There is a tiny medusozoan called a hydra, named after the mythical multi-headed snake that Heracles defeated.
- In China, people have fished for jellyfish for more than 1,700 years, for food and medicine.

## TYPES OF MEDUSOZOANS

There are three different types of medusozoans: polyps, medusae, and siphonophores (Figure 1). Let us explore each one!

**Polyps** are stuck to a surface. You can find them living on rocks, algae, piers, and boats. Typically, they live together and depend on one another to survive. Some polyps can create a structure like a knight’s armor on the outsides of their bodies. This is called an **exoskeleton** and it helps protect them from predators. For example, fire corals, a type

### Figure 1

Types of medusozoans. Hydroid jellyfish and fire coral are polyps and live attached to a surface. Generally, siphonophores and jellyfish (medusae) float below the surface of the ocean water at different depths. Despite being a siphonophore, the Portuguese man-of-war floats on the surface of the ocean water propelled by winds and ocean currents only! (Artwork: María A. Mendoza-Becerril. Photograph credits: siphonophore and jellyfish, Vicencio de la Cruz Francisco; hydroid jellyfish, Isai Domínguez Guerrero; fire coral, Axel Guillermo Castañón Gheno/CC BY-NC 4.0<sup>1</sup>).

<sup>1</sup> See <https://www.inaturalist.org/photos/2529156>

### MEDUSA

The name used by scientists when referring to jellyfish.

### MESOGLEA

Clear gelatinous substance found in jellyfish and siphonophores.

### SIPHONOPHORE

The name used by scientists when referring to string jellyfish.

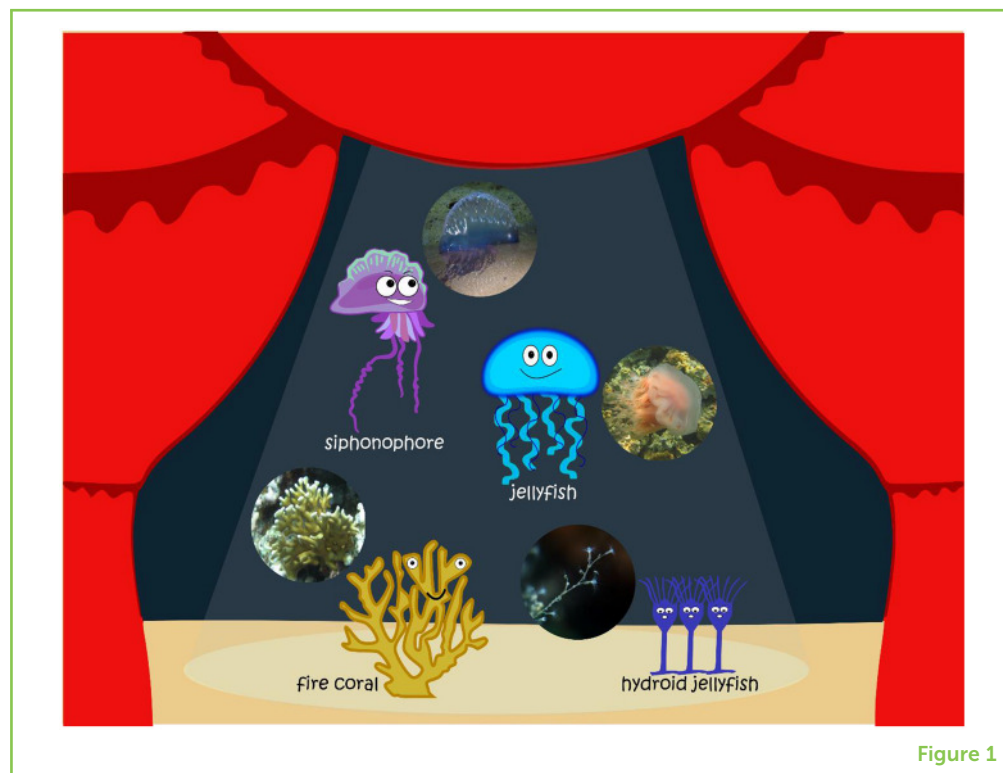


Figure 1

of polyp, build enormous, beautiful, branching exoskeletons. Many people are tempted to break off pieces for souvenirs when diving or snorkeling, but this is a bad idea. Some people are sensitive to the fire coral's sting, which gives them pain similar to getting burned. Another type of polyp, called a hydroid jellyfish, is small and resembles a fork. Its head and body resemble a fork's handle, while its tentacles resemble the prongs.

**Medusae** are known as jellyfish, and they look like umbrellas—that is what scientists call their bodies. Their bodies are made of a gelatinous substance called **mesoglea**. Jellyfish swim either just using the movement of the ocean water or by flexing their umbrellas and squeezing water out behind them.

**Siphonophores** are some of the most fascinating living things in the entire animal kingdom. They are a complex mix of polyps and jellyfish, and they come in a wide variety of shapes and sizes. Each siphonophore is actually a colony containing many polyps and jellyfish. Due to this physical feature, siphonophores are called string jellyfish, or chain jellyfish. The best-known siphonophore is the Portuguese man-of-war. Its body has a purple-blue balloon-like appearance with many tentacles. Sometimes one or more of a Portuguese man-of-war's tentacles break off from the colony. Be careful—the broken-off tentacles can still sting as they drift around.

## NEMATOCYST

Stinging cell of the tentacles of medusozoans.

## HOW AND WHY DO MEDUSOZOANS STING?

Regardless of their shape and size, all medusozoans sting. To do so, they use stinging cells called **nematocysts**. These stinging cells are tiny, hard, and balloon- or egg-shaped. Inside each nematocyst is a long, coiled, barbed harpoon. This harpoon sits in a mixture of toxic substances. The amount of toxins that each stinging cell has is small, but there are large numbers of stinging cells in medusozoans' tentacles.

Medusozoans use their stinging cells when they feel threatened, or to capture their food. But how does a medusozoan sting happen? Simple contact explodes their stinging cells. It is important to remember that medusozoans do not attack humans intentionally. Most stings occur when people touch them by accident, in or out of the water.

When you encounter a medusozoan while swimming or walking on the beach, you might accidentally touch its tentacles (Figure 2). At that moment, your skin contacts thousands of nematocysts, so thousands of tiny stings occur. These stings can cause a toxic effect that can even cause death on rare occasions. When a medusozoan stings you, your skin may turn red, and you may feel pain, itching, and intense burning. Sometimes symptoms include nausea, red welts on the skin, fever, vomiting, and a sensation of weakness. In the worst cases, the stings can cause shock, interfere with breathing, and result in drowning. Generally, the symptoms caused by stings disappear within hours or days, but they can leave scars. Stings are most often reported on the legs and chest [4].

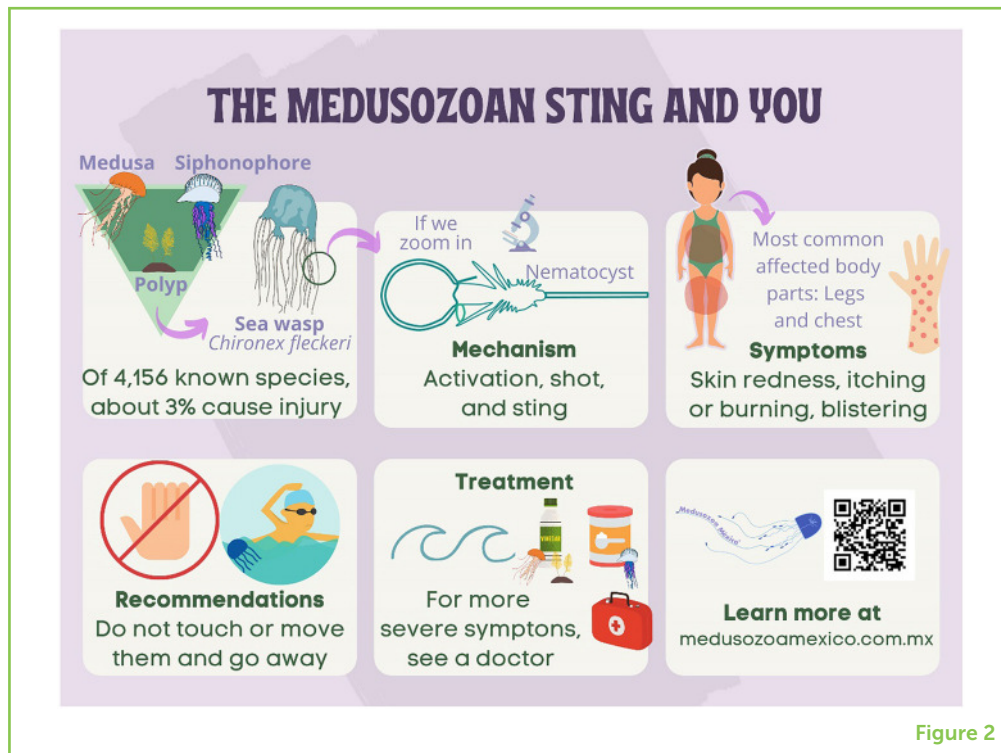
## WHAT SHOULD I DO IN CASE OF A STING?

If you or someone close to you suffers a medusozoan sting, follow these simple tips [5]. First, keep calm. Second, remove any visible tentacle remnants using an object, to avoid further direct contact with your skin. Third, rinse the affected area with lots of seawater. Never use freshwater (or pee!) to rinse the sting! Last, apply household vinegar to jellyfish stings or baking soda mixed with seawater to siphonophore stings [6].

In the past (and sometimes even today), people have commonly used pee to treat medusozoan stings. Thanks to movies and TV, pee is a famous treatment and is often said to be effective. In the last century, bathers carried a bottle of their own pee when they went to the beach! However, using pee to treat medusozoan stings is not a good treatment. First, pee can cause more nematocysts to explode. Second, pee can generate skin infections, particularly in more severe stings. Third, using pee is unpleasant, especially when stings occur on the face, neck, armpits, and groin.

**Figure 2**

Here you can see how a medusozoan stings and what you should do if you encounter medusozoans or get stung by one (Artwork: Ariadne Molina-Alonso).



One way to avoid medusozoan stings is to wear protective clothing made of neoprene or nylon. If you see a medusozoan stranded on the beach, do not touch it! Even if it is dead, its stinging cells remain active and can still sting. Additionally, do not go to the beach on days after storms or strong winds, because this weather may carry medusozoans close to shore or onto the beach.

**PAY ATTENTION TO THE SIGNS!**

At least six countries are in the practice of warning bathers about the presence of medusozoans on beaches. This probably started in Australia, where warning signs that resemble yellow traffic signals are used. On some beaches these signs are up all the time, because those beaches are home to dangerous medusozoans, such as the sea wasp or the Portuguese man-of-war.

Flags are commonly used as signs on beaches. Flag use is common in Argentina, Israel, Mexico, Spain, and the United States. These flags come in various shapes and colors. For example, they may be rectangular, white, or purple and may have the name or drawing of the medusozoan to look out for (Figure 3).

**Figure 3**

Warning signs to indicate the presence of dangerous medusozoans on beaches in Argentina, Australia, Israel, Mexico, Spain, and the United States (Artwork: Mariae C. Estrada-González).

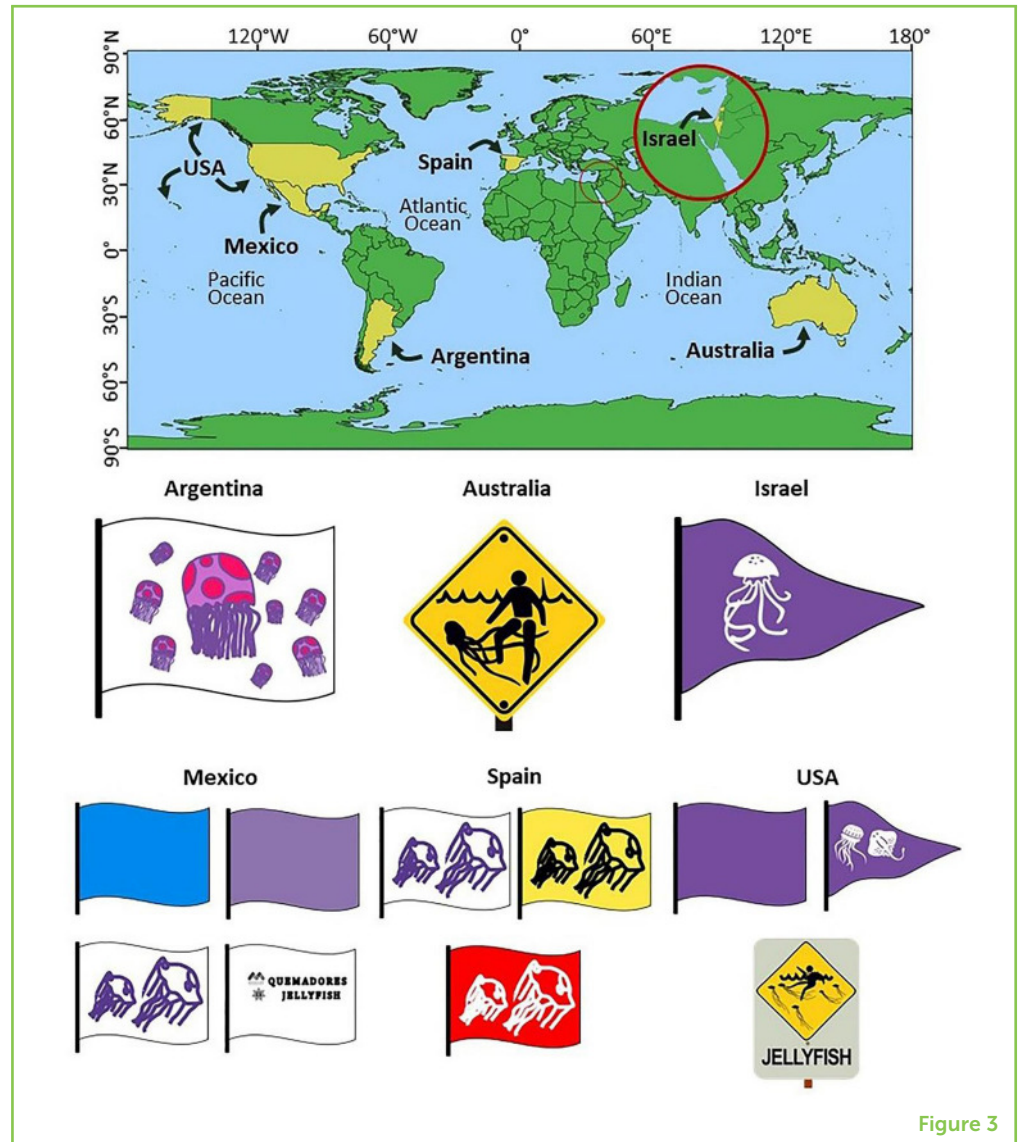


Figure 3

To summarize, in this article you have learned what medusozoans are and why they sting. You also learned what to do to avoid or treat medusozoan stings. So now that you know more about medusozoans, you, your family, and your friends can enjoy a beach day and stay safe from medusozoan stings!

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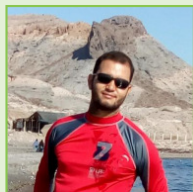
## YOUNG REVIEWER

### MEHA, AGE: 15

Hey, I am a sophomore in high school, and looking forward to a career in medicine. My hobbies include drawing, tennis, and just hanging out with friends! I also love to volunteer and give back to my community. I am excited to be a part of Frontiers for Young Minds, as I want my peers and other students to be able to access these great scientific accomplishments made every day.

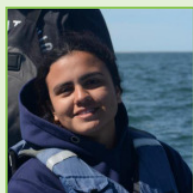


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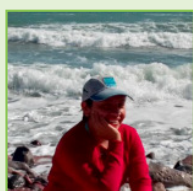
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