

Anemonefishes and host anemones

By Mikayo Langhofer

Anemonefishes and host anemones are a favourite subject of the underwater photographer. Fascinating to watch, either in their native habitat or in an aquarium, anemonefish dive into the arms of their host anemone immune to its deadly sting. Anemonefish are evocative of the world underwater, colourful delegates of the ocean. How do they do it? Why do they do it? And why does the sea anemone allow them to live within its deadly embrace? The answers to these questions can be found in deadly boring scientific papers suitable for reading only when suffering from severe insomnia. With some luck you can learn more about anemonefish in this article (without falling asleep!). And as is true with any other wildlife subject, the more you know about the animal on the other end of your camera the better your chances of getting a good photograph.

First, a little information about sea anemones. There are almost 1000 species of sea anemones, distributed world wide from pole to pole. However, not all anemone play host to anemonefish. Only 10 species of anemone host anemonefish, and they are found in regions of the Pacific and Indian Oceans where there is warm, tropical water. So don't bother looking for them in the Caribbean. However you will find them in the Red Sea and Arabian Sea.

Sea anemones vary greatly in appearance. A litany of the variety of their appearance would sound like something out of a Dr Zeus book: there are short anemones, there are tall anemones, there are big anemones, there are small anemones... What they all share is a stalk, which is hollow and houses all of the internal functions. At the top of the stalk is the mouth of the



Nikonos V, 35mm lens with Ocean Optics close up lens, Ikelite substrobe 200, Velvia, F22, 1/90th second

anemone, which is surrounded by tentacles which act to capture food and bring it to the mouth. Tentacle shape, length and number are very important for sea anemone identification. The colour of sea anemones is dependent upon the symbiotic algae that live in the tentacles, consequently colour is not of much use in identifying a particular species. The structure responsible for the sticky quality of the sea anemone tentacle is known as a nematocyst, a harpoon like stinging capsule which may or may not contain toxin. The nematocysts of the sea anemone tentacles are used for defence, capture of prey, and internal nematocysts are used for digestion.

There are 28 species of anemonefish. They are members of the family Pomacentridae, which also includes damselfishes. By definition anemonefish are dependent upon their host sea anemones for survival, and are classified as obligate symbionts. Only in the "artificial" environment of an aquarium can an anemone fish live without the protection of a sea anemone. Experiments done in the

wild have demonstrated that anemonefish cannot live without a host sea anemone. When sea anemones are removed from part of a reef, the anemonefish are rapidly preyed upon. However the inverse is not true. Sea anemones appear to thrive with or without anemonefish. At the present time the benefit to the sea anemone conferred by the anemone fish is unknown.

Other fish may live in a sea anemone, but because they do not absolutely depend on the anemone for their survival they are not classified as anemonefish. For example it is relatively common to find sea anemones which have schools of juvenile black damselfish living in them. Damselfish are not anemonefish because their survival is not dependent upon the sea anemone. None the less, they sometimes share sea anemones with anemonefish and sometimes are the sole inhabitants of sea anemones. Damselfish appear to use the sea anemone as a protected nursery, as they grow larger they leave the sea anemone. Some species of sea anemones are home to small shrimps or crabs. The relationship



of these animals to the sea anemone has not been studied and it is not known if they are dependent upon the sea anemone for survival, or if like the damselfish, it is a case of facultative symbiosis. In non scientific terms, this means that they may live together, but do not have to.

The greatest diversity of anemonefish is to be found in Papua New Guinea. It is an anemonefish paradise, rich territory for the underwater photographer in search of the perfect anemonefish photograph. The number of different species of anemonefish that can be found in any one location decreases as you move further away from Papua New Guinea. Surprisingly, there are no anemonefish in Hawaii.

However there are anemonefish that live as far north as the eastern coast of Japan.

In the anemonefish community there is a definite pecking order based on size. It is theorised that small anemonefish are kept small by the constant harassment of larger fish. And the largest, dominant fish in a sea anemone colony is female, the other fish are males. She is the only female in the colony, it is a matriarchy. The second largest fish in the colony is the alpha female's



mate.

Should something happen to her, the largest male undergoes a sex reversal becoming a female. (Should we really call it reversal-wouldn't change be more appropriate?).

In the sea this matriarchal social structure is somewhat unusual. It is more common for the dominant fish to be male with female harem, and for sex reversal to go from female to male. For example both wrasses and parrot fishes begin life as females and become males later in adulthood.

Anemonefish are not inherently immune to the sting of the sea anemone, but appear to develop a resistance to the nematocysts. In experiments done in aquariums, anemonefish introduced to a new sea anemone will perform a prolonged dance, approaching the sea anemone hesitantly, appearing to get stung, retreating, recovering,

and repeating the process for minutes to hours, depending on the species of sea anemone and anemonefish. If an anemonefish has been separated from its host sea anemone for more than a few days or weeks, the above process must be performed before the anemone fish can once again live comfortably in the tentacles of its host sea anemone. The ability of the anemone fish to live within the tentacles of its host sea anemone appears to be derived from the anemone fish, and is not conferred by the sea anemone.

Mikayo Langhofer

More information about anemonefishes can be found in "Anemonefishes and their host sea anemones" by Daphne G. Fautin and Gerald R. Allen, ISBN 07309 8365X.