

## Brooklynellosis

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*By Neale Monks, Ph.D.*

Because it commonly affects wild-caught clownfish, brooklynellosis is often referred to as clownfish disease. This is misleading though, because it regularly occurs on other types of saltwater fish.

### Identification

Infected aquarium fish develop patches of white slime on their bodies indicative of abnormally high mucus production. Affected fish are also likely to exhibit heavy or labored breathing, lethargy, disinterest in fish food, and abnormal, usually subdued, coloration. Brooklynellosis can progress extremely quickly, and infected aquarium fish can be dead within a few days of the first visible symptoms.

Brooklynellosis produces symptoms very similar to those of fish infected by another protozoan parasite of the skin known as *Uronema marinum*. Distinguishing between the two infections requires examination of skin tissue under a microscope, but fish infected with *Uronema marinum* frequently develop bloody sores beneath the patches of slime.

### Pathology

Brooklynellosis is caused by a protozoan parasite called *Brooklynella hostilis*. This parasite kills and eats the epidermal cells, including those of the skin, fins and gill membranes of the fish. By damaging the skin brooklynellosis causes dehydration as fluids are lost through the skin to the surrounding seawater, and as the gills become increasingly damaged the aquarium fish finds it more and more difficult to breathe. Eventually the host fish dies.

### Life Cycle

Like many other protozoan parasites, *Brooklynella* has a two-part life cycle that includes a free-swimming stage and a feeding stage. However, the feeding stage is unusual in that the parasites are able to multiply asexually through binary fission. Once established on a host aquarium fish, *Brooklynella* populations can increase extremely rapidly, which is why prompt diagnosis and treatment of the fish is so important.

### Treatment

Formalin is the preferred medication for treating brooklynellosis, and may be used on the aquarium fish either as a dip or a continual bath. "Saturated formalin" is used, a 37 to 40 percent solution of formaldehyde in water.

Formalin will kill saltwater aquarium invertebrates and algae, so it cannot be used in a reef aquarium. Formalin also displaces oxygen from water, so supplementary aeration of the water will be required in the quarantine aquarium.

Treatment dips are normally performed daily for 5 days. Dosage, duration and frequency should be described by the manufacturer and may vary slightly between brands. But the required concentration of formalin is 200 mg/l, or 2 ml of 37 to 40 percent formalin per 2.6 gallons (10 liters) of seawater. Treatment dips last 30 to 60 minutes, though the aquarium fish should be removed immediately should it show signs of severe distress, such as rolling onto its side. Some aquarium fish react negatively to formalin dips (including surgeonfish, tangs and butterflyfish), in which case half-doses should be used instead. Once dipped, the aquarium fish should be placed in the quarantine aquarium and observed.

If used as a continual bath, formalin needs to be added to the quarantine aquarium at the dose recommended by the manufacturer. The aquarium fish will need to be held in the aquarium for at least 7 days. Reduced salinity (hyposalinity) is beneficial, but otherwise environmental parameters, particularly pH and temperature, should be similar to those of the display aquarium.

Because brooklynellosis causes damage to the skin, there is value to using medications that boost or replace the slime coat of the aquarium fish after the formalin treatment is concluded. Damage to the skin may allow secondary infections to develop, so the use of a broad spectrum antibiotic in the quarantine tank is useful, especially following severe infections.

### Treating Reef Aquariums

Brooklynellosis cannot be adequately treated in reef aquarium situations because formalin is highly toxic to saltwater aquarium invertebrates. Infected aquarium fish must be removed to a quarantine tank for treatment either in situ or through

dipping.

#### Prevention

Despite being known as clownfish disease, brooklynellosis is no longer all that commonly seen on clownfish. The reason for this is that it is primarily wild-caught clownfish that suffer from the disease, and brooklynellosis is hardly ever seen on captive-bred clownfish maintained by retailers or hobbyists that use appropriate quarantining and disease-control methods. One of the best ways to avoid brooklynellosis is to buy properly maintained captive-bred aquarium livestock.

New aquarium livestock should receive a freshwater dip and then be quarantined for 2 to 4 weeks before being placed in the display aquarium. Removing infected fish from reef aquariums is very difficult, often impossible, making timely treatment difficult. By quarantining new aquarium livestock and then treating them as required, only healthy aquarium livestock will be introduced to the reef aquarium.

Neale Monks studied zoology at the University of Aberdeen in the north of Scotland and obtained his Ph.D. at the Natural History Museum in London. He's also been a marine biologist, a high school teacher, a university professor and a museum's exhibit designer. But his real love has always been tropical fish. His particular interest in brackish water fish culminated in his editing of the first encyclopaedic book on the topic, 'Brackish-Water Fishes', published by TFH in 2007. Neale regularly contributes to all the major English-language fishkeeping magazines, focusing especially on community tanks, biotopes, healthcare and water chemistry issues. After living in London and then for a while in Lincoln, Nebraska, Neale now lives in a quaint cottage in a pretty market town in Hertfordshire, England, where he divides his time between teaching and writing.