

# Ich in Saltwater Fish: Cause, Treatment, and Prevention

Drs. Foster & Smith Educational Staff

Saltwater ich (ick), or "white spot disease" is one of the most common diseases that infect marine fish in home aquariums. It is caused by *Cryptocaryon irritans*, and for the purpose of this article will be referred to as *Cryptocaryon*. This disease is similar to freshwater ich and is often confused with another common saltwater disease called oodinium (velvet). Infection with *Cryptocaryon* has several distinctive traits that can help with proper identification, which is necessary for correct treatment and prevention of this disease.

## What is *Cryptocaryon*

*Cryptocaryon* is a fully ciliated protozoan that is present in all saltwater environments, and is particularly prevalent in marine aquariums, aquaculture ponds, and in import and wholesale holding environments. The protozoan is considered an external parasite and is so widespread that many fish that enter the home aquarium market have had a good chance of being exposed to it at some point in their handling. The protozoan penetrates the skin and gills of the fish, and depending on the immune status of the fish, can cause symptoms as mild as just a few small white spots to more severe symptoms including severe irritation, loss of appetite, lethargy, severe respiratory distress, and death.

## Why do fish get *Cryptocaryon*?

*Cryptocaryon* is a parasite, and like most parasites it is very prevalent in the environment of the species it normally infects. Therefore, most wild fish are exposed to low levels of this parasite fairly frequently and are able to effectively fight off the infection without becoming seriously ill. What happens in an aquarium fish, however, is very different than what happens in a wild fish. In the wild, the number of free-floating *Cryptocaryon* per 100 gallons of water is extremely small. Whereas in a home aquarium with a relatively small volume of water and a concentrated population of fish, the number of *Cryptocaryon* has the opportunity to explode into a number hundreds of times higher than what would ever be experienced in the wild. The other thing that happens in a home aquarium is that the level of stress has the potential to be much more severe than what is found in the wild.

Almost all marine aquarium fish are wild harvested, and in a period of several days their lives change dramatically. They go from living on the reef to being collected, handled, shipped, and re-handled repeatedly. When those fish finally enter the home aquarium, they are then subject to yet another change in water parameters, diet, temperature, and environment and may even be subject to aggression from existing tank mates. To say the least, these fish are severely stressed to the point that their immune system may not be functioning properly, making them very susceptible to infections and parasites like

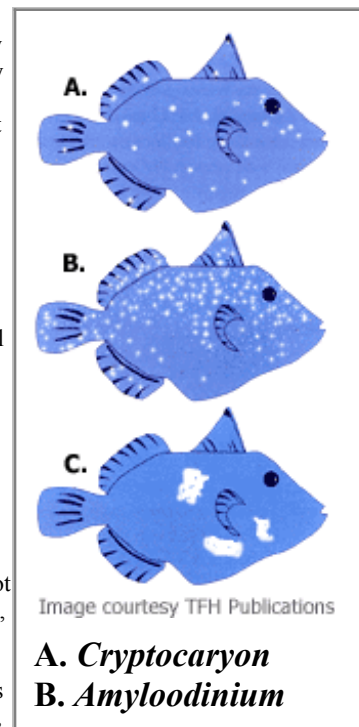
*Cryptocaryon*. In an existing tank in which the fish are healthy, the introduction of a new fish or a decrease in water quality or temperature fluctuations may stress the fish to the point that the *Cryptocaryon* protozoans that were present but not creating problems will then rapidly cause a more serious infection.

## Identifying *Cryptocaryon*

*Cryptocaryon* is not too difficult to identify because of the characteristic white spots present on the body and gills. If the infection is concentrated in the gills or is in the early stages, the fish may show irritation, respiratory distress, and lethargy without having any visual spots. As the disease progresses, the white spots will begin to develop until they reach a size of .5 - 2.0 mm. The spots have a tendency to appear on the pectoral fins first and the fish may swim with folded or clamped fins. As the disease progresses, the spots will become more wide spread and the eyes may become cloudy and secondary fungal infections may appear on the skin. The infection may begin in only one fish, but will often spread to other fish and can infect every occupant in the tank. Without treatment, the disease may progress until fish begin to die. Many fish that are older and have been exposed to the disease and survived, or fish that have strong immune systems will develop only minimal symptoms and recover. *Amyloodinium* is another disease that has similar symptoms and is often confused with marine ich, but is more severe and fatal than *Cryptocaryon*. *Amyloodinium* creates white spots but they are smaller and more widely spread than *Cryptocaryon*, and *Amyloodinium* more often causes respiratory distress and rapid death. *Brooklynella* is another parasite which can cause white spots, but these are generally quite large. Invertebrates, fortunately, do not get *Cryptocaryon* infections.

## The life cycle of *Cryptocaryon*

Understanding the life cycle of *Cryptocaryon* is very important in effectively treating or preventing the infection. *Cryptocaryon* is an obligate parasite, which means that it cannot survive without a period of growth on a fish. Once the original parasite attaches to a fish, it burrows into the skin where it feeds and grows for 5 to 7 days. During this time, it is very irritating to the fish and the characteristic white spot develops. The protozoan then breaks out of the cyst and is called a tomont. The tomont swims freely for 12 to 18 hours until it produces sticky opaque material and creates a cyst, which then attaches to a rock,



coral, glass, etc. A tomont then starts dividing until it produces up to 200 daughter cells called tomites. This process is temperature dependent and can take from 3 to 28 days.

***C. Brooklynella***

When the tomites have finished dividing and are mature, they are then released into the water. They then develop cilia and begin to swim through the water looking for a host. These free-swimming organisms are called theronts. They will only live 12 to 18 hours if they do not find a new host fish to attach to and start the cycle over again. The completion of the entire life cycle can be between 9 and 40 days and is temperature dependent. The warmer the water the faster the cycle occurs, and most likely is complete in a couple of weeks in most home aquariums. However, there are some reports that indicate that despite being at a warmer temperature, there may be other variables that make the multiplication process take longer than two weeks, which is why some experts recommend a slightly longer treatment period.

#### Treating *Cryptocaryon*

**Copper:** The treatment for *Cryptocaryon* is fairly straight forward provided the cause of the stress is corrected. By far, the most popular and effective treatment is copper. There are a variety of copper products available for use in the home aquarium, most of which will provide proper treatment, if used at the correct dose. Copper can be very toxic at very low amounts to invertebrates and can never be used in reef tanks or tanks with invertebrates. Copper can also be toxic to marine fish, if not given in the correct dose. A copper ion test kit that can accurately measure the copper level in the water is critical for maintaining the correct copper levels when treating with copper.

There are two main types of copper; ionic copper and chelated copper, so make sure the test kit matches the type of copper you are using. Copper is quickly bound to any calcium carbonate or magnesium carbonate based rock, sand, or gravel in your tank, so if you do not treat in a bare bottom tank, the copper levels could potentially change daily. The water should be tested several times the first day and then daily after that. The recommended dose for ionic copper formulas is between 0.115 and 0.2 ppm (parts per million). Treatment should be continued from between 14 and 25 days. Because of the variability in the life cycle, the length of treatment is also variable, but continuing the treatment for 7 days after all symptoms are gone is usually a good rule of thumb. Chelated copper products are advocated by some aquarists because of their high safety margin. However, some reports indicate that to be effective, very high doses need to be used, negating some of their safety benefits.

Remember that when we are treating with copper, we are treating the stages that occur off of the fish. Because the fish encapsulates the parasite on the skin in such a tough cyst, the medicine cannot kill the organism until it leaves the skin. This is why it is necessary to have such a long treatment cycle because the parasite will only be susceptible to the copper at certain times in its life cycle.

Since copper is extremely toxic to invertebrates, treating *Cryptocaryon* in a reef tank poses special problems. One option is to remove the infected fish to a bare bottomed treatment tank where they can be effectively treated. While this will usually treat the infected fish, it will not get rid of the *Cryptocaryon* in the original as long as there are fish remaining in the tank. So to clear up a tank, all of the fish will need to be removed and the tank will need to run on its own for about a month until all of the *Cryptocaryon* have a chance to complete their life cycle and die. In some severe cases, owners have been known to remove all living organisms and completely tear down and sanitize their tank; however, this is not practical for most owners.

In a fish-only tank, copper can be added directly to the tank, but it should be mentioned that copper will bind to many inert substances in a tank and some experienced aquarists caution against ever adding copper to a display tank because of the risk of never being able to completely rid the tank of copper, making it unsuitable for ever housing copper-sensitive invertebrates.

**Other treatments:** Other methods that are sometimes used to control both freshwater and marine ich are high wattage UV sterilizers and diatom filters. The very fine diatom filters can help strain the small floating tomites out of the water. A UV sterilizer that is sufficiently powerful to kill parasites will also kill free-floating *Cryptocaryon* tomites. It should also be mentioned that some hobbyists choose to not treat mild cases of ich, but work very hard to have excellent water quality, nutrition, and proper cover, and feel that the new fish will have a mild outbreak because of shipping stress but will improve once they adjust to the new tank.

One last note on treating *Cryptocaryon* has to do with the fish in some tanks that 'always have ich.' There are some fish that develop a mild case of *Cryptocaryon* and never seem to get a severe case, but then also never seem to recover it completely. Many of these fish appear to be healthy except for the small white spots or other mild symptoms. It is very likely that these fish are being stressed either by aggression in the tank, water parameters, or diet. If the underlying stress can be identified and remedied, then these fish have a chance of completely recovering from the disease.

#### Preventing *Cryptocaryon*

The old saying that 'prevention is the best form of medicine' is very true of all marine disease, but especially true of *Cryptocaryon*. All new fish should be placed in a quarantine tank for at least ten days to make sure that they are eating, free of disease, and so they are not being bullied in a new tank. Any sick fish can be treated before being added to the display tank. Remember though, a quarantine tank needs to be clean; appropriately sized; have the necessary biological, mechanical, and chemical filters; and have adequate hiding places or it can actually increase the stress level of the fish.

Stress is the enemy of fish health. *Cryptocaryon* will target stressed fish with lowered immune systems. Anything we can do to reduce the stress that fish undergo will decrease both the disease incidence, mortality, and improve treatment results. Remember that almost all marine fish are wild harvested and are extremely stressed by the time they reach your home. These fish need to be handled very carefully to avoid disease outbreaks. They need to have perfect water quality, correct nutrition, a stable temperature, and places to hide and feel secure. If any of these needs are not met, then the already stressed fish will likely develop marine ich or another disease.

Some owners will place all new fish into a quarantine tank that is being treated with copper. Remember that these newly arrived fish are very stressed, and copper or other treatments can add additional stress. Once the fish has had several days to a week to acclimate and is eating well, then prophylactic treatment can be performed, however, it is never good medicine to routinely treat healthy fish. In fact, treating healthy fish should be avoided in both the show tank and the quarantine tank.

#### Summary

Marine ich is one of the most common diseases to strike saltwater fish. There are different levels of severity but *Cryptocaryon* can be a deadly disease, especially in already stressed fish. *Cryptocaryon* can be successfully treated if done promptly, but the best treatment is prevention. Quarantining all new fish, and then providing high water quality including a stable temperature, adequate shelter, and nutrition are all important in preventing an outbreak of this common disease.