

Bad Water Quality Can Cause Abnormal Behaviors

Is rubbing and scratching a sign of disease or bad water quality?

By Stephen M. Meyer

Q. I really enjoy your column in every issue of Aquarium Fish International, and I've learned a great deal since I began subscribing to AFI. I hope you can help me solve a serious problem in raising goldfish that has been plaguing me for more than four years.

Before I buy goldfish I look them over very carefully. I check for strange behavior and any sign of parasites or infection. They seem fine in the store, but once I get them home the same problem develops time after time. First they start to rub against the gravel and other objects in the aquarium. Sometimes they swim in an erratic pattern. They often develop cottony strings that hang from their fins and bodies. I sometimes see mucous floating in the water.

When I see them behaving this way I suspect parasites because that is what the books say cause fish to rub against objects. I have treated them with copper, tetracycline and a number of other parasiticides and antibacterial medications. I maintain good water quality and do weekly 30-percent water changes. Because there are chloramines in my tap water, I dechlorinate the water (a double dose) and use an ammonia remover. The pH remains about 7.1, there are no measurable nitrites and ammonia is always below 0.25 parts per million.

Every time I replace one of my dead goldfish, the new goldfish begins the same routine. When I add copper they seem to stop rubbing for a few days, but then the rubbing and erratic swimming returns. I've also noticed that the signs get worse after a water change. What is the problem here? By the way, the aquarium stores in my area use the same city water and they do not treat the water at all.

A. Let's start with what the problem is not. Reviewing your description of events (only a small fraction of the single-spaced three page original is summarized above), it is clear that the problem is not caused by parasites or bacteria. Parasitic and bacterial infections just do not explode in such a short time. Even under the most virulent conditions several days would pass before external parasites had latched onto a new fish in such large numbers that rubbing would be observed.

Indeed, contrary to what the books say, rubbing is not a sign of parasites — it is a sign of irritation. Yes, a parasitic infestation can cause such irritation, but so can about a dozen other things. So the question you must ask when you see such behavior is: What could be the source of the irritant?

Besides the speed at which the problem arises, your letter provides several other clues. You mention that the problem intensifies following water changes. You have also observed slime-coat stripping and floating mucous. Given these observations there is only one reasonable answer. Something in your aquarium water is producing severe and immediate external irritation. The fact that the slime coat (the white stringy trails coming off the fins and body) is being shed almost immediately after the fish enters the aquarium water is a good indicator of how bad things are.

Let's consider the possibilities. The first and most obvious is pH shock. However, you noted that the pH remains fairly constant around 7.0 to 7.1, and the aquarium stores in your area use the same city water, which they do not treat.

A second likely possibility would be residual chlorine in the water. However, you say you use a double dose of chlorine remover, and you also noted in your letter that tests for residual chlorine reveal no problem. The 0.25 parts per million (ppm) of ammonia found in your water after neutralizing the chloramine with water conditioner would not be sufficient to cause the problems you observe — at least not at the near neutral pH you maintain.

The next possibility is heavy metal contamination. Your letter mentioned that iron, copper, lead and manganese were found in your water. This type of contamination can cause the signs you have observed. Iron and manganese, in particular, are much faster acting poisons than, say, arsenic.

Lethal concentrations for iron vary from 0.1 to 10 ppm depending on the tropical fish species. When water pH is 7.0 or above, iron hydroxides form on fish gills. The rapid irritation of the gills causes mucous secretion, gill tissue swelling, and suffocation. If the iron concentration is high enough, death may follow within one to several days. The irony (no pun intended) of iron precipitation toxicity is that it is exacerbated by good aeration. Manganese poisoning follows a similar path, although the triggering pH is closer to 7.5.

Copper is a well-known treatment for fish parasites, but it is equally deadly to fish if concentrations rise too high. In soft water, such as yours, it is more dangerous. Copper toxicity is highly variable. Some guidelines suggest no more than 0.006 ppm for long-term exposure in soft water and certainly no more than 0.1 ppm over several days.

There are also interaction effects among metals. For example, copper increases zinc toxicity.

There are a number of commercial products available that claim to remove metals from water. Because I have no direct testing experience with any of them, I cannot really offer recommendations. I suggest you talk with your local aquarium store owner.

You may wonder why your use of a parasiticide seemed to lessen the rubbing even though I claim the problem is not the result of parasites. The parasiticides listed in your letter are very powerful — so powerful that they often make the fish sick. During the few days that the fish are under the influence of the chemicals they become relatively inactive. The fish do recover, as yours did. (Hopefully, when there really is a parasite problem, the parasites don't recover.)