

Treatment of *Columnaris* Disease in Aquatic Salamanders

Deborah A. Schaefer
and
Heather L. Elsthen

Program in Neural Science
Indiana University
Bloomington, IN 47405

We recently found a successful treatment for *columnaris*, a common infection of aquatic salamanders. We received a shipment of wild-caught mudpuppies (*Necturus maculosus*) and placed them in a large tank at 18°C. Within a day of arrival several animals developed signs of infection: they had white fuzzy patches on the head and torso. We isolated the animals, and within a day the infection had spread to at least 30% of the body surface with short white strings hanging from some of the infected areas. The infected mudpuppies' skin color was unchanged, but their water was slightly murky and emitted a noticeable rotten odor.

The culprit was probably *Cytophaga columnaris* (Stanier et al, 1986), an aerobic, gliding bacterium that forms branching aggregates but no fruiting bodies. Under a light microscope, *columnaris* has a distinctive appearance: it is rod-shaped, and tends to form slender non-septate filaments or aggregates (Brock et al., 1984). These aggregates look strikingly similar to fungal hyphae, and have probably misled researchers who are seeking a treatment for infected animals. *Columnaris* is Gram-negative and catalase-positive (Brock et al., 1984). The Gram test involves placing a sample of the bacteria on a slide and adding a drop of Gram stain. If the cell wall turns pink, then the bacterium is Gram-negative, and if the wall turns a blue-purple color then the bacterium is classified as Gram-positive. The catalase test consists of adding a drop of hydrogen peroxide to a bacterial sample on a test slide. If bubbles form the bacteria are catalase-positive. These tests can quickly and easily be performed in the lab, and in combination with the unusual morphology of the bacteria, identification of *columnaris* is not difficult.

Columnaris is found in both fresh and salt water and proliferates rapidly in water over

20°C, which makes these bacteria a problem in thermally-polluted areas and in laboratories. The route of infection is through small, induced lesions in the skin surface such as might occur during capture or shipping. The bacteria travel under the surface of the skin to the connective tissue, causing abnormal multiplication of skin cells which may contribute to the stringy appearance of the infected areas (Brock et al., 1984). Once established, *columnaris* causes deep lesions, occasionally to the bone.

We have found that sulfa drugs can be used to treat *columnaris* infection. Many aquarium stores sell a sulfa-containing solution called Turtle SulfaBath, produced by Terrafauna (Tetra), which is sold in combination with RidRot, another Tetra product. We soaked the infected animals in 15 ml SulfaBath/gallon refrigerated water for one to three hours a day. The animals were then removed from the bath, and we swabbed the affected areas with 3% hydrogen peroxide followed by RidRot. According to the label these products are sold for the treatment of microbial infections of terrestrial reptiles and amphibians, and the directions must be modified slightly to accommodate aquatic salamanders. The user is directed to allow the animal to dry completely before returning it to its tank; we waited approximately 15 seconds after treatment with RidRot before returning the animals to their bowls, which we kept cool in a 12°C refrigerator. The animals improved dramatically within a day of initiating treatment, and within five days there were no lesions or signs of infection. The treatment does not appear to harm the mudpuppies, and during treatment their appearance and behavior were normal.

Before finding the sulfa treatment, we tried several treatments that had no effect. Increased salt in the tank water (an extra 10 g/gallon) did not prevent infection. Swabbing the infected areas with mercurichrome did not reduce the size of the infected area or prevent the spread of the bacteria to other parts of the animal. The addition of potassium dichromate (1:20,000) to the tank water was similarly ineffective, and may have resulted in the deaths of several animals.

Columnaris infects other aquatic salamanders such as axolotls and newts, and presumably the SulfaBath treatment would be effective in controlling infection in these organisms.

References

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