

must be rinsed well before being placed into contact with fish. Tanks and other equipment can be disinfected with chlorine (10 mg/l) for one hour; however, chlorine residue must be completely removed before they are placed into contact with fish. Never use chlorine bleach in a closed room containing live fish or to disinfect porous surfaces. Chlorine residue can be removed by using 7.4 ppm sodium thiosulfate to neutralize each 1 ppm chlorine.

Quarantine

Quarantine is not always popular with aquarists, but introduction of a newly acquired fish directly into an established aquarium is foolish. Some pet stores are equipped to quarantine fish for the owner following purchase. This is a service that could also be offered by veterinary practitioners. The quarantine period should be at least 3 weeks. During this time the fish should be kept in a small hospital tank where it is accessible for observation, physical examination, gill and skin biopsies, fecal examination, and medication if necessary. A 10-gallon tank with a sponge filter is ideal for quarantine of small fish. The filter may be discarded at the end of the quarantine period or can be thoroughly washed (a household washing machine works well), dried, and recycled¹ with ammonium chloride or fish food.

Examination of Fish

Restraint

Many fish can be examined with nothing more than manual restraint. Fish should be placed on a wet surface for examination. Many fish seem to stop struggling if the eyes are covered. If the fish is too large to handle safely or will not settle down, chemical restraint can be provided using methane tricainesulfonate (MS-222). Finquel (Argent Chemical, Redmond, WA) is a brand of MS-222 that has been approved by the Food and Drug Administration for

use in food fish. Induction can be achieved with a concentration of 50 to 100 mg/l, which seems to be safe for most species. The compound is acidic and should be buffered to a pH of 7.0 to 7.5, which can be done by adding sodium bicarbonate (NaHCO₃) to saturation. Any anesthetic solution should be well aerated. Following induction, anesthesia can usually be maintained with a concentration of 50 to 75 mg/l MS-222. While the fish is anesthetized, it should be monitored for respiratory movement. If the operculum stops pumping at any time, the fish should be placed into clean water immediately.

External Examination

External, physical examination of a fish is done in the same way as of other animals. Beginning with the head, a fish should be examined for lesions, body condition, and finnage. Eyes should be clear, not cloudy or exophthalmic; gills should be bright red, not swollen, pale, or puffy; and the mouth should be clean with no lesions, fuzzy areas, or organisms visible. The best way to evaluate body condition on most fish is to assess the amount of muscle tissue behind the head, anterior to the dorsal fin. Weight loss will be most evident by a thinness behind the head and protrusion of the backbone. Skin and scales should be bright and intact. Loss of scales, ulcerations, dullness, or excessive mucus accumulation may indicate external parasitism or bacterial infection. Fins should be intact, not tattered, fuzzy, or bloody.

Biopsies of Gill, Skin, and Fin

Examination of fresh material collected from gills, skin, and fins of fish is an important part of the examination process. The tip of a few gill filaments can be snipped with a small pair of scissors. Iridectomy scissors are ideal, if available; however, any small pair of scissors with curved tips are adequate. Embroidery scissors are particularly well suited for gill biopsy. A sample of skin mucus and scales

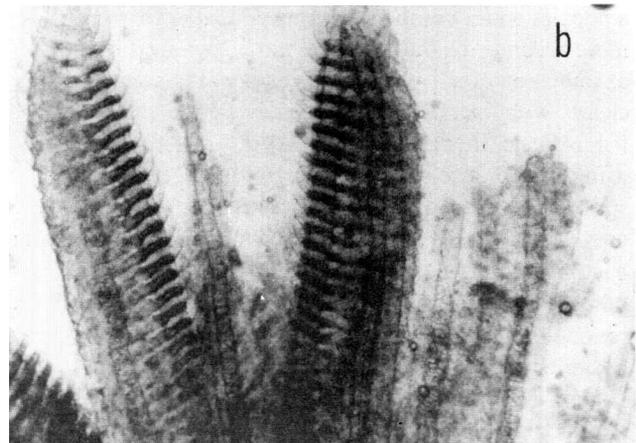
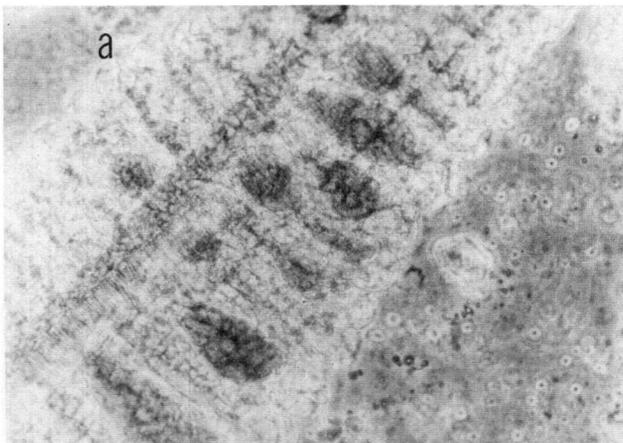


Figure 2. The condition of gill filaments can be assessed with a light microscope: (a) gills demonstrating telangiectasis and clubbing at the tips of filaments, which are indicative of damage from ammonia; (b) gills demonstrating significant loss of epithelium following treatment with malachite green.

¹To "recycle" a sponge filter means to provide a source of nitrogen to nitrifying bacteria so that recolonization occurs as quickly as possible. At least 3 weeks is required to reestablish the population levels needed for effective biofiltration.