

years, probably due to better husbandry on farms and a build-up of natural immunity within fish populations.

Detection/identification: ulcers that appear on medium to large goldfish (usually fish larger than 60 mm), most commonly in spring or autumn, are likely to be caused by GUD. (Note however that ulcers on fish are relatively common and can have many causes, therefore not every ulcer on goldfish is necessarily caused by GUD.)

Treatment: the disease can be treated with the antibiotic doxycycline at 7.5 ppm as an indefinite bath, or in the diet at 1 to 2 grams of doxycycline per kg of food, fed for at least 10 days.

Bacterial gill disease (BGD)

Detection/identification: this is a common disease in farmed goldfish. Fish become lethargic and stop feeding. Gill lamellae, which may be noticeably damaged, become pale and mucousy. Fish which are unable to obtain sufficient oxygen may rise to the surface or position themselves in currents to assist with breathing.

Treatment: a dirty environment and overcrowding of fish in culture conditions are considered to be major contributing factors in outbreaks of the disease, so avoiding these is the first step in controlling the disease. BGD can be treated with antibiotics but because several types of bacteria can cause it, it may be necessary to test more than one kind of antibiotic. In large grow-out facilities antibiotics can be added to diets. See antibiotic treatments below in 7.7 'A summary of some common fish medications, in alphabetical order'.

(3) Sporozoa (8 – 100 microns)

(Note that sporozoa are classified as protozoa, but are covered separately here due to the differences between them and other protozoa from a fish disease management perspective.)

There are several members of the sporozoon group which can cause very serious problems in cultured fish, and susceptibility appears to be extensive. However, generally sporozoon diseases are relatively slow to develop, unlike, for example, mouth fungus (*Flexibacter columnaris*) or white spot (*Ichthyophthirius multifiliis*) which can develop

and kill large numbers of fish within days. There is said to be no effective cure for sporozoon diseases once fish are infected. Diseased fish should be removed, euthanized and safely disposed of. Good husbandry, notably hygiene, seems to help in minimizing the spread of the disease. In the author's experience, although *Pleistophora hypohessobryconis* made an appearance, it was easily managed and its impact was negligible. However, this is almost definitely only because species other than neon tetras were affected. The disease has caused huge problems in major neon-producing areas until farms were cleaned up.

The most effective defence is to make absolutely sure that incoming broodstock are not infected, and remain so. If detected, every possible effort must be made to prevent its spread, and ultimately, to eliminate it.

Neon tetra disease

Pleistophora hypohessobryconis, (sometimes also spelled *Plistophora*) which is responsible for the well known 'neon tetra disease', is perhaps the best known sporozoon disease in tropical fish, most notably in neon tetras, though other tetra species and other families have also been found to be susceptible. Although sporozoa in general are recognized as having the potential to be very destructive, *Pleistophora* is relatively slow-developing and may take months to cause mortalities. However, the disease is extremely unsightly and is very problematic for wholesalers

White necrotic (dead) tissue containing *Pleistophora* cells (pansporoblasts) and spores

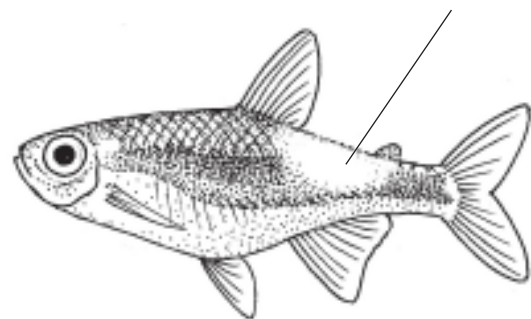


FIG 7.3. Adult neon tetra showing area infected with *Pleistophora*.