

Diseases in Fish

Part 4

By John *Shawn* Prescott

Well finally (not before time, probably some of you would say), we will begin the long journey to examine the many ailments that fish are prone to. The lists are so extensive that sometimes one wonders how fish survive at all, given the countless "enemies" just waiting to strike them low.



Silver Dollar with a moderate to heavy infestation of I.multifiliis "Ick" Photo courtesy of Dr. Ed. Noga. NCSU.

Notwithstanding this, most fish given good husbandry and attention will thrive to be a constant pleasure to those of us, who like to replicate a small piece of nature in our own homes.

The diseases and problems that can afflict fish can be broken down into the following categories:-

1) Parasitic 2) Bacteriological 3) Viral 4) Nutritional 5) Toxicological 6) Environmental 7) Other.

Although we will deal with the latter two categories in later articles , in fact these are among the most challenging, and will become the topic eventually of some interesting discussions, but for now we will begin our investigation of diseases, by looking at the first major group, that is the parasitic species, that are endemic to so many of the tropical fish, which for the most part today are bred on farms.

PARASITES OF FISH

Freshwater

In considering these parasites, the Hobbyist should be aware that some parasites essentially need an intermediate host, in order to be able to complete their life cycle. In several cases such an intermediary is a snail, or some form of Invertebrate such as Daphnia, or other similar organisms. In such cases, by eliminating the intermediary we can bring the spread of the infestation to a halt.

In the wild probably a majority of fish are host to one or more parasites, but for reasons addressed in previous articles, they seldom become a major problem or cause of mortality. In fact there is considerable evidence that in some of the more prevalent parasites e.g. White spot (*Ichthyophthirius multifiliis*) that exposed fish can develop an immunity against further attack

Whilst in most cases it is recommendable for the Hobbyist to purchase young specimens, (as they will live longer, & more easily adapt to the confines of his/her Aquarium), such specimens are also more prone to succumb to attacks by parasites as they have less size, and body weight to resist the damage that many of the parasites can so easily inflict.



Discus fish with typical early stage infection on pectoral fin of Ichthyophthirius multifiliis.

For this reason, any purchases, should be carefully inspected, to ensure that there are no "blemishes" of any kind, on the desired specimen, and the buyer should also ensure that no fish are bought from any tank in which any fish are manifesting unfavourable symptoms. Parasites once present in a tank can in so many instances spread rapidly with devastating effects, a fish that has been exposed and yet appear to be perfect, can break out within a day or so, spreading its parasites to others in your Aquarium.

For those of you that have the possibility , it is advisable to keep all newcomers in a separate quarantine tank, when first purchased. This will give you the chance to ensure that nothing untoward, will be transferred to the principle Aquarium, as it is counterproductive to try treating a fully planted and landscaped Aquarium, when disease breaks out. The period of such quarantine, bearing in mind the life cycles and latent period of so many of the potential problems should be 3 weeks. This is the period used by Government edict in Australia, which is one of the few countries so far, to require all imports of Tropical fish to be so held, in Government approved holding facilities. Such facilities are licensed and examined regularly. The limited number of approved Importers must keep accurate records, and anyone breaking the rules which are closely and continuously monitored, will have the sanction of repeal of his/her importing license effected without delay.

Therefore if you do take the prudent step to quarantine all new purchases, it is wise to make certain that they are kept for at least two weeks, if not three, before introducing them to their new home. I realize that such goes to a large extent against the "I want it now" , type of society we live in today, but the " I want a cure, that is 100% effective, works in one day or less , and causes no headaches" DOES NOT EXIST, so caution can pay off in spades, as they say.

It is also important to note, that parasitic infestations, often do not kill directly. However because of the damage they cause to the tissues as well as the vital organs of fish, they frequently cause secondary opportune infections of bacteria and or fungi, to invade the fish, bringing about a rapid death of the host, and often spreading the new infection throughout the Aquarium.

In order to avoid the potential spread of any infestation or infection, all nets, or utensils of any kind that may be used with your fish, should be kept in a sterilizing solution between uses, and should be rinsed thoroughly before and after use.

Methods of diagnosis: (Parasites)

Although it is possible to come to a reasonable diagnosis, by carefully noting observed signs (symptoms or indications), which in fact is part of the purpose of this series of articles, it is most useful if the Aquarist can manage to have on hand the following tools to aid and help confirm their findings.

An inexpensive stereo microscope. This should have magnifications of 10-40 times to enable one to observe the majority of the parasites. Such microscopes can be bought new nowadays for around £250, but many are available from secondhand dealers, for about a third of this price. If buying a used instrument ensure that the optics and mechanical system are in good working order prior to commitment.

A few glass or plastic Petri dishes of suitable size in which one can lay the fish in a small amount of water whilst making observations.

A simple fine pair of tweezers, which can be used to "pick of" some of the larger parasitic forms for closer examination, without keeping the fish too long out of water.

Some glass microscope slides for making skin smears.

A simple plastic rod (thin about 3mm diameter) which can be used to gently pry open the gills of the fish for examination.

A fine pair of scissors which may be needed to excise a small piece of fin tissue, for closer examination.

A glass pipette, which may be used to aspirate (suck), some material from the gills or elsewhere for further examination.

Whilst these materials are not essential, they do make accurate diagnosis, far more certain, and any Hobbyist who has invested serious money in their Aquarium(s), would be well advised to try and obtain the above items.

Diagnostic procedures .

Whenever fish are observed with some abnormal signs or behaviour pattern, it behoves one without delay to try to make a determination of what is the cause.

Even if one suspects that the cause may be parasitical, bacterial, or viral, the first thing that should be observed and noted are ALL the water parameters. Often an adverse change in the quality of the water can induce latent potential infections to break out, so that even with a correct diagnosis it will be extremely difficult to treat the problem without taking steps to remedy the cause of the water in-balance. Some signs such as hanging at the surface, are common to the observed indications for some diseases, but also to water quality problems like Ammonia toxicity. Thus even though we will pursue all the recognized procedures for determining the cause, first ensure that the water parameters are where they should be for the species you are keeping.



Poor water quality can bring on many parasitic diseases. Reliable & easy to use test kits, like the ones by Red Sea, should be used to ensure that the quality of the water is in accordance with normal parameters.

If for any reason they are not, take the appropriate steps to rectify the problem, ensuring that any correctional changes are made slowly to avoid further stressing the fish.

Assuming the water quality is within normal values, then one should proceed as follows:-

1) Note down all external observations that are ***abnormal***.

Behaviour

One should examine any signs of abnormal behaviour , such as unusual swimming patterns, refusing all food etc. etc.

Body

Look especially for colour changes, bleeding or ulcers, swellings etc.

Skin

Try & observe any cuts or lacerations, scales protruding etc.

Eyes,

Observe if any Exophthalmia (popeye) is apparent, or cloudiness etc.

Gills

Examine the Gills & note if the colour is a normal bright red, or if it shows unusual colour or other markings.

Fins

Note if the fins appear normal, or are rotting, or show markings etc.

In our **Fish-Vet**™ programme, we have currently some 200+ *abnormal* indications.

When all the unusual signs have been noted it is then sometimes possible with the aid of a good text book or computer programme, to make a determination . However just as in human and animal medicine, we like to

have absolute confirmation, for this reason some of the verifications which follow should be attempted, this assuming you have the above mentioned equipment. If one does not, then the specific details of each disease, should be kept, as a reference source, along with any other good book that one has, as you make your best shot, at the problem, without the "proofs" which we will now talk about.

Skin smears. Probably the easiest and often the one that will "prove" the diagnosis fastest and most conclusively at least as far as parasitic infections are concerned is the skin smear. In order to do this one takes a clean microscope slide and simply presses it gently over the area on the fish that one suspects is a source of the problem. One can also "run" the edge of the slide along the infected area, with a little pressure, this will almost always release some of the epithelial matter along with some indication in many cases of the causative organism.

A word of caution. In a fish that may have had a wound or similar for quite some time, (over a couple of days), there may already be secondary infections taking place, of a fungal &/or bacterial nature, it is important to be aware of this when taking such a smear, so these are best done in the earliest stages for best results.

Once the smear has been made, it should have a drop of clean water should be added to the slide with a pipette, an examination under the microscope should then take place. Be careful when adding the drop of water that only a small amount is added, otherwise the vital material to be examined can all too easily "flow" off the slide making the examination more difficult or useless.

Again a good reference book, or computer programme will be needed for most Hobbyists to enable them to recognize the causative organism which may then be observed.

Fin Biopsy. If the fins show any abnormality, one should take the fish, holding it gently but firmly in a wet clean net, and using a fine pair of scissors, cut a small piece of tissue from a fin that is showing signs of abnormality. Cut between the fin rays, so that only tissue is removed, in this way minimal damage to the fish will ensue. Proceed to examine the sample in the same way as with skin smears.

Gill examination Hold the fish as mentioned above, prise open the gill covers with the mentioned clean plastic rod. Insert a fine pipette & aspirate (suck) a small amount of tissue, from the gill lamellae taking from any part that may appear abnormal (dark in colour, pale, with small black or white dots etc). Let this material drop onto a clean slide as before then proceed to examine same.



Wet mount of a Gill Biopsy showing I.mutifiliis trophozoites. Photo courtesy of Dr. Ed. Noga. NCSU.

Should one need to proceed to do post mortem examination of a dead fish, then it is advisable to use a qualified laboratory, to take samples from some of the internal organs as well as the outer body. For such examinations detailed methodology which requires some special preservatives, as well as certain specimen holders and more

must be used, otherwise the chances of it arriving in a fish disease laboratory in a useable form are remote. Laboratories tell us that nearly half the samples they receive cannot be used as they have not been prepared correctly. Qualified laboratories will instruct persons what procedures must be followed.

Armed with your notes on external signs & adding to this confirmatory examinations as indicated it should be possible to make accurate determinations for at least the majority of parasitic infections.

We will now deal with the major parasitic species as our typically found in the Aquarium, beginning with by far the most prevalent.

White spot (*Ichthyophthirius multifiliis*)



Causative organism

Ciliated parasite viz:- *Ichthyophthirius multifiliis* with a complex life cycle.

Synonyms (alternative names)

White spot, or "Ick".

Geographic distribution

World wide.

Water type

Fresh & Brackish water. (similar organism *Cryptocaryon irritans* is a salt water parasite.)

Trophont stage of *Ichthyophthirius multifiliis* "Ick". Note the typical 'u' shaped nucleus.

Typical signs of infection. *Ichthyophthirius multifiliis* aka "Ick".

Water. Elevated Ammonia levels, high Nitrate measurements, sudden changes in Temperature especially a fall in Temperature can bring about a latent infection.

Behaviour. Anorexia, (loss of appetite with consequential wasting), hiding abnormally, rubbing and scratching, breathing at the surface, fast respiration, refusing all food are all typical indications, but these are also signs in other problems so diagnosis must be coupled with other indications.

Fins. Fins folded, Fins showing white spots about 1mm in size.

Body. White spots from 0.2mm - 1mm in size will appear over the body.

Eyes. Eyes may appear cloudy.

Gills. Gill examination may show numbers of such white spots.

Skin. (smear). Should show ciliates if white spot is present.

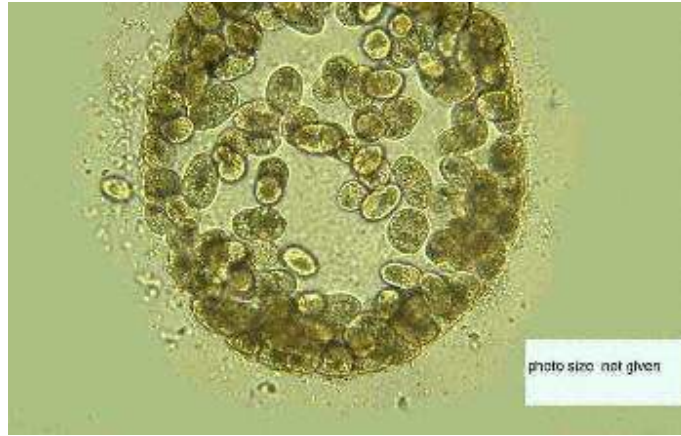


Black Widow showing typical "Ich" sign, of a folded dorsal fin, this sign often appears in the early stages.

Life cycle & method of transmission.

White spot, is a parasite that covers the entire globe, there are few Aquarists that have not met it on one or more occasions. A sudden chilling of the fish, which can easily occur when they are being transported from the shop to one's home, is often sufficient to take the parasite from its latent state to the reproductive phase. An unchecked outbreak will bring about a heavy mortality rate, though it takes usually quite a number of days before such comes to pass, thus giving the Aquarist time to take remedial action.

White spot "Ich", is a ciliated parasite with a three stage life cycle. On the fish, the only part that we can easily observe, the form is termed a *trophont*, & causes the appearance that gives rise to the popular name of the condition, i.e. "White spot" As the trophont matures it eventually breaks through the skin (epithelial layer), then falls to the bottom of the tank, during which phase it can attach itself to any of the various materials that we use in our Aquaria, such as gravel, filters, airline tubing and more.



Theronts leaving the cyst (Tomont stage) . *Ichthyophthirius multifiliis*.

This part of the life cycle is called a **tomont** . How long it remains in this stage is a variable as a higher temperature will accelerate its maturation, whilst colder water ensure a longer latency. For this reason many Aquarists use an elevated temperature to try & cause the parasite to mutate into the final re-infective form termed a **theront** .

The parasite is at its most vulnerable whilst in the free swimming Trophont form before it encysts as a Tomont. Various chemical therapies are effective, such as Malachite green, or Malachite green with formaldehyde. The Theront stage is very sensitive to higher temperatures, which is the reason that many skilled Aquarists often try eliminating an outbreak, purely by increasing the number of degrees Centigrade by some 3-5 ° whilst the infestation is endemic.

Prognosis :

If diagnosed early & effectual treatment is applied, the outlook is excellent. However if the infestation is at an advanced stage, then mortalities must be expected. Any treatment method must take into account, both the species of fish (some will not tolerate the more popular medications , see below), as well as how heavy the infection rate is. Diligent observation of these criteria should enable the Aquarist to obtain a successful resolution to the problem.

Treatment

Most proprietary medications give the recommended dosage, but there are several cautions which must be noted, when using any of the mentioned treatment methods.

The popular treatments contain Malachite green, sometimes combined with Formalin.

The dosage will vary according to the manufacturer, but a typical treatment level for Malachite green is .1mg/L of water. Formalin ranges form .25mg/L to much higher levels depending on the combination with Malachite green or it's usage alone, also on whether it is meant as a timed bath treatment of prolonged immersion. One must refer to the instructions on the chosen medication but also be aware of the points below to achieve the desired result.

1) The species of fish. Some fish especially scaleless forms such as Clown Loach, Elephant noses, plus many others, as well as a great many Tetras, are adversely impacted by the use of Malachite green, or some cannot tolerate the full dosage that others can. It is therefore essential, that BEFORE applying any chemotherapy , that one is aware of the limitations of the chosen treatment, if in doubt seek some professional advice. Otherwise

the "cure" could be worse than the disease. I have seen many times, entire tanks of fish wiped out for this reason, sick and healthy fish alike

2) Heat treatment, which can be highly effective. However again there are species of fish, that will not tolerate the temperatures needed to be effective. One such example would be White Cloud Mountain Minnows. A temperature of say 22 ° C or higher, will cause such fish to succumb very quickly.

3) The degree of the infection. Grossly weakened fish, will not tolerate medication that more robust and less infected ones may. All medications to some degree, are toxic not only to the parasite but also to the fish, it is a matter of judgment, that can take many years of experience to know just how much of a medication to use. The guide lines given on most proprietary treatments, can only be considered guidelines, so the user must take into account the many variables before making his/her call on how much to use.

It is also vital to ensure that after a treatment has been selected & found efficacious to make certain that water changes are made afterwards to try to minimize any side effects on bacteriological filters as well as plants etc. Naturally if it is possible, it is better to treat in a hospital tank, and when the fish are cured to reintroduce them to the main Aquarium. This ideal situation is not always possible however.

A treatment that I have found effective but not one that all readers will find practical, is to place infected fish in a small 10 Gal. Aquarium with some outside filtration. There should be no rocks or other ornaments for the Trophont's to adhere to easily. Another one or two such Aquaria are also set up, and the water in each must match in every parameter (Temp. pH, alkalinity etc.) the original tank water. About every eight hours the fish are transferred to a "clean" tank, thus breaking the possibility of the parasite obtaining a new host. The emptied tank is then sterilized & refilled with water, again paying close attention to the water parameters as before. If this procedure can be carried out by the Aquarist, it will usually result in a cure within a matter of some 3-4 days, though caution should be employed for another day or so, to ensure all is in order, before putting the fish back to the main tank. Although time & space consuming, it has the advantage, that no chemicals need to be used, so consequently the fish are far less stressed, even allowing for the trauma of moving them. The treatment tanks should be in a quiet place, as there is no place for the fish to hide, they are in this way not "excited" as this would be counterproductive. Of course small tanks like this will not work for large fish, such as grown Oscars and many others, but it is a technique well worth considering.

Refs. & further reading .

C.van Duijn Diseases of Fish . Published by Ilife books London. 1973

M.Stoskopf. Fish Medicine . Published by W.B. Saunders. 1993

D.Untergasser. Fish diseases. Published by TFH 1989

John Shawn Prescott

john@aquarium-gardening.com