PARASITES AND DISEASES OF WARM-WATER FISHES

FISH FARMING EXPERIMENTAL STATION
U. S. FISH AND WILDLIFE SERVICE
STUTTGART, ARKANSAS

Department of the Interior

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Bureau of Sport Fisheries and Wildlife

Fish Farming Experimental Station

Stuttgart, Arkansas

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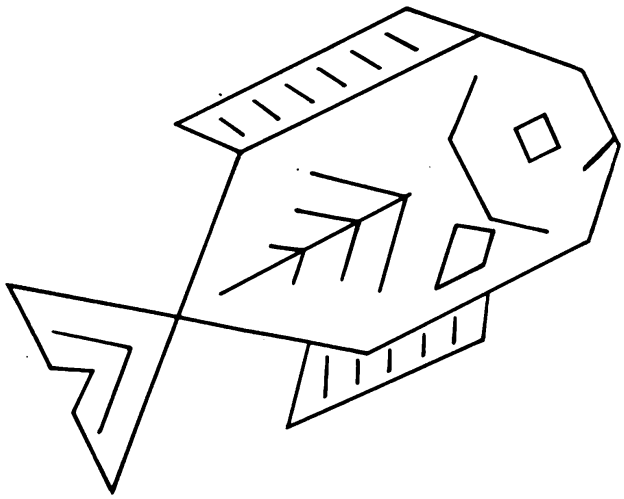


PARASITES AND DISEASES OF WARM WATER FISHES

Introduction

The investigation of parasites and diseases affecting fish raised in fish farming reservoirs is one of the major areas of investigation at the Fish Farming Experimental Station. Studies are conducted on their control, their life histories, and their distribution. A few of the more common problems are presented in generalized form in this booklet with facts about each. It is hoped that this brochure will help you to recognize some of the more common diseases and parasites and help you to understand some of the problems of the fish farmer.

Parasitic organisms often become a problem when animals are crowded or reared in closely confined quarters. Outbreaks of diseases or parasites are common to the fish farming industry and it is important that techniques be found for their control

if fish farming is to develop to its fullest potential.

Unfortunately, many of the diseases affecting fish have similar symptoms and it often becomes necessary to perform a microscopic examination before a diagnosis can be reached. A microscope would not be practical for the average fish farmer. However, a few of the diseases have characteristic symptoms. These have been noted and the species of fish most commonly affected are listed.

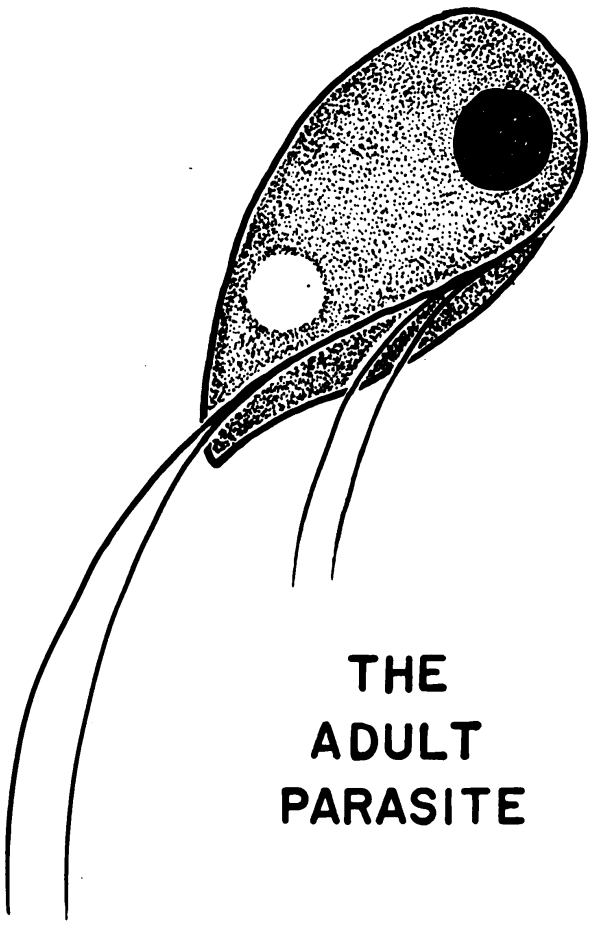
Bacterial diseases are perhaps the most difficult to diagnose since their identification often requires a thorough understanding not only of the bacteria but also of the anatomy or physiology of fish. Frequently special cultures or stains are required before a definite conclusion can be reached.

Internal parasites such as tapeworms and flukes are known to occur in many species of fish raised in fish farming reservoirs. Many of the life cycles of these parasites and their exact effect upon a fish and its growth are unknown.

Treatments for the various diseases are, in general, only partially successful. The best control for any disease is prevention. Careful selection of brood stock, purchases of fingerling fish from disease-free establishments, a good water source, exclusion of wild fish, and general sanitation are some of the best ways to control fish diseases. Fish culturists in various parts of the country are not in accord concerning the best treatment for a particular disease. As

a consequence, in the case of each disease, several possible treatments will be given since factors such as water quality, temperature, species of fish, and the physical condition of the infected fish may affect the success of a particular treatment.

Many people consider a parasitized fish as being unfit for human consumption. This is a waste of a good resource. None of the parasites affecting warm-water fish are known to affect man. It should be emphasized, moreover, that any fish, properly cooked and prepared, is fit for human consumption even though it may appear parasitized.



THE ADULT PARASITE

COSTIASIS DISEASE

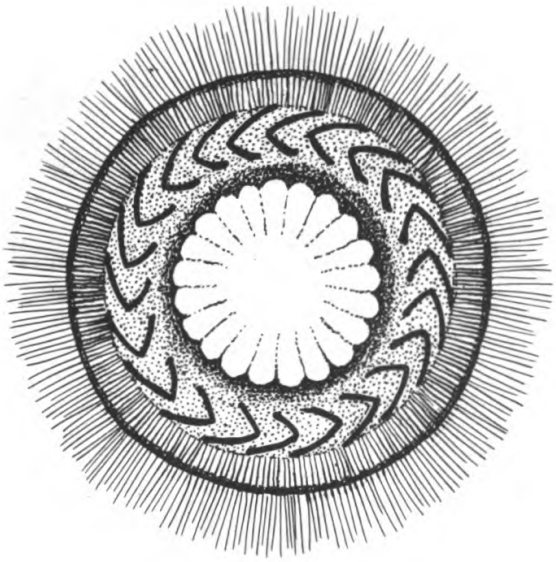
Causative organism: Protozoa of the genus *Costia*.

Symptoms: Blue-gray film appears over body surface; fish do not feed. Infected fish often show quick-erratic movements.

Susceptible species: Channel catfish, bass, bluegills.

Possible therapeutic agents: Salt, acetic acid, formalin, PMA, triparsamide, stilbamidine.

NOTE: This organism is microscopic.



THE ADULT PARASITE

TRICHODINIASIS

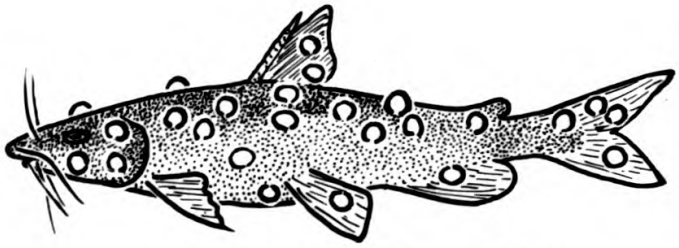
Causative organism: Protozoa of the genus *Trichodina*.

Symptoms: Irregular white patches appear over head and body. Fish show frayed fins, sluggishness, and loss of appetite.

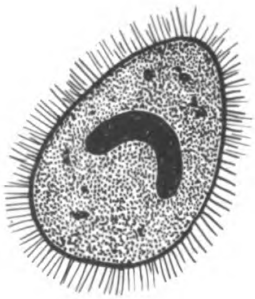
Susceptible species: All minnows, bluegills, crappie, bass, and channel catfish.

Possible therapeutic agents: Salt, acetic acid, formalin, PMA, and Quinine hydrochloride.

NOTE: This organism is microscopic.



AN INFECTED FISH



THE ADULT PARASITE

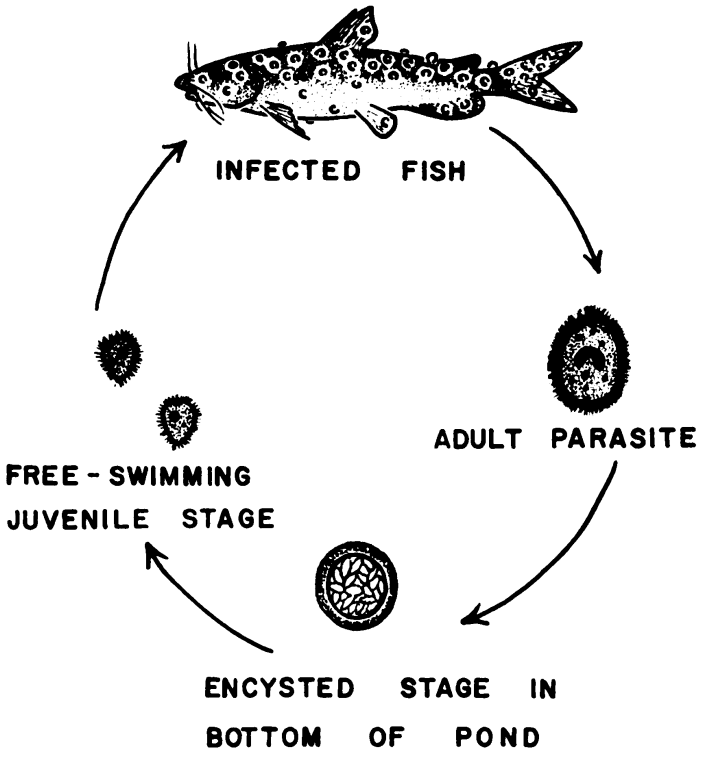
ICHTHIOPHTHIRIASIS

Causative organism: *Ichthiophthirius multifilis.*

Symptoms: Fish develop a thickened epithelium, excessive mucus, parasites appear as small white nodules over the body surface. Heavily infected fish often congregate at the intake or outlet of the pond.

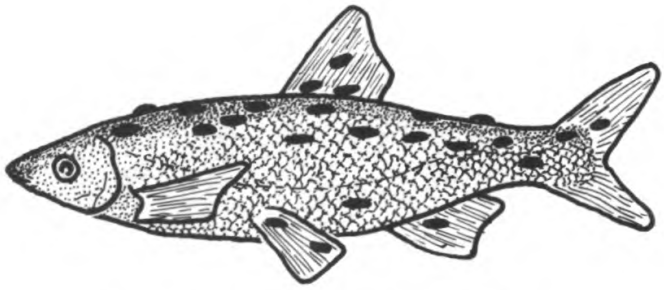
Susceptible species: Channel catfish, bullheads, buffalo fish, carp, Sunfishes.

Possible therapeutic agents: Formalin, methylene blue, PMA, salt, copper sulfate, quinine hydrochloride, mepacrine hydrochloride.



THE LIFE CYCLE OF ICHTHIOPHTHIRIUS

The life cycle of the "Ich" parasite involves several stages and it is for this reason that the disease frequently recurs. Treatments for one stage often will not affect the others. The adult stage of this protozoan emerges from the epithelium of the infected fish and drops to the bottom of the pond where it forms a resistant cyst. There the organism undergoes multiple divisions to produce many tiny juvenile forms. Under suitable conditions, these juveniles (tomites) emerge and swim about seeking a fish into which they may penetrate and develop to maturity.



AN INFECTED FISH

A PARASITE REMOVED
FROM ITS CYST

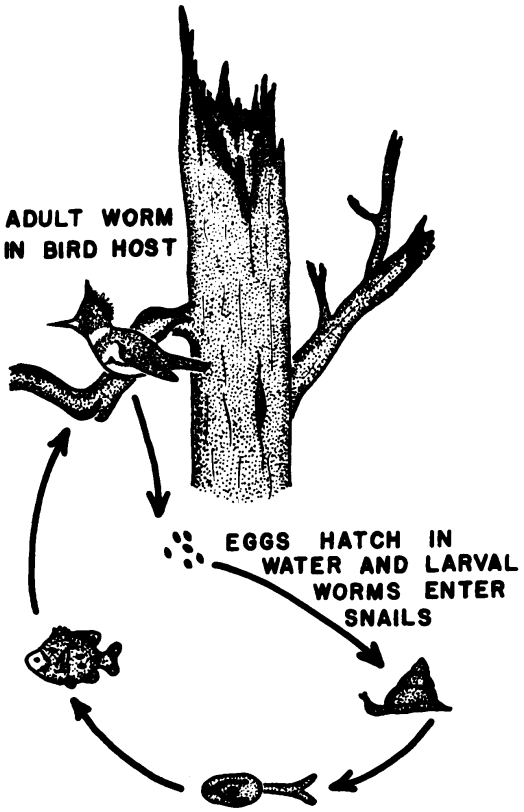
BLACK-SPOT DISEASE

Causative organism: Larval flukes.

Symptoms: Small pigmented black nodules appear in the flesh and over the body of infected fish.

Susceptible species: Most minnows, bluegills, sunfish, bass.

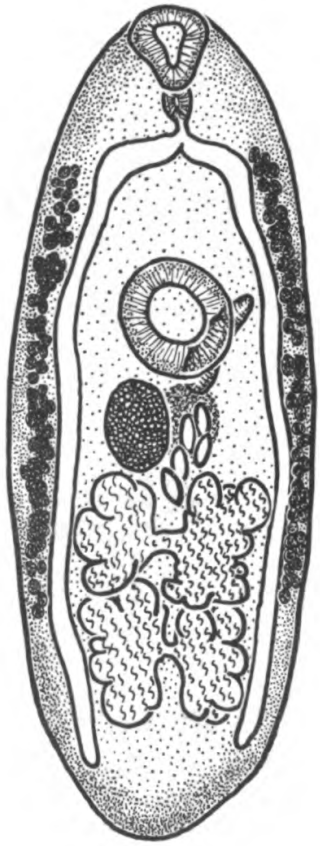
Possible therapeutic agents: Once the fish has become infected, no known treatment is available. For the control of this problem, see the next page for a discussion of the life cycle.



THE LIFE CYCLE OF BLACK-SPOT

Black-spot disease is the reaction of a fish's body to the presence of larval parasitic worms in its flesh. These worms reach adulthood only when an infected fish is eaten by a proper bird host. As indicated above, the life cycles of these flukes involves fish, snails, and birds with several free-swimming stages. Should an animal other than a bird eat an infected fish, there would be no danger of infection.

Possible controls: Eradication of snails, removal of bird roosts in vicinity of reservoirs.



AN INTESTINAL FLUKE

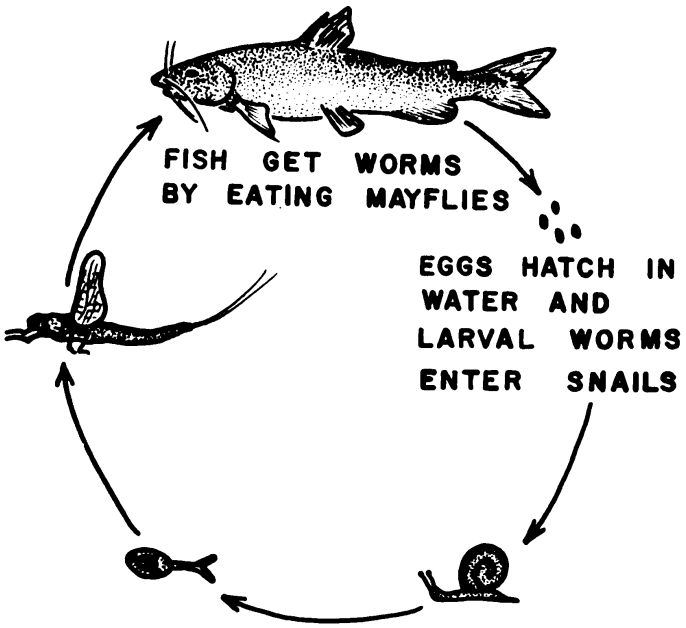
INTESTINAL FLUKES

Causative organisms: Parasitic worms known as digenetic trematodes (flukes).

Symptoms: Generally infected fish exhibit no symptoms. They may appear listless or show a loss of weight.

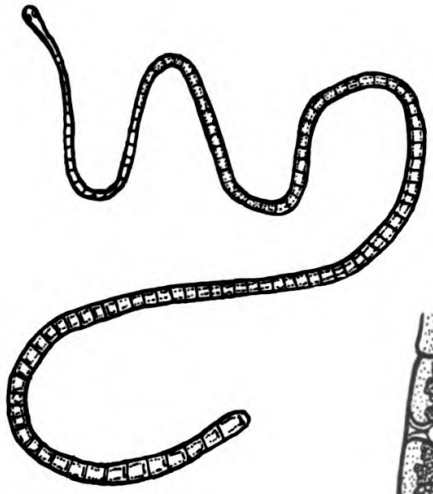
Susceptible species: All species of fish produced in fish farming reservoirs.

Possible therapeutic agents: di-N-butyl tin oxide, Kamala, chloroxylenol.



THE LIFE CYCLE OF A FLUKE

The life cycle of these parasitic worms follows a pattern similar to that described for the black-spot disease. The major difference is that, in this case, the worms reach maturity in the intestine of a fish rather than in a bird. Since insects serve as important fish foods, their eradication is neither desirable nor practical. As in the case of black-spot disease, the most effective control is the removal of snails from a reservoir.



ADULT TAPEWORM

HEAD

SECTION OF A TAPEWORM

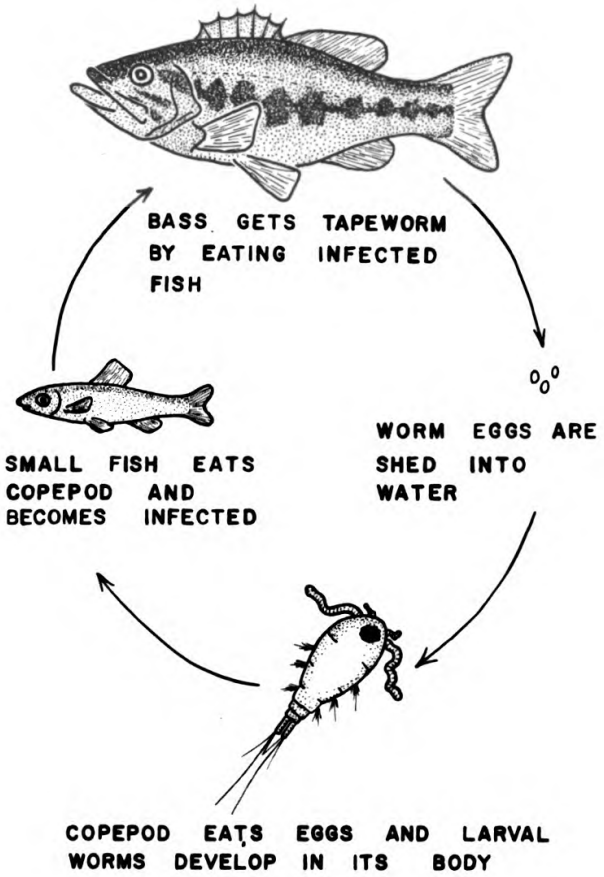
TAPEWORMS

Causative organisms: Tapeworms. The species of worm will vary with each species of fish involved.

Symptoms: Usually no outward symptoms but fish may be listless, lose weight, or become sterile.

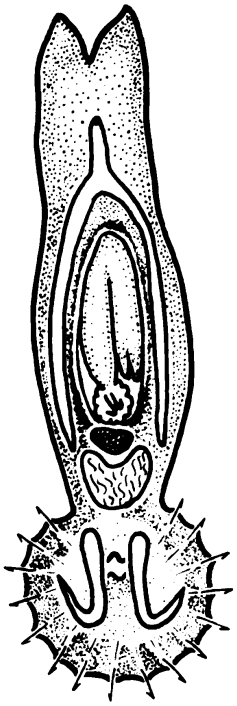
Susceptible species: All species, especially bass and catfish.

Possible therapeutic agents: di-N-butyl tin oxide, Kamala, chloroxylenol.



THE LIFE CYCLE OF THE BASS TAPEWORM

Many parasitic worms require a number of animals as intermediate hosts in their life cycles. The bass tapeworm requires a copepod and a small fish as such hosts. While many species of small fish will serve for the larval stages, the worm reaches adulthood only in the largemouth bass. Once the parasite has been introduced into a reservoir, only the removal of all fish will guarantee its eradication. Stocking with parasite free bass is the best control. However, if bass to be stocked are suspected of carrying the parasite, they may be given an anthelminthic to remove the worms.



THE
ADULT
PARASITE

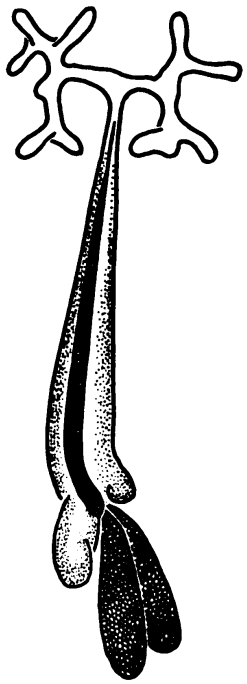
MONOGENETIC FLUKES

Causative organisms: Many monogenetic flukes are known. The most common species are *Gyrodactylus* (illustrated above) and *Dactylogyrus*. They are similar in size and general appearance.

Symptoms: Fish show discomfort, often rubbing against the bottom or rocks. Excessive numbers of the parasites may cause death.

Susceptible species: All species of fish in fish farming reservoirs.

Possible therapeutic agents: Acetic acid, formalin, PMA.



THE
ADULT
PARASITE

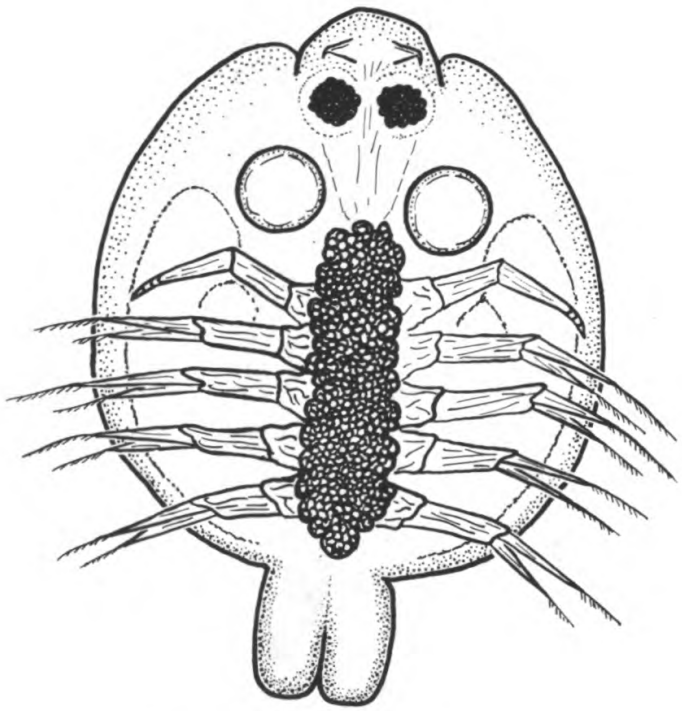
ANCHOR WORM

Causative organism: A parasitic copepod, *Lernea carassii.*

Symptoms: Small lesions appear on the external surface, often surrounded by a patch of fungus. The parasites resemble a shaft of a small barb inserted into the flesh of the fish. The parasites cannot be easily removed due to the anchor.

Susceptible species: Buffalo fish, carp, golden shiners, bluegills, bass, crappie -- most scaled fishes.

Possible therapeutic agents: Benzene hexachloride, Potassium permanganate.



THE ADULT PARASITE

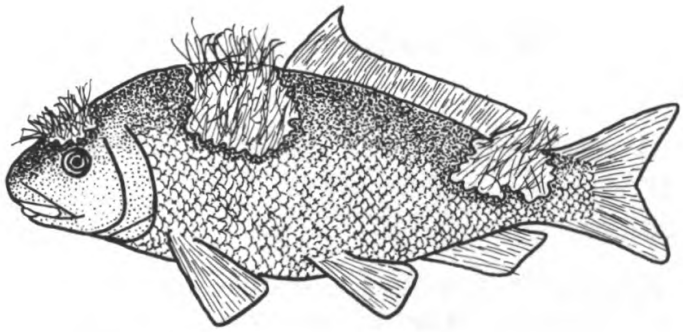
FISH LICE

Causative organisms: Parasitic copepods of the genus *Argulus*. These organisms are closely related to the anchor worm.

Symptoms: Mortality, listlessness, general discomfort.

Susceptible species: Buffalo, carp, goldfish, golden shiners, bass, bluegills, crappie, and catfish.

Possible therapeutic agents: Salt, benzene hexachloride, Potassium permanganate, chlorine.



AN INFECTED FISH

FUNGUS

Causative organism: Fungi of *Saprolegnia* and *Achlya* species.

Symptoms: General fuzzy appearance, usually associated with localized discolored areas or lesions. Fungus infections are generally secondary and are indicative of other problems. Fungi seldom become established on healthy fish unless they have been subjected to some stress or injury.

Susceptible species: All species of fish produced in fish farming reservoirs.

Possible therapeutic agents: Malachite green, copper sulfate, potassium dichromate, potassium permanganate, methylene blue, phenoxethole, acriflavine (neut.)

COLUMNARIS DISEASE

Causative organism: Bacteria; *Chondrococcus columnaris*, and *Cytophaga columnaris*.

Symptoms: Appearance of discolored patches on the body, sloughing of scales, and high mortality. There is a superficial resemblance between these lesions and those caused by fungus infections. Care must be taken to avoid confusing the two.

Susceptible species: Buffalo, golden shiners, bluegills, bass, crappies, and catfishes.

Possible therapeutic agents: Copper sulfate, potassium permanganate, PMA, antibiotics.

NOTE: MICROSCOPIC EXAMINATIONS ARE NECESSARY IF A POSITIVE DIAGNOSIS IS TO BE MADE.

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Many fish may carry low numbers of the organism, either harboring a chronic, low-grade infection or serving as carriers. Such fish might develop acute cases if they were subjected to stresses such as handling, malnutrition, or seasonal climatic changes. This may account for the sudden massive outbreaks which sometimes develop.

OTHER DISEASES OF FISH

The foregoing pages represent only a few of the many diseases which affect fish. Fish are susceptible to nearly every type of disease known to afflict the higher animals. They suffer from attacks by viruses and rickettsiae as well as bacteria. A form of tuberculosis has been isolated from fish. Some of the protozoan diseases and worm parasites have been discussed in the preceding pages.

Tumor-like growths occur on many fishes. Studies indicate that these abnormalities may be of varied origins. Certain ones, as in the case of Lymphocystis disease, are known to be caused by viral agents. Others, such as goiter, may be due to nutritional disorders. The study of this area of fish disease is just beginning. It is hoped that current research at the many interested laboratories will contribute greatly to the meager knowledge now available.

Compounding the problems presented by diseases are such factors as pollution, water quality, the use of insecticides by farmers, population density, food supply, inter-species competition and radiation. There is no quick solution to any of the problems. Sound research is a slow, time-consuming process requiring carefully controlled experiments and testing before a conclusion can be reached.

MAKING A DIAGNOSIS

Consider the fish involved because certain diseases affect only one species.

Examine the history of the fish in the reservoir: where were the fingerlings secured? when were they stocked? are wild fish present?

The water supply is important. Is the source a well or surface water? Are antibiotics or other drugs included in the feed formulation? Have disease treatments been applied earlier?

Study the history of the disease. When were the first signs of illness noted? How rapidly did the disease develop? Are losses severe? What are the symptoms: do the fish congregate in the vegetation? are they listless? do they have any external signs of disease such as heavy coats of mucus, discolored patches, or fungus? Have there been any marked changes in behavior?

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NOTES