

PESTS/PARASITES AND DISEASES OF MILKFISH IN THE PHILIPPINES

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This paper presents all known parasites of milkfish in the Philippines. The major parasitic groups include acanthocephalans, copepods, isopods, and heterophyid flukes. The number of parasitic species found in ponds is small compared with those harbored by the fish in its natural environment. Parasites with a direct life cycle usually survive in ponds as flagellates, ciliates, myxosporidians, coccidia, and parasitic arthropods under improper management. The methods of treatment, prevention, and control of these parasites are discussed.

INTRODUCTION

In the Philippines, milkfish culture has been a traditional enterprise without a scientific basis for many years. Lately, the industry has expanded into fishpens in large bodies of water such as Laguna de Bay. Barring other calamities such as typhoons and floods, entrepreneurs have profited as long as no epizootics have occurred. Attempts to increase the productivity of fish farms, to improve stocks, and most of all to acclimate fish to new environments require detailed knowledge of the parasites inhabiting the different localities involved. For fish in a fishpond, migration from an unsuitable environment is not possible, and infestation may result in death and economic loss.

Every parasite living in or on a fish exerts some degree of harmful influence on its host. Parasites can influence the body of the fish in many different ways — either

mechanically or physiologically. In some cases, the influence may be so slight as to cause no external signs, but extensive changes in individual organs or tissues or a general effect on the host may occur. Knowledge of the development and biology of the parasites of fish is necessary if successful prophylactic measures are to be devised. For example, many endoparasites enter the host through the alimentary canal by being swallowed with food. If not regulated, invertebrate food fauna in areas new to the fish may cause outbreaks of epizootics. On the other hand, ectoparasites develop externally and are more influenced by the conditions of the macroenvironment (i.e., environment of the fish host).

Upon arrival of the fry at the fishpond from the spawning ground, profound changes in their physiology are bound to have an effect on their resistance to parasitic diseases. Differences in water quality between seawater and pond water such as reduced salinity, plus methods involved in the management of ponds such as polyculture, may enhance mass infestation or infection, resulting in enormous losses. The density of the fish population is one of the most important factors in the outbreak of disease in ponds; crowding, along with lack of food supply, lessens fish resistance.

However, conditions in pond fisheries allow for preventive and control measures. Methods of treatment which are not possible in large bodies of water are feasible in confined areas. These methods include baths, drying of the pond, treatment of the bottom with lime, quarantine of single ponds or entire farms, extermination of wild fish and birds that may be not only predators but carriers of parasites, proper waste disposal, and cleaning of the surrounding area.

The parasitic fauna in fishponds differs greatly from that of natural environments and may include flagellates, ciliates, myxosporidians, coccidia, and parasitic arthropods, all with direct life cycles. This paper presents all known parasites of *Chanos chanos* (Forsskal) in the Philippines, organized by major groups.

MAJOR PARASITIC GROUPS

Acanthocephala

The Acanthocephala form a clearly defined group of worms. They are cylindrical and are provided with spines in the proboscis; hence they are called "spiny headed worms." Sexes are separate, the females being usually somewhat larger than the males. Intermediate hosts are arthropods (Yamaguti 1963).

The Acanthocephalan life history may be divided into four distinct phases (Yamaguti 1963): (1) within the egg, the hooked *acanthor* is formed; (2) upon ingestion by a suitable intermediate host, the parasite emerges within the gut, loses its larval hooks, and becomes an *acanthella*; (3) this progressively develops into a *juvenile* (infective stage); and (4) when the infected intermediate host is eaten by an appropriate final host, the juvenile is liberated, immediately attaches itself by its proboscis to the intestinal mucosa of the host, and becomes an *adult*. A final host may also become a potential intermediate host.

Numerous worms were found in the intestinal walls of *sabalo* (adult milkfish) from Nasugbu, Batangas and from the Bureau of Fisheries and Aquatic Resources (BFAR) station in Mindoro (Velasquez 1979). Ulceration of the intestinal wall was evident, with the proboscis of the worm securely attached to the wall. The *sabalo* had acquired

the *Acanthocephalus* sp. infection in the open sea by eating infected arthropod intermediate hosts.

Milkfish from fishponds have been found negative to acanthocephalosis.

Copepoda

Fingerlings infected with *Lernaea cyprinacea* L. 1958 reared in Himalayan fishponds and those of the fishpens of Laguna de Bay were diagnosed (Velasquez 1979). The copepods protrude wormlike from the nostrils or from the skin of the infected fish, usually at the base of the fin. The visible portion is cylindrical and whitish, often with two eggs extending from its posterior end. When carefully dissected out of the fish, the modified head appears anchor-like, giving the organism the name "anchor worm." This parasite goes through developmental stages from fish to fish, resulting in considerable damage to the host, and mass infestation results in great economic loss.

A salt solution bath of about 3-5% concentration has been found effective in treatment of copepod infestation (Velasquez 1979). However, because the adults are difficult to kill, dessication of infected ponds and liming are recommended before restocking with healthy fish.

Caligus patulus Wilson 1937 frequently infects *sabalo* reared in experimental tanks whose water is supplied directly from the sea without adequate filters (Velasquez 1979). Concentration of the planktonic caligids results in the infestation and death of some of the *sabalo*.

All members of the family Caligidae are parasites (Kabata 1979). They cling to their host's surface with their flat bodies, somewhat like large adhesive discs, aided by prehensile appendages. They are capable of movement over the host surface. The first larval stages and the final adult stage are free-swimming. The adults occur free in plankton. The second pair of antennae are provided with claws and have two suckerlike organs located close to the anterior end of the cephalothorax. The nauplii are positively phototropic and swim up close to the surface of the water. The final stage of metamorphosis, however, becomes negatively phototropic and finds its host near the bottom of the water. The copepodid stage in caligids is extremely characteristic and is generally known as the chalimus stage. It is found attached to the host, usually to a fin or scale, by a long filament that is formed by the hardening of the secretion derived from a gland located in front of the eyes. The larva undergoes several molts while remaining attached this way, each molt bringing it to a stage nearer to the adult. When the adult male emerges from its final molt, it breaks off the thread and immediately searches for a female. The latter remains attached until fertilized, and only then breaks away to lead a planktonic existence. However, during confinement — as in the case of adult milkfish in rearing tanks — the planktonic caligids from the ocean find their way to the fish, wander over their hosts' bodies, and suck their food with the aid of a tubular mouth part. Caligid adults never stay very far from their hosts.

For treatment, the use of a 1-3% formalin bath is recommended since it is less harmful to other organisms in the tank. Laviña (pers. comm.) used neguvon (Dylox), an acaricide, with positive results. However, neguvon dissipates quickly in seawater.

Isopoda

Rocinella typicus and *Ichthoxyenous* are vicious killers. They kill not only the fry and fingerlings but also fish of marketable size. Under laboratory conditions, they attack, traumatize the fish, and eventually kill them. Mass killing of fish in fishponds has occurred (Velasquez 1979).

A direct life cycle and fast multiplication enhance the intensity and incidence of infection. It is recommended that (1) all infected fish be removed from the ponds, (2) survivors and non-infected fish be placed in clean ponds, and (3) all ponds with infected fish be dried and limed for several weeks before subsequent use.

Heterophyidae

Various species of heterophyid flukes (Digenea: Trematoda: Heterophyidae) are etiologic agents of heterophyidiasis, a disease in man caused by these very small flatworms. The larvae (metacercariae) of *Haplorchis varium*, *H. yokogawai*, and *Procerovum calderoni* have been found encysted in the muscles of milkfish obtained from fishponds at the BFAR Dagatdagatan Experimental Station, Malabon, Rizal (Velasquez 1973a, b; 1975). They are of zoonotic significance.

Human infection or infection of piscivorous birds and mammals occurs following ingestion of the flesh of raw or inadequately cooked fish harboring metacercariae of heterophyid flukes. Excystment of young flukes takes place in the small intestine, and they develop into adults in 5-10 days or more. In humans, the infection may cause mild diarrhea. However, the continuous practice of eating insufficiently cooked infected bangus may result in cardiac and visceral complications. To date, the only heterophyid life cycle known in the Philippines is that of *P. calderoni* (Velasquez 1973a). The snail intermediate host is *Thiara requetti*. The eggs are eaten by the snail and develop into the early developmental stages in the hepato-pancreas. Emerged cercariae penetrate and encyst in a suitable fish such as milkfish.

Infection of fish can be avoided by proper waste disposal and by strict observance of preventive measures.

CONCLUSION

The composition of the parasitic fauna of *Chanos chanos* (Forsskal) is affected not only by the physiological and biological features of the host but also by management in the case of pond fisheries.

Prophylactic measures, treatment, prevention, and control should be in accordance with the ecological conditions existing in the locality. Chemotherapy of fish for human and farm animal consumption should be employed in accordance with Food and Drug Administration rules and regulations.

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