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CAUSE OF MORTALITY IN AQUARIUM FISH, ANGELFISH (Pterophyllum Scalare)

(With 3 Tables)

By

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أسباب الوفـــاة فـــي أسمـــاك الزينـــــــــة

ليلى صلاح الدين أحمد ، شعبان أحمد ، حلمى صديق ، يوسف كامل ، طه العلاوى

هذه الدراسة تمت على عدد ٢٠ سمكة من أسماك الزينة وكذلك عينات من الماء المحيطة بها ، وفيها تم عزل وتصنيف عدد ٤ عترات بكترية ، عدد ٣ أنواع من الفطريات وكذلـــــك ٣ أنواع من الطفيليات وذلك من عينات للخياشيم والجلد والأعضاء الداخلية لهذه الأســـــماك ويرجح أن نسبة الوفيات العالية التى تحدث في أسماك الزينة ترجع إلى إصابة هذه الأســـــماك ببعض من هذه الميكروبات المسببة لأهم وأخطر الأمراض التى تصيب السمك .

SUMMARY

A total of 20 angelfish were microbiologically investigated to determine the role of pathogenic and potentially pathogenic as well as water saprophytic microbes in causing the high mortalities among aquarium fish.

The bacteriological examination revealed the isolation of 4 species including Aeromonas hydrophilia, A. sobria, Pseudomonas aeruginosa and Staph. epidermidis from the surface gills and internal organs of the examined fish.

Identification of the fungal isolates revealed the recovery of 3 different species mainly Saprolegnia diclina, Achly sp. and Aspergillus flavus from the surface and gills of the fish.

Three parasitic isolates comprising of Ichthyophthirius multifiliis, Henneguya sp. and Gyrodactylus sp. were recovered from the skin and gills of the examined specimens.

The role of the microbial evaluation of the water samples indicating that water may act as one of the most important sources of infection and contamination of fish with bacteria and fungi.

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INTRODUCTION

The health of an individual fish or of a given fish species in fish culture is greatly influenced by its ability to adapt the variations and extremes in environmental stress factors predisposing to diseases.

Fish diseases investigators are well aware of the difficulty in deciding which species of bacteria are true fish pathogens. Some of the well pathogens are not causing a disease sometimes in the aquatic environment. On the other hand, many saprophytic water bacteria may produce disease when fish are under stress from specific but poorly under-stood environmental conditions.

However, fish may become actively infected or subjected to a wide variety of bacterial pathogenes resulting in serious pathological lesions as well as significant hazards among fish population in aquarium resources. Of these Haemorrhagic septicaemia, or Aeromonaden septicaemia caused by Aeromonas hydrophilia and sometimes by a Pseudomonas sp. is considered as on of the most important bacterial diseases among Aquarium fish (ASHBURNER, 1983).

Ornamental cold water fish have also brought in several serious parasitic diseases including white spot disease, Trichodiniasis, Henneguya, and Gyrodactylus infestations (ASHBURNER, 1970) of these Ichthyophthiriasis or white spot disease caused by protozoan parasite Ichthyophthirius multifiliis is one of the serious illness affecting aquarium fish and causing very high mortalities among these cold blood animals (ASHBURNER, 1983).

Unfortunatly, fungal infections of aquarium fish are very frequently occur after damage of the protective slime layer of the skin by some trumas and rough handling. Saprolegnia spp. is one of the water moulds which penetrate the damaged skin epidermis causing rapid destruction of it. Penetration of the fungus by its hyphae through the basement membrane and into the dermis further compromises the integrity of the integument (GARDNER, 1974 and HARGENS and PEREZ, 1975).

The aim of the present study was to investigate the main cause of the high mortalities among aquarium fish.

MATERIAL and METHODS

1- Source of specimens:

A total of 20 angelfish were collected from hobbies. The obtained fish were separately wrapped in a sterile plastic bags with little amount of aquarium water which it lives in, and dispatched to the laboratory with a minimum of delay.

2- Preparation of specimens:

Specimens of the fish were obtained from the surface, gills and internal organs. Samples from the surface were obtained by swab method for bacteriological and mycological examination and by means of scrabing for parasitological investigation. Specimens from the gills and internal organs were aspetically in small pieces for laboratory examination.

3- Laboratory examination of the specimens:

The laboratory examination entailed the following:

a) Clinical and post. mortem examination of fish:

Each fish was thoroughly investigated according to AUSTIN and AUSTIN (1987) for any symptoms or P.M. lesions.

b) Bacteriological examination:

Each specimens was cultured on trypticase soya agar and blood agar media. The incubated plates were incubated at 22°C for 48 hours. Identification of the bacterial growth was carried out microscopically and biochemically according to ALLEN, et al. (1983) and AUSTIN and AUSTIN (1987).

c) Mycological examination:

Specimens from the surface, gills and internal organs were streaked on sabourod's agar meida. The inoculated plates were incubated at 22°C for one week. Identification of fungi was carried out according to NEISH and HUGHES (1980).

d) Parasitological investigation:

Parasitological examination of skin scraping, gills and internal organs were done by direct smear method and according to KABATA (1985).

e) Microbial evaluation of aquarium water:

Water samples were collected from the aquarium. The samples were thoroughly mixed and centrifuged at 3000 r.p.m. for 5 minutes. The sediment obtained was examined for bacteria, fungi, and parasites according to the aforementioned references.

RESULTS

Results are tabulated in tables 1, 2 and 3.

DISCUSSION

Four bacterial species were only recovered from the twenty examined fish samples. They included Aeromonas hydrophilia, A. Sobria, Pseudomonas aeruginosa and staph. epidermidis. Identification of these species was based on their cultural character as well as biochemical activities (Table 1).

The mycological examination of the examined fish specimens revealed the isolation of three different genera of fungi including Saprolegnia sp., Achyl sp. and Asperigllus flavus (Table 2).

Three different species of parasites comprising of Ichthyophthirius multifiliis, Henneguya sp. and Gyrodactylus sp. were only recovered from the surface and gills of the examined samples (Table 3).

Regarding the pathogene significance of the bacterial isolates in fish it is clearly evident from our results that fish were found to be carrier of some water borne pathogenic bacteria for several genera including Aeromonas, Pseudomonas and staphylococci which have been reported as an etiologically significant agents or coagent in fish diseases.

Aeromonas species including A. hydrophilia and A. sobria were recovered from the surface, gills, intestine and internal organs of all the examined fish. These motile aeromonads are considered as an etiologically significant agents in either primary or secondary infection of fish and some other species of animals all over the world (LALLIER, et al. 1981). They are detected in cases of motile haemorrhagic septicemia of fish, ulcer disease of Cod. and red leg disease of frogs (SANARELLI, 1891; SCHAPERCLAUS, 1930; HALEY, et al. 1967 and AHMED, 1982). They also recovered from cases of gastroenteritis and acute myelogenous leukemia in man (ROSNER, 1964; DEAN and POST, 1967) and Bovine abortion in animals (WOHLGEMUTHET, et al. 1972).

Staphylococcus epidermidis as a potential pathogen was recovered only from the surface and gills of the examined fish (Table 4). The aquarium health hazards of this organism was recorded by many authors all over the world. It was recovered as the main etiolgical agent on cases of outbreak of yellow tail and red seabream in Japan (CUSUDA and SUGIYAMA, 1981). It was also detected in cases of Staphylococcosis among Tilapia nilotica in Egypt (LAILA, et al. 1990).

The significance of the recovered fungi including Saprolegnia diclina, Achyl spp. and Aspergillus flavus were recorded by many authors as (NEISH and HUGHES, 1980; POST, 1983 and OLUFENI, et al. 1983). As the main causative agents of saprolegniasis affecting fish with the characterestic symptoms of fluffy and cotton-like white to grey growth on skin, fins, gills and eye of the affected individuals.

Ichthyophthirius multifiliis as the causative agent of ichthyophthiriasis or white spot disease was isolated from the skin and gills of all the examined fish. This protozoal disease is characterized by small white spot on the skin and gills accompanied by lethargy, listlessness, and rubbing on the sides or bottom of the aquarium (HOFFMAN, 1978 and LEVINE, 1973).

Henneguya spp. is the other protozoal parasite recovered from the skin and gills of the examined fish. This parasite is considered as the etiological agent of

Henneguyiasis with the characteristic formation of either gross or microscopic opaque masses in the various tissues of the body or cysts on the skin, gills and internal organs (McCRAREN, et al. 1975 and MITCHELL, 1978).

Gyrodactylus spp. is the only tremotode parasite which recovered also from the skin and gills of examined specimens. The infested fish become lethargic and swim near the surface, seek the sides of the pond and refuse food (NOBLE and NOBLE, 1971).

It is clearly evident from our results that various pathogenic organismes were isolated from water as well as from the examined fish indicating that water may act as one of the most important sources of infection and contamination of fish with many microbes. On the other hand, fish can also aquire pathogenic or potentially pathogenic organismes from other sources including food, utensils and equiments. However, the environment is the most important of unstable factor for fish contamination. Its significance is intensified by the presence of potentially pathogens that commonly co-exist in water. Good water quality is the any of successful fish production.

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Table (1)
Bacterial isolates recovered from fish and water samples

Biochemical reaction	A. hydtrophila	A. Sobria	Pseudomonas aeruginosa	Staphylococcus epidemidis
G-stain	G-ve short rods	G-ve short rods	G-ve short rods	G+ve cocci
Motility	+	+	+	-
Oxidase	+	+	+	-
O/F	+/+	+/+	+/+	-/-
Glucose	+	+	-	-
Trehalose	+	+	-	-
Aesculin hydrolysis	+	-	-	-
Salicin	+	-	-	-
Indole	+	+	-	-
Catalase	+	+	+	+
H_2S	-	+	-	-
Gelatin	+	+	+	+
Coagulase	?	?	?	-
Methyl red-test	+	+	-	+
Fluorescein production	-	-	-	-

Table (2)
Fungi and parasites obtained from examined fish and water

	Fungi			Parasites		
	Saprolegnia diclina	Achly sp.	Aspergillus flavus	Ichthyophthirius multifiliis	Henneguya sp.	Gyrodactylus sp.
Fish	+	+	+	+	+	+
Water	+	+	+	-	-	-

Table (3)

Different isolates recovered from the surface, gills internal organes and water of the examined fish

	Bacteria				Fungi			Parasite		
	A.hydro-phila	A. sobria	P.aerug-inosa	Staph. epider-midis	Saprolegnia diclina	Achly spp.	Aspergillus flavus	Ichthyoph-thirius multifiliis	Henneguya spp.	Gyrodact-ylus spp.
Surface	+	+	+	+	+	+	+	+	+	+
Gills	+	+	+	+	+	+	+	+	+	+
Internal organ	+	+	+	-	-	-	-	-	-	-