

THE ESTABLISHMENT OF EXOTIC FRESHWATER AQUARIUM FISH IN PAPUA NEW GUINEA

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ABSTRACT

Two species of exotic freshwater tropical aquarium fish have been discovered in natural waters in the Port Moresby area. These are the Guppy, *Lebistes reticulatus* (Peters), and the Three-spot Gourami, *Trichogaster trichopterus trichopterus* (Pallas). They may have an adverse effect on native fish, because of ecological disruptions, or introduction of disease. The natural waters of Papua New Guinea provide suitable conditions for the survival of escaped tropical aquarium fish; continued importation of these fish increases the risk of new species becoming established. An alternative to importing aquarium fish is to use native freshwater fish, of which there are over 100 species suitable for aquaria. If native fish are used, it would be desirable to restrict their movement to areas in which they occur naturally.

WHEN exotic aquarium fish are imported it is almost inevitable that some will escape accidentally, or be deliberately released into natural waters. The problem is most acute in tropical countries, where there are suitable natural conditions for the establishment of escaped tropical aquarium fish which constitute the bulk of the aquarium trade.

An analysis of import data shows that six species account for nearly half the total number of individual fish ordered (Filewood pers. comm. 1972).

The species of fish which are permitted into Papua New Guinea is based on recommendations made to the Australian Commonwealth-State Fisheries Conference. These recommendations are, however, based primarily on Australian conditions, where it is considered unlikely that escaped aquarium fish could survive in natural waters, particularly in the colder southern states (Munro 1960). However, this does not apply to the lowland waters of Papua New Guinea. Proof of this is the establishment in natural waters around Port Moresby of the Guppy, *Lebistes reticulatus* (Peters), and the Three-spot Gourami *Trichogaster trichopterus trichopterus* (Pallas).

Accidental Introductions into Natural Waters

The Guppy was first reported in drains in the Port Moresby suburb of Boroko in 1967; and has since been found in waters draining into

the nearby Waigani Swamp, which forms part of the Laloki River system.

This species can be expected to spread, as it has in Indonesia, where it competes for food with more valuable native fish (Schuster 1950). The Guppy grows to a size of only about 4 cm, and is not used for food.

The Three-spot Gourami was first reported in the Laloki River in 1970 (Moore pers. comm. 1970). In the shallow backwaters where it is commonly found, it is the dominant species, exceeding in numbers both native fish species and the deliberately introduced *Tilapia mosambica* Peters, and the Snake-skinned Gourami, *Trichogaster pectoralis* (Regan).

Problems Created by Escaped Aquarium Fish

Concern over the occurrence of aquarium fish in natural waters is based on the inevitable ecological disruptions which ensue, and the risk of introducing diseases.

On a practical level, the basis for concern over the ecological effects of aquarium fish in natural waters "is essentially one of competition with native species for food and space backed by predation on eggs, fry and adults" (Munro 1960). Even after very careful research into the possible effects of an aquarium fish becoming established in natural waters, it is impossible in many instances to guarantee that harmful effects will not occur (Schultze-Westrum 1970). Consequently, drawing up lists of aquarium fish approved for import offers

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no protection for the freshwater fish fauna, unless there is no possibility of the aquarium fish becoming established in the wild.

There is considerable risk of introducing diseases harmful to native fish populations, to useful introduced species of fish, or even to man, through the occurrence of aquarium fish in natural waters. International traffic in live freshwater fish and ova has aggravated the spread of diseases, among which the most prevalent are whirling disease, swim bladder inflammation, and furunculosis. It has been recommended that international controls be initiated applying first to cultivated fish, such as trout and salmon, and then to ornamental fish (Australian Fisheries 1972).

In Papua New Guinea there are strict quarantine conditions which must be satisfied before cultivated fish may be imported. This is to prevent diseases harmful to man, such as clonorchiasis, from being introduced. However, ensuring that imported aquarium fish are free from disease harmful to other fish is much more difficult: diagnostic methods are often very sophisticated, the required staff need to be highly trained, and the number of fish species and individuals involved is very large. The only practical solution may be to impose a complete ban on the importation of aquarium fish, as has been done recently in Fiji (Spottiswoode, pers. comm. 1972).

Native Aquarium Fish

An alternative to importing aquarium fish, which eliminates many of the problems associated with exotic fish introductions, is to use suitable species of native fish, or species of introduced fish which are already established in natural waters. There are over 100 species of freshwater fish native to Papua New Guinea which are suitable for aquaria. Approximately fourteen families of fish found in estuarine and fresh waters in Papua New Guinea are common to the world-wide aquarium trade. These are listed in Table 1.

Apart from the two species of aquarium fish present in freshwaters around Port Moresby, there are four species of deliberately introduced fish established in Papua New Guinea. These are the following:—

Cyprinus carpio Linnaeus—Common carp

Gambusia affinis (Baird & Girard)—

Mosquito fish

Table 1.—Families of native fish used in aquaria

Family	Common Name
Anguillidae	Eels
Chandidae	Glassy-perchlets
Eleotridae	Gudgeons
Gobiidae	Gobies
Melanotaenidae	Rainbowfish
Monodactylidae	Silver batfish
Mugilidae	Mullet
Periophthalmidae	Mud-skippers
Plotosidae	Catfish-eels
Scatophagidae	Scats
Syngnathidae	Pipefishes
Telmatherinidae	Sailfin silversides
Theraponidae	Therapon perch
Toxotidae	Archer fish

Tilapia mossambica (Peters)—Tilapia

Trichogaster pectoralis (Regan)—Snake-skinned Gourami

If any of these native or established introduced fish are to be used in aquaria, it is essential that the particular species be present in natural waters in the area in which the aquarium is situated. There are several reasons for this:—

1. With regard to introduced fish, it is not desirable to increase their distribution, because the effect of these exotic fish is not yet understood, and there is concern that their spread could harm valuable native fisheries.
2. With regard to native fish, there are very definite differences in the zoogeographical distribution of various species. The zoogeography of native fish is, however, not completely known and transplants of these fish are not desirable from a scientific point of view. More importantly, transplants are not desirable ecologically, as in some situations transplants of native fish into different drainage basins may have effects comparable with those resulting from the introduction of exotic species (Lachner *et al.* 1970).

It has been conservatively estimated that approximately 12,000 aquarium fish are imported annually into Papua New Guinea (Filewood, pers. comm. 1972). Use of native fish to replace these imports could be the basis of a small local industry.

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