Tropical Fish Hobbyist

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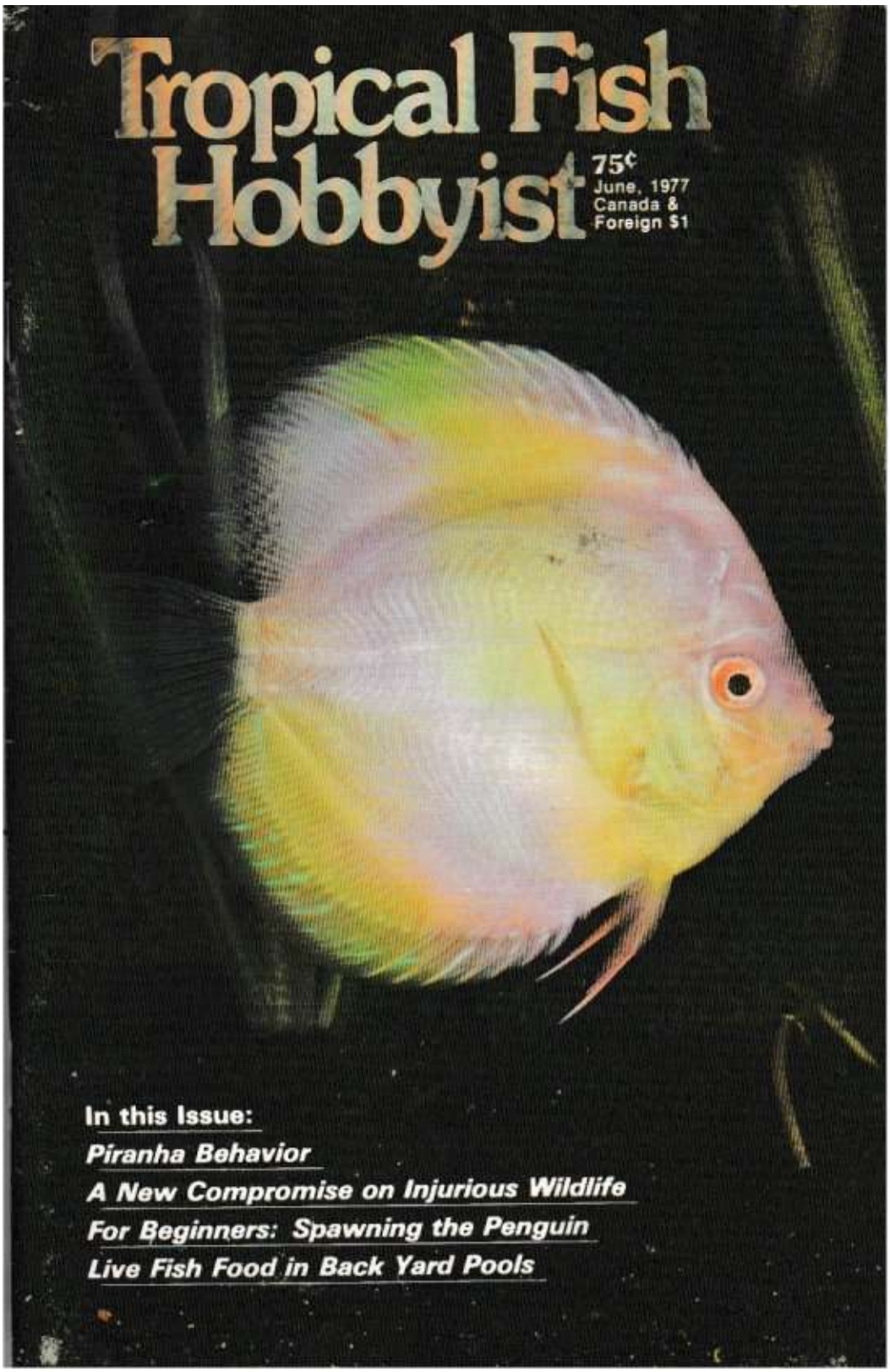

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A New Compromise on Injurious Wildlife
For Beginners: Spawning the Penguin
Live Fish Food in Back Yard Pools

Tropical Fish Hobbyist

VOL. XXV, June, 1977 (#256, No. 10)

Cover
A LoBue albino discus. Photo by A. Castro.

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Characoids

Piranha Behavior... Facts & Myths

by Richard M. Foxx, Ph.D.

The piranha, like the shark, has long been vilified in print and on the screen as a piscine horror. There are numerous written and filmed fictional accounts of piranha schools skeletonizing people and large animals within a matter of minutes, and James Bond has disposed of enemy agents by throwing them into piranha pools.

For some of us, Frank Buck provided our most vivid impression of piranhas. I recall an old film clip of him sitting in a dugout canoe on the Amazon River, hamhock in hand. Slowly he lowers the meat into the water and within a few seconds the water begins to boil with frenzied splashing as hundreds of piranhas tear at the meat. After a minute or so Frank pulls up the hock sans ham. After that film, I needed no further proof of what a piranha school was capable of executing on man or beast.

The extremely blunt snout of this *Serrasalmus* species characterizes it as one of the more dangerous piranhas. Photo by Dr. Herbert R. Axelrod.

Eye witness descriptions of piranha behavior have proved to be more terrifying than any novelist or screen writer's wildest imagination. For example, in 1966, the Associated Press reported from Venezuela that piranhas ate 21 leftist rebels who had jumped into the Arauca River to escape a national guard patrol. Professor M. P. Godoy of Sao Paulo, Brazil reported that they mutilated twelve persons, one of whom "was emasculated, with almost fatal results."

Despite the above accounts, not all fish experts have found piranhas to be particularly dangerous to people. Harald Schultz, the noted Brazilian ethnologist who spent many years along the Amazon studying the Brazilian Indians and collecting exotic fishes, felt that the danger posed by piranhas was greatly exaggerated. He wrote that "naked children and

A pair of *Serrasalmus nattereri* (the red-bellied piranha) engages in a nuptial embrace as eggs are deposited at the carefully chosen spawning site. Photo by H. Azuma.

adults romp and play among schools of the fearsome piranhas." Schultz himself often ventured into piranha-infested waters and was ignored even when he swam among them. Others have reported similar experiences. Dr. Herbert R. Axelrod has swum among piranhas on several occasions. Dr. George S. Myers, probably the foremost authority on piranhas, has bathed among them. Each of these distinguished individuals added Pepperdine College in Los Angeles was bitten on the left thumb by his 6-inch pet piranha when it jumped out of the net as he was transferring it to another aquarium. The wound required five stitches. A woman in Huntington Beach, California received a nasty bite when she placed her hand in her pet piranha's aquarium. Yet on many occasions when cleaning aquariums I have placed my hand in water containing piranhas as large as 14 inches.

The wimple piranha, *Catoprion mento*, has a very prominent lower jaw and curious everted teeth. The fish uses its odd mouth structure to feed on the scales of other fishes. It is a very specialized fish and probably not as dangerous to humans or other animals as are some piranhas. Photo by Harald Schultz.

cautionary notes, however, that their successful experiences may have been the result of a number of factors such as the particular species of piranha, time of the year, water temperature and location.

Differences in opinion over the piranha's bloodthirsty reputation have not been limited to the experts. Owners of piranhas have reported a variety of experiences with their pets. A student at My hand was never attacked. Others have reported that piranhas—at least those kept individually—are timid fish that respond to the intrusion of fingers by cowering in the opposite end of their aquarium.

The above instances point out how greatly divided opinion is as to the supposed viciousness of piranhas. These differences in opinion produced a major controversy in California during the late 1960's that was reported by the *Wall Street Journal* and several other national periodicals.

Ban the Piranha

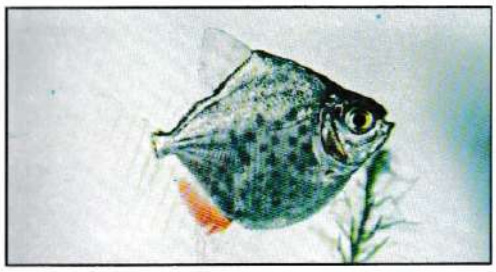
The California Fish and Game Commission, following the lead of their coun-

Serrasalmus rhombeus seems to one of the "less dangerous" piranhas. Although it has strong teeth and jaws, there are no known reports of serious injury to humans in encounters with this species. Photo by Dr. Herbert R. Axelrod.

terparts in Florida and Texas, began legislation to ban the importation of piranhas into the state by pet dealers. The proposed ban was prompted by the Commission's concern over the piranha's survival potential in the warmer waters of southern California. One can picture the dire consequences if piranhas were to become established in a state's lakes and reservoirs. Recent developments in California and other warm states, especially Texas and Florida, appear to have justified the Commission's concern. In these states several species of tropical fishes became established in local waters after they escaped from commercial tropical fish breeding establishments or were released by aquarists. For example, the infamous walking catfish (*Clarias batrachus*) of Southeast Asia attracted national attention in Florida a few years ago when it supposedly began eating great numbers of indigenous fish.

In 1965, in the Los Angeles Superior Court, a pet shop owner sought to have an injunction brought against the California Fish and Game Commission, which was seeking to confiscate all piranhas not displayed by public aquariums. Testimony was heard from numerous fish experts and the injunction denied. The California Fish and Game Commission then felt itself free to confiscate all privately owned piranhas. The Commission reached its decision after careful consideration of a very thorough research report by James St. Amant, one of its biologists. In the course of preparing his report, St. Amant compiled a detailed bibliography on piranhas that included an extensive review of almost everything that had been written about the piranha as well as personal correspondence from South American scientists. He also studied piranhas at one of the state's wildlife stations.

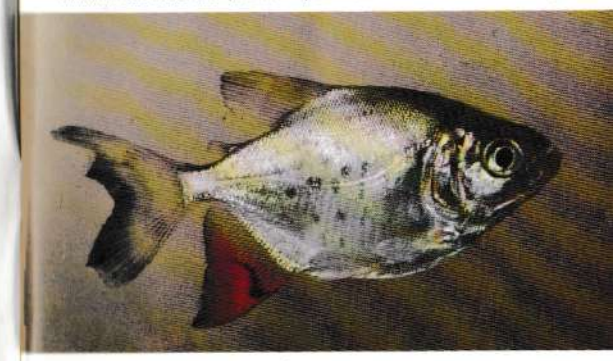
The California ban on the importation of piranhas produced a highly sophisticated black market operation in which piranhas could be obtained for private ownership, but only at a very high price. The piranhas were shipped commercially into California in large plastic bags filled with many fish. The piranhas were only



The color pattern of a juvenile silver dollar, *Metynnis maculatus*, is quite similar to that of the red-bellied piranha, but it is a harmless herbivore.

an inch or so long, making them difficult to recognize, since at that size they have very little coloration and resemble a variety of other fishes. Fish and Game inspectors at the airport found it very difficult to detect 2 or 3 dangerous piranhas among 200 to 300 of their nondangerous relatives. One could find piranhas in many of the pet stores throughout southern California under various exotic names. If you could recognize that they were piranhas, you could buy them; otherwise, they were not for sale. Since small piranhas are rather nondescript, few people would be interested in owning one unless they knew what it was. The

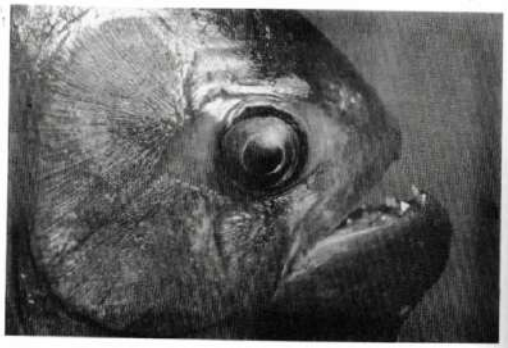
Colossoma oculus is another harmless piranha-like herbivore that inhabits waters of the Amazon basin. Photo by Dr. Herbert R. Axelrod.



stores were taking some risks, since the Fish and Game officials frequently visited the stores and confiscated any piranhas that they found. Also, the penalty for possession of piranhas was quite severe; a maximum sentence of one year in prison and a $500 fine.

I was working at a state hospital in California during the uproar over the piranhas. Having previously met Jim St. Amant, I was aware of his interest in piranhas and that he was studying them at the Chino California Wildlife station. Through his efforts my colleague Pat Martin and I were able to obtain 17 piranhas to study. We were interested in investigating their behavior under carefully controlled laboratory conditions, since a literature search had revealed that most reports of piranha behavior dealt with anecdotal evidence obtained in the wild.

We began by studying variables related to the piranha's survival potential in California water, such as their food consumption rate and survival temperatures.



This is a dead piranha with the lips shrunk away showing the razor-sharp triangulate teeth. Photo by H. Schultz.

Our first study investigated the relationship between water temperature and food consumption rate. We wanted to know how many fish piranhas would eat at varying water temperatures within a range of 60 to 90 degrees. We found that piranhas consumed the most fish at temperatures between 76 to 82 degrees, a range that corresponded to the water temperatures in their native habitat. At the extreme temperatures of 60 and 90 degrees piranhas ate fewer fish. The 60 degree figure was quite meaningful for the Fish and Game officials, however, since that temperature was well within the temperature ranges for some southern California bodies of water. We also kept piranhas alive at 45 degrees, which was a demonstration of their potential to survive the southern California winters.

Another study on feeding behavior produced some interesting findings. The piranhas studied were immature *Serrasalmus nattereri*, commonly known as the red-bellied piranha because of the deep red coloring that extends from the mouth to the vent. The study was prompted by a rather intriguing discovery: I had placed

two 3-inch piranhas in a large aquarium into which I had also placed 25 4-inch goldfish to serve as food. When I looked in on the piranhas the next day I discovered that they had eaten the tails of all 25 goldfish and about 40 percent of the goldfish were eyeless. The eyes had been removed as if by a surgeon; there was no bleeding and no frayed or loose flesh around the eye sockets. I began to add a goldfish to the aquarium every four hours. In every instance, the tail was sheared off and eaten within a few minutes. No matter how many goldfish were introduced, the tails were always eaten before any other parts of the goldfish were consumed.

Although pacus such as this large *Colossoma* species are members of the same family as piranhas, the family Serrasalmidae, they are not predatory fishes. Their dentition differs considerably from that of the piranhas, having a front row of incisor-like teeth and an inner row of molar-like teeth. They feed on large leaves as well as fruits and seeds that fall into the rivers where they are found. Photo by Dr. Herbert R. Axelrod.

I devised an experiment to test whether piranhas would always first attack a prey fish's tail region. The two immature piranhas were separated and placed in individual aquaria. Each day I placed a goldfish in each piranha's aquarium for 30 minutes and recorded the area of the fish's body first attacked. In almost 90 percent of the feedings, the piranhas attacked the tail region first. The middle part of the goldfish's body was attacked about 10 percent of the time, and there was one instance in which the head was attacked. In further investigations with other piranhas, I found that piranhas do not always attack the tail of a prey fish. If the fish is small enough to be swallowed, the piranha merely engulfs it. Only when the prey cannot be eaten whole does a piranha attack the tail region first. The adaptive significance of tail attacks, and to a lesser extent eye attacks, may be to immobilize the prey so that it cannot escape. Tail-attacking behavior has been reported to occur when a piranha school attacks. Dr. Leonard P. Schultz reported from the Amazon that when a school of

The torn fins of these young *Serrasalmus nattereri* indicate that under certain circumstances they will bite each other. Photo by H. Azuma.

piranhas encounters a prey fish "... one of their number usually bites off its tail so that it cannot maneuver; then, when the prey weakens from loss of blood, all gather around to eat it piecemeal."

Some of our experiments had indicated that piranhas could possibly survive in the waters of some of our southern states. However, we had not studied whether or not piranhas were dangerous to humans. As mentioned earlier, opinion among the experts is divided. To date, there is still no consensus on how dangerous piranhas are.

When are They Dangerous?

Why do piranhas attack in certain situations and not in others? One theory that seems plausible concerns the piranhas' level of deprivation. Piranhas are schooling fish that inhabit an area until they have reduced the existing food supply, at which time they move on. When they have recently arrived in an area and food is abundant, it is likely that all healthy animals are relatively safe in the water. Only the old, sick, disabled or very young are likely to be eaten. Thus piranhas serve the same function as any other predator ... to eliminate the unfit. If they were as bloodthirsty as we have been led to believe, the Amazon River region would be barren of wildlife rather than teeming with it. However, when piranhas have inhabited a region for an extended period of time and thereby have decreased their available food supply, hunger could motivate them to the point where they might possibly attack any organism that enters the water. This would be especially true if they became trapped in a relatively small space such as during a drought.

Some natives report that piranhas are dangerous only during certain periods of the year. These periods may correspond to the piranhas' breeding season, since they, like many other fishes, are extremely pugnacious at that time, especially the piranha species that guard their nests. Also, many fishes have voracious appetites just before and early into their breeding season in order for their bodies to have sufficient food to produce eggs and sperm.

The Perfect Predator

Nature has fashioned in the piranha the ideal predatory fish. Piranhas have strong jaws for seizing and holding their

(Continued on page 101)

Legislation

A New Compromise on "Injurious Wildlife" Amendments

On March 7, 1977 the United States Department of the Interior (DOI) published its new "Injurious Wildlife" amendments in the Federal Register (Vol. 42, No. 44, pp. 12972-12978). This new proposal represents a great deal of compromise on the part of the DOI over what it had proposed at any previous time. In a lot of ways this compromise reflects a set of regulations that many of us in the tropical fish industry can live with, **provided there are no more changes.** *Certain aspects of this proposal, however, are still unpalatable to some of us.*

There are pros and cons to be considered in deciding whether or not we should now step aside and allow these amendments to become law without further opposition.

This is one of the rare times in the history of the controversial Lacey Act that the DOI has come around to the type of thinking that has been supported in the tropical fish industry in terms of defining "Injurious Wildlife." Gone is the "clean list"... gone is the "gray list"... and what we now have is a limited "dirty list." There are actually very few popular aquarium species on this new list. Among freshwater fishes of any popularity that have been excluded from importation are Cichlasoma, Satanoperca *and* Tilapia. *The only popular marine fishes to be excluded are* Dendrochirus *and* Pterois *(the lionfishes) and* Plotosus *(a marine catfish). Although piranhas are specifically excluded, it is reassuring as a hobbyist to know that we won't have to go to jail for owning a school of neon tetras or for not having a costly permit allowing us to own a silver dollar fish, as was suggested under previous "Injurious Wildlife" proposals.*

However, what about those of us who already own a Satanoperca *(Tilapia) mossambicus or a* Pterois volitans? *Must we now seek and pay for a permit to keep them? This issue does not seem to be covered in the new proposals. Historically, the DOI has taken a strong stand in seeing that fishes and other animals that were privately owned prior to their elimination as importable species under the Lacey Act were illegal to own as well. Consider, too, that many states follow suit when the DOI bans a particular fish, these states disallow its importation or possession under state statutes, thus making enforcement of these laws a little easier.*

The Lacey Act calls for criminal penalties for violations. While owning glow-lite tetras will not be a violation, owning a walking catfish will be. Does owning such a fish really call for punitive measures under a criminal code?

A final point to consider is that many of the freshwater fishes included in the "dirty list" are there because the DOI claims that they are injurious to the environment. This may be true in some cases, but how long will Tilapia mariae *survive in the upper reaches of the Mississippi River in the state of Minnesota? Certainly not long enough to breed. Furthermore, an unrealistically large number of them would have to be released there for them to do any ecological damage in the few days that they might survive.*

The following excerpts are taken directly from the Federal Register, Volume 42, Number 44, and cover information that is of direct interest to aquarium

hobbyists. In addition, we have printed the entire list of injurious reptiles, amphibians and fishes that will be illegal for individuals to own or import without the appropriate permit.

DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
[50 CFR Part 16]
INJURIOUS WILDLIFE
Proposed Importation and Shipment Requirements

Notice is hereby given that the United States Fish and Wildlife Service proposes to amend Part 16 of Subchapter B, Chapter I of Title 50, Code of Federal Regulations. These amendments are proposed under the authority of section 42 of Title 18, United States Code.

Background

Section 42 of Title 18, United States Code, authorizes the Secretary to prescribe by regulation those wild mammals, wild birds, fish (including mollusks and crustaceans), amphibians, reptiles and the offspring or eggs of any of the foregoing, (hereafter, "prescribed wildlife") which are injurious to human beings, to the interests of agriculture, horticulture, forestry, wildlife or to the wildlife resources of the United States (hereafter, "the designated interests"). Aside from limited exceptions for zoological, educational, medical or scientific permits, internal use by Federal agencies, dead natural history specimens, domesticated psittacine birds and other situations authorized by statute, no injurious wildlife may be (1) imported into the United States, any territory of the United States, the Commonwealth of Puerto Rico or any possession of the United States, or (2) shipped between the continental United States, Hawaii, the Commonwealth of Puerto Rico or any possession of the United States. 18 U.S.C. § 42.

Description of This Proposal

Part 16 of Title 50, Code of Federal Regulations, governs the importation and shipment of wildlife prescribed by the Secretary as injurious. This proposal would restructure Part 16 for clarity and would add a number of species to the list of wildlife declared injurious. Part 16 currently lists those species of wildlife which have been designated injurious and therefore cannot be imported or shipped. Preceding proposed amendments of Part 16 would have abandoned this "dirty list" approach in favor of an expansive "clean list" of species which present a low risk of injury to the designated interests and therefore could be imported or shipped. This proposal preserves the present structure of Part 16 and provides a specific list of injurious species. In addition, the proposal adds a number of species to the list of wildlife deemed injurious.

The Secretary believes that all wildlife outside its native habitat is potentially injurious to one or more of the designated interests. However, the Secretary recognized that the degree of risk to the designated interests varies from species to species. The species that this proposal would add to the present list of injurious wildlife have been determined by the Secretary to be injurious on the basis of one or more of the following criteria:

1. The species occupies an ecological niche (including feeding habits, roosting habits, requirements for reproduction and other factors) that overlaps to a considerable extent the ecological niche of a native species;

2. The species is a close relative of a native species with which it might be expected to compete with for food, space or some other resource, or with which it might be expected to interbreed;

3. The species has behavioral traits, feeding habits or ecological requirements that could be disruptive or destructive to natural communities or environmental features, or in conflict with man's use of the environment;

4. The species is known to have feeding or foraging habits that include crops or other agricultural products or harvested natural resources, or that suggest that it may readily be able to adapt to such food resources;

5. The species is known to be the host of a parasite that would be detrimental to humans, domestic animals or native wildlife, or is known to be a reservoir or vector of, or the host of a parasite that is a vector of, a disease that can be readily transmitted to humans, domesticated animals or native wildlife;

6. The species is known to be dangerously venomous or toxic or otherwise noxious to man or other animals;

7. The species occupies ecologically disturbed areas, particularly urbanized areas or those altered by the addition of exotic vegetation, as a major part of its habitat;

8. The species has demonstrated an ease of establishment, colonization or dispersal, or has reproductive characteristics that suggest an ease of establishment in the absence of its normal population controls; or

9. The species is a close relative of a species that falls into one of the above categories.

The skin glands of newts produce a toxic secretion that could be extremely dangerous to humans if accidentally ingested. This toxin is very effective against potential predators, and these salamanders would be difficult to eliminate or control if established. They would compete with native species. Other genera of newts and salamanders are similarly toxic, but are not listed because the likelihood of importation is low.

The African clawed frog, established in southern California, feeds on almost all other forms of aquatic animals, and not only competes with but preys on native amphibians.

The giant toad, already established in the United States, competes with and preys on other wildlife species. Poison produced in its parotid glands can be harmful to domesticated pets and to other potential predators.

All the snakes listed are venomous and can inflict serious, even fatal, bites on humans. Some species in the genera listed are frequently imported and may be sold to persons unaware of the danger involved. Other venomous genera of snakes are not listed because the likelihood of importation is low.

There are 50 genera of fishes belonging to 22 families included on the list. The fishes included on the list are either parasitic, venomous, electric, large aggressive predators or superior competitors and would be detrimental if introduced into U.S. waters. There are presently no known safe and efficient means for control of these fishes if they become established.

There are 28 genera of fishes in nine families (Centropomidae, Characidae, Cichlidae, Citharinidae, Ctenoluciidae, Erythrinidae, Hepsetidae, Lebiasinidae, Ophiocephalidae) included on the list that are considered to be injurious to man and fish and other aquatic resources due to their (1) aggressive predatory behavior, (2) superior competitive ability and (3) tendency to disrupt habitats into which they are introduced. Some of the predators attain lengths of three to four feet and have powerful jaws well armed with teeth. In some cases, the smaller species, such as piranhas, which rarely exceed 18 inches, are most dangerous.

There are several genera of fishes on the list which have the capacity to produce an electric discharge. These fishes include the electric eels in the genus *Electrophorus* (family Gymnotidae), the electric catfishes in the genus *Malapterurus* (family Malapteruridae) and the electric rays of the family Torpedinidae. The electric shocks of the fishes range up to 600 volts. The electric eel is one of the most powerful, adults producing an average output of 350 volts. Electric eels are largely air breathers, which would make control very difficult. Other electric fishes, the electric rays and electric catfishes, are less powerful, usually producing less than 200 volts.

The candiru, diminutive catfishes native to South America, are often parasitic on fishes, feeding on the blood of the gills. The opercle and preopercle of these fishes are armed with retrorse spines which, when extended, enable the fish to become hooked to objects it contacts. These fishes are feared by South American natives due to their habit of penetrating the urogenital openings of swimmers causing severe pain and inflammation which often necessitates surgery.

Several genera belonging to six families are included on the list due to their venomous nature. The toxicity of the venom varies depending on the species and the type of venom. The venomous toad fishes of the genus *Daector* and *Thalassophryne* (family Batrachoididae), all genera of stingrays both freshwater and saltwater (family Dasyatidae and Potamotrygonidae), the catfish eels of the genus *Plotosus* (family Plotosidae), five genera of scorpion fishes *Brachirus, Dendrochirus, Inimicus, Pterois* and *Synanceja* (family Scorpaenidae) and the weever fishes of the genus *Trachinus* (family Trachinidae) are all dangerous to fishermen, swimmers and other aquatic recreationists who may come in contact with these fishes. The reaction of the victim to their sting is dependent on a number of variables, but it may result in death.

The climbing perch of the genus *Anabas* (family Anabantidae) would be detrimental to native fishes. This fish is very aggressive, prolific and is an air breathing species with the ability to move over land.

The six genera *Aristichthys, Ctenopharyngodon, Hypothalmichthys, Leuciscus, Mylopharyngodon, Opsariichthys* of cyprinid fishes (family Cyprinidae) included on the list would be detrimental if introduced and subsequently became established. These fishes are prolific, tenacious and aggressive. If established, these fishes, through competition for food and space, could eliminate native fishes which occupy the same or similar niche.

The pike killfish of the genus *Belonesox* (family Poecilidae) is a very aggressive predator which attains lengths up to eight inches. It preys on small aquatic life including fishes. In Florida, where this species is already established, it is reported to seriously impair the natural control of mosquito larvae by the mosquito fish *Gambusia affinis*.

Subpart B — List of Injurious Wildlife
§16.11 Injurious Wildlife

Pursuant to section 42 of Title 18, United States Code, the Director has determined that the following species of wildlife are injurious to human beings, to the interests of agriculture, horticulture, forestry or wildlife or the wildlife resources of the United States:

Family	Genus	Species
REPTILES		
Viperidae	*Atheris*	All
	Atractaspis	All
	Bitis	All
	Causus	All
	Echis	All
	Eristicophis	All
	Vipera	All
Crotalidae (pit vipers, rattlesnakes)	*Agkistrodon*	All
	Bothrops	All
	Calloselasma	All
	Crotalus	All
	Lachesis	All

Photo by Vaclav Lahoda

Spawning the Penguin

by Vaclav Lahoda

New hobbyists are most often attracted to fishes that are brightly colored, which accounts for the great popularity of swordtails, mollies, guppies, bettas and the like. In making their selection, newcomers tend to overlook some of the less colorful fishes that are actually much more hardy and really quite easy to spawn. One such fish is the penguin or hockey stick, *Thayeria boehlkei*. Here is a fish that is quite attractive, not because of its bright colors, but because of its unique pattern and its odd way of swimming.

Thayeria boehlkei comes from Brazil and is most often found in the upper reaches of the Amazon basin. The penguin has an elongate body that is laterally compressed. The lower lobe of the tail fin is slightly longer than the upper lobe and gives the illusion of being much longer because of the sharp black band that runs from the upper edge of the gill cover along the upper flank and then curves sharply downward into the lower lobe of the tail fin, reaching its tip. The back has a bronze-green color, and the lower part of the body is a silvery white with a slight hint of yellow. Except for the black band on the lower lobe of the tail fin and occasionally a white edge on the anal fin, the fins are colorless, adding to the illusion of the greatly elongated lower lobe of the tail. Further enhancing this illusion is the fish's unique posture. Many fishes

A pair of *Thayeria boehlkei* assumes its typical oblique head-up posture. Photo by G. Timmerman.

assume an oblique posture, but most of these have the head down. The penguin is one of the few obliquely oriented fishes that takes a head-up position. Its odd posture and color pattern serve a necessary function for the fish in its natural habitat, breaking up its contour so that it is not recognizable as another fish by a would-be predator. This is one of the many ways that Nature protects her charges.

The penguin is a schooling species that is fairly active, and there are few sights more attractive than a dozen of these unique oblique little creatures swimming in open water against a dark background of water sprite or *Cabomba*.

The sexes are not easy to distinguish when the fishes are not in spawning condition. The male tends to be slightly smaller and a little more slender in its body shape than the female. In spawning condition, the female is easily distinguished by her full abdomen.

There are several species of penguins, all belonging to the genus *Thayeria*. *T. boehlkei* is the most popular and is often seen in aquarium shops being sold as *T. obliqua*. This is erroneous because in *T. obliqua* the black band in the lower lobe of the tail fin extends up toward the base of the dorsal fin and fades out as it approaches the dorsal fin so that it is barely visible at its forward end.

Since they are active fishes, penguins should be given plenty of swimming room. A 20-gallon long tank with a heavily planted background is ideal habitat for a dozen or so penguins. The plants should be concentrated toward the back of the aquarium to give the fish plenty of swimming room out in the open. As to water conditions, they prefer swiftly moving clean water. This can be accomplished by using an undergravel filter or a power filter and directing the water flow across the water surface. The fish will often be seen playing in the outflow stream of the filter. They do well at temperatures between 72 and 76°F (22-24° C) but will not die or become ill in slightly cooler water if they are in good condition in the first place. The pH of their water can be anywhere from slightly acid (6.6) to slightly alkaline (7.4) as long as extremes are avoided. They do well in soft to moderately hard water.

Penguin fish are egg scatterers that spawn over a gravel bed as readily as over clumps of vegetation. Photo by Louise Van Der Meid.

For a successful spawning, the water should be gradually softened and acidified, which is easily accomplished by placing some peat moss in the filter (be sure to use a brand that has no additives . . . pet dealers sell peat pellets that are ideal for this purpose). The best results will be obtained in water that has a pH of 6.0 to 6.4, although they have been bred at higher pH levels. The temperature should be elevated to about 80°F (27° C). A tank as small as five gallons is sufficient to breed them in. Although they will spawn almost anywhere in the tank, fine-leaved plants such as *Myriophylium* or *Ambulia* will serve to concentrate the area in which they spawn and will help conceal the eggs since these fishes are prone to eating their own spawn.

The breeding pair should be placed in the spawning tank in the evening, and if the female is sufficiently ripe, spawning will begin at dawn. Courtship is rather rough, and some breeders prefer to use several females to one male so that the female will not be battered so badly. The courtship begins with a lot of chasing and is culminated when the male and female swim side by side with their vents in close apposition. Thirty to fifty eggs at a time are ejected freely into the water and are

Hundreds of eggs from this pair of penguin fish can be seen clinging to the plant sprig in the background. Photo by Laurence E. Perkins, F.Z.S.

fertilized by the male as they are ejected. The entire sequence is repeated over and over again until the female has expelled all of her ripe eggs. A good mature pair can produce as many as 1,000 eggs in one spawning session.

If the water is maintained at 80°F, the fry will hatch in 16 to 20 hours. The fry are very small and immediately after hatching rise to the surface, where they hang for about four days until the yolk sacs are completely absorbed. On the fifth day they begin to swim free and feed. They should be fed at least twice a day and more often if possible. They can take

Salts From the Seven Seas

Mirolabrichthys imeldae, a New Species of Anthiid Fish from the Philippines (Perciformes: Serranidae)

by Warren E. Burgess

Fishes of the serranid subfamily Anthiinae are usually brightly colored, with shades of red and gold predominating, and occur in often large groups from relatively shallow waters to depths of 200 meters or more. The bright colors and patterns are helpful in the recognition of the species in the field and in freshly preserved specimens, but unfortunately these distinctive colors fade quickly in preservative, making the systematics of the group much more difficult. Compounding the confusion are sexual dimorphism and ontogenetic changes.

The new species of *Mirolabrichthys* described here was brought to my attention by Mr. Earl Kennedy, who sent specimens through aquarium import channels and provided me with one of the photos used to illustrate the description.

***Mirolabrichthys imeldae*, new species**

Holotype.—USNM 216923, 66.0 mm SL, subadult, Philippine Islands. Collected by Mr. Earl Kennedy and given to me through Mr. Murray Wiener of Tropiquarium, Oakhurst, New Jersey.

Paratypes.—USNM 216922, 2: 53.1 and 53.6 mm SL, subadults, Philippine Islands. Collected by Mr. Earl Kennedy and given to me through Mr. Victor Bota of Vic's Underwater World.

Diagnosis.—Dorsal fin X, 16; anal fin III, 6-7; pectoral rays 17-18; scales in a longitudinal line 50-52; pored scales in the lateral line 50-51; gill rakers on first arch 9-10 + 1 + 21-24; two opercular spines present; eye diameter contained 3.5-4.1 in head length; third dorsal fin spine elongate, more so in holotype (largest specimen) than in paratype; color pinkish, shading to white ventrally, with about 4-7 bright red bars extending from base of dorsal fin to about lateral line and another horizontal red bar extending entire length of caudal peduncle along its upper portion; a weakly defined red stripe may be present on the dorsal keel of the caudal peduncle; some bright yellow markings on eye and upper lip.

In addition, a sequence of photographs, some of which are presented here, shows the changes that occur with growth. Fully adult specimens which I have seen exhibit additional characters such as: third dorsal fin spine very elongate; first two pelvic fin rays prolonged, extending to middle of anal fin; caudal fin deeply forked, one or more rays of each lobe somewhat produced. The species is assigned to the genus *Mirolabrichthys*

because there is a fleshy, proboscis-like protuberance at the symphysis of the upper lip in these very large specimens. The red markings disappear with age, and the body becomes pinkish violet to violet with a large number of yellow spots in very irregular, wavy, broken horizontal lines; each caudal lobe is provided with a single dark red bar extending its length.

Description.—Dorsal fin continuous, X, 16; third dorsal ray elongate, very much so in large specimens; anal fin III, 6-7; pectoral fin rays 17/18, 17/18, 17/17 for the three specimens; caudal fin deeply forked, some rays prolonged in very large specimens; first two rays of pelvic fins prolonged, extending to midpoint of anal fin base in very large specimens.

Head and body covered with ctenoid scales; soft dorsal and anal fins scaled at base, caudal fin scaled to distal margin; basal third of pectoral fins scaled; pelvic fin rays scaled on their basal half. Axillary scale present at insertion of pelvic fins. Scales in a longitudinal line from angle of opercle to base of caudal fin 50-52, pored scales in the lateral line 50-51; scales above lateral line 4 (from origin of dorsal fin) or 3 (at end of spinous portion of dorsal fin), scales below 12-14; about 26 scales around caudal peduncle and 6-7 rows on cheek (between orbit and angle of preopercle).

Mirolabrichthys imeldae Burgess. Subadult showing characteristic barred pattern. Photo by Aaron Norman.

Two spines present on opercle, ascending limb of preopercle with about 30-35 small spines, ventral limb smooth; maxilla broadly expanded posteriorly, covered with scales, extending to about posterior edge of orbit. Gill rakers long and slender on first arch (much shorter on succeeding arches), 9-10 + 1 + 21-24; pseudobranchiae present.

Upper jaw with an outer row of slightly curved canines, an enlarged canine on each side of upper jaw; lower jaw with row of canines, an enlarged canine directed forward and outward on each side of lower jaw.

Color in alcohol pale yellowish with no trace of distinctive life colors and pattern. Pattern in life as in accompanying photos. Color in life pinkish, becoming white ventrally; bars extending from base of dorsal fin to lateral line and along upper portion of caudal peduncle bright red; fins pinkish to hyaline, caudal with hint of darker pink to red bars (one along each caudal lobe); yellow streaks on iris above and below pupil; snout tip yellow. In the intermediate or transforming stage, the bright red markings become more orange, and yellow spots appear on the body; the dorsal and caudal fins become marked with reddish and yellowish, the anal is pale bluish with pale yellow spots.

Mirolabrichthys imeldae Burgess. Intermediate form showing reduction of barred pattern and initial phase of adult pattern. Photo by Kenneth Lucas at Steinhart Aquarium.

the pectoral fins are hyaline to pinkish, and the pelvics are hyaline but with the first ray white. Eventually the red bars disappear altogether, leaving a pinkish violet fish covered with yellow spots; these spots are arranged in irregular, wavy, broken horizontal lines except for a more solid one from the snout along the base of the dorsal fin (one on each side) to the end of the dorsal where it changes to red and extends into the upper lobe of the caudal fin; a second red bar runs the length of the lower caudal fin lobe.

Remarks.—*Mirolabrichthys imeldae* is very similar in counts and proportions to the other known species of *Mirolabrichthys* as described in Heemstra (1973) but differs significantly in color pattern, particularly the red vertical bars. I was fortunate to be able to see enough specimens in different stages of transformation to be able to connect the juvenile and/or female color pattern with that of the adult and to be able to illustrate the changes with color photographs. The connection also enabled me to confirm the placement of the species in the genus *Miro-*

Mirolabrichthys imeldae Burgess. Adult characteristics (reduced pattern, elongate third dorsal spine, etc.) beginning to become established. Photo by Earl Kennedy.

opened for sexing and found to have both white testis-like and yellow ovary-like structures. These structures were not examined histologically.

I wish to thank Earl Kennedy for bringing this fish to my attention and Artie Hine and Edward Murphy of Marine Tropicals, and Murray Wiener and Victor Bota for actually getting the specimens into my hands. Thanks are also due to Jerry Walls for critically reading the manuscript and making suggestions for its improvement.

Distribution.— The origin of all imported specimens was the Philippine Islands. A photograph of an adult was taken by Dr. Gerald R. Allen, at Palau, Western Caroline Islands.

Etymology.—Named for the First Lady of the Philippines, Mrs. Imelda Romualdez Marcos, in recognition of her interest in furthering the study and conservation of the Philippine fauna.

Literature Cited

Heemstra, P.C. 1973. *Anthias conspicuus* sp. nova (Perciformes: Serranidae) from the Indian Ocean, with comments on related species. *Copeia*, 1973, No. 2: 200-210 (May 22).

Mirolabrichthys tuka. Adult with well developed proboscis. Photo by Dr. Herbert R. Axelrod, Marau, Solomon Islands.

The dorsal and pectoral spines of these marine catfishes (*Plotosus anguillaris*) are equipped with venom glands. Although human death is not likely to result from a single puncture, the serrated spines can inflict extreme pain. Venomous fishes should be handled only when necessary and then with due caution. Photo by Roger Steene.

Over 200 species of marine fishes have been reported to be venomous. Many of these, such as this lionfish (*Pterois*) are commonly kept by aquarists. The venom apparatus of this species is contained within various spines, particularly those in the dorsal fin. Photo by M. Goto.

Fugu niphobles possesses a potent toxin that is especially prevalent in the skin, liver, intestines and ovaries. Skilled fugu cooks can render the poisonous pufferfishes into a harmless gourmet's delight. Untrained cooks, however, frequently serve meals that contain lethal quantities of tetrodotoxin. Photo by Y. Takemura and K. Suzuki from *Life of the Seashore*.

This diver is showing us the strong sharp spines at the front of each dorsal fin. Although not typically aggressive, the bullhead sharks in the family Heterodontidae can inflict a painful puncture, especially when being handled out of the water. This crested Port Jackson shark, *Heterodontus galeatus*, grows to a maximum size of four feet. The juveniles of this species make excellent pets. Photo by Walter Deas.

Readers React

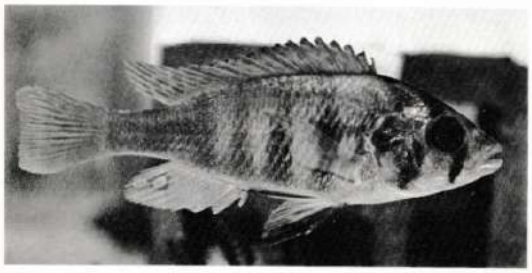
An Expert Speaks Out on Egg Dummies

Most African cichlid enthusiasts are by now well aware of the difference of opinion between Dr. Herbert R. Axelrod and Dr. Wolfgang Wickler as to the functional significance of egg spots on the anal fins of certain African mouth-brooding cichlids. Dr. Wickler, in his paper "Egg Dummies as Natural Releasers in Mouthbreeding Cichlids," (*Nature*, Lond., 1962, 194:1092-1093), proposed that the egg ocelli on the anal fin of the males of many African mouth-brooding *Haplochromis* and other related genera are actually egg dummies or egg mimics, their purpose being to attract the female to the vicinity of the male's vent so that his sperm can be taken directly into her mouth after she has picked up the eggs. In other words, the female is attracted to this area of the male to pick up what appear to be more eggs but are actually egg mimics on the male's anal fin.

On the other hand, after many dives into the Lake Tanganyika and Lake Malawi habitats of many of these African cichlids, Dr. Axelrod proposed that the egg ocelli on many of these species are not actually egg mimics, but rather serve as identification marks for the purposes of mating and territorial establishment. In *African Cichlids of Lakes Malawi and Tanganyika* (T.F.H. Publications, Inc.), Dr. Axelrod observed that all cichlids that dwell and spawn in and among dark rocky crevices (where the fish themselves are often not visible) possess egg ocelli that are clearly visible, thus enabling potential mates and potential territorial invaders to identify the fishes inhabiting these dark areas.

There seems to be much evidence favoring both of these theories. For instance, we recently received a letter from Dr. Ethelwynn Trewavas, an ichthyologist who is well known in the scientific community and among cichlid enthusiasts throughout the world for her work with these fishes. In her letter she concurs with both Dr. Axelrod's theory and Dr. Wickler's theory and observes that each theory applies in a more limited sense to only certain fishes. She feels, as do both Dr. Wickler and Dr. Axelrod, that neither theory is all-inclusive for African mouth-brooding cichlids. We have reproduced Dr. Trewavas's letter here so that all readers of *Tropical Fish Hobbyist* can be appraised of a very valuable opinion concerning the egg spot theories.

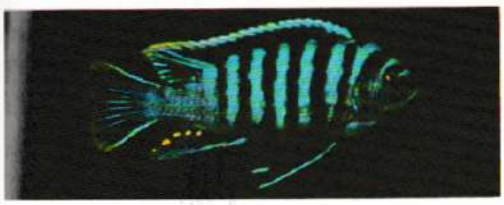
Here is a Lake Victoria *Haplochromis, H. lacrimosus*, that has anal ocelli that are most likely used as egg dummies. Photo by Dr. Herbert R. Axelrod.



Opposite page:
This *Pseudotropheus zebra* was photographed by Dr. Herbert R. Axelrod in its natural habitat in Lake Malawi. The glowing spots on the anal fin of this fish leave little doubt that their function subserves identification.

This unidentified *Haplochromis* species, photographed by Warren E. Burgess in Lake Malawi, shows a yellow band on its anal fin rather than the usual anal spots. It too is easily recognized in its natural habitat.

This unidentified estuarine *Haplochromis* species is apparently related to the *H. burtoni* group. The anal ocelli on this fish are egg-like in appearance and, as in *H. burtoni*, are likely to serve as egg dummies. Photo by Dr. Herbert R. Axelrod.



December 16, 1976

Dear Dr. Axelrod,

Thank you very much for the copy of the fifth edition of your handsome book. And please thank Dr. Burgess for his share in it. I see there are some good new underwater photos too, always an asset.

When the book arrived I posted to you a copy of a fairly recent paper of mine in which I refer briefly to the "egg-spot theory." I don't think you have seen Wickler's film. If you did, I think you would be convinced that the female concerned was being "fooled" into thinking the spots on the fin were eggs and she was trying to add them to the clutch in her mouth. The facts are these:

In mouth-brooders the T-position is often taken up during spawning.

When the female has just spawned she is then snapping at the area where the eggs are and which the male is just fertilizing.

Many Haplochromis *and* Haplochromis*-related species have ringed yellow spots on the vertical fins.*

In Haplochromis *in the most narrow sense (at the moment excluding the Malawi and Zambesi species), the ringed spots are confined to the anal fin and intensified there.*

In the Haplochromis *of Lake Victoria (but not all the river species) the anal ocellar spots are present only in the male, where their function has become specialized to "deceive" the female into actions that doubly ensure fertilization of the eggs already in her mouth.*

I have seen in H. bloyeti *(Tanzania) and* H. nubilus *(Lake Victoria and rivers and swamps to the west of the lake) brilliant anal ocelli in ripe females.* H. burtoni*, however, seems to be a species in which the egg spots are confined to the male, and in the exclusively lacustrine Lake Victoria species they have been found only in the males.*

I think your underwater photos and the fact that the bright anal spots are present in both sexes in mbuna *and some other Malawian species are strong support for their function in those species being recognition rather than mimicking eggs, but that doesn't invalidate their having a special position and function in* H. burtoni *and the Lake Victoria flock.*

Thank you again and good wishes to you and Mrs. Axelrod.

Yours sincerely,
Ethelwynn Trewavas

Idea of the Month

More Air

by Ira Manners

For those aquarists who have a lot of aquariums, getting enough air to operate filters, air stones, etc. is a big problem. Buying more pumps is the obvious solution, but this can be a problem when the electric bill arrives. Here is a way to nearly double the output of your pumps and considerably lengthen their service life.

As any fluid passes through a restricted opening (air is a fluid) the amount of pressure needed to move the same volume of that fluid increases as the diameter of the pipe through which the fluid moves decreases. In a restricted pipe, back pressure (called head loss) builds up as the length of the pipe increases. This causes a loss of output and puts a great strain on the pump. The problem becomes acute when you have a long bank of aquariums operated by one or two pumps. Because of head loss, a pump that is advertised to have the capacity to handle 30 outlets may in fact only handle 10 outlets when the outlets are located far away from the pump.

The solution is to avoid using the standard airline tubing as the main trunk line carrying air to the aquariums. Instead, use 3/8-inch or ½-inch inside diameter PVC pipe and run it the entire length of your bank of aquariums. Outlets for each aquarium are then drilled into the pipe. Use a drill that is about 1/64-inch less than the diameter of the nipples you will insert. The best thing to use for nipples is the standard plastic valve that is available in most pet shops. They are usually sold in a blister package of five valves and five tees. These valves are just flexible enough that they can be forced into the holes you have drilled into the pipe without themselves cracking or cracking the pipe. This will give you a good tight fit and prevent loss of air around the taps without using any kind of sealer. Insert one such tap for each outlet and locate them just over the corner of each tank where the filter or air stone will operate. Place end caps on the pipe and seal them with the kind of glue that your hardware store recommends for PVC seals. Drill one tap into the end cap where the pump will be located and insert a plastic nipple.

Keeping the pump and the outlets as close to the trunk line as possible, thus minimizing the footage of airline, will keep head loss to a minimum. The trunk line acts as a pressure tank and, if you are using a piston pump, the surges of air due to the strokes of the pump will be reduced, thus giving you a smooth air output at all taps. The capacity of the pump is increased and the pump will last a lot longer since the strain on it is reduced to a bare minimum. In addition, you can do your duty as a citizen by conserving energy.

Foods & Feeding

Raising Live Fish Food in Back Yard Pools

by Joseph Boucher

A water lily pool in a secluded corner of your back yard can be an educational and ornamental replica of nature in which beautiful aquatic plants and flowers are grown. At the same time, it can serve to raise a summer supply of live food for aquarium fishes.

Choosing and Setting Up the Pool

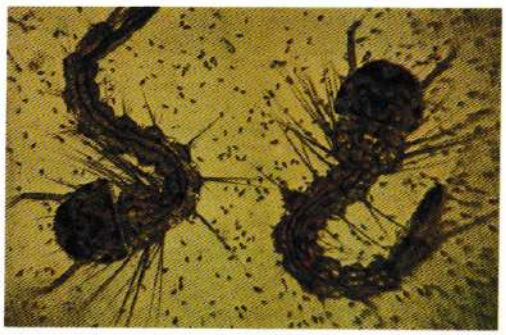
A small serviceable pool may consist of a watering trough sunk in the ground, or a larger pool can be made of welded sheet metal coated with a non-toxic water-resistant paint such as epoxy paint. A more ornamental pool can be constructed with a concrete bottom and a cemented brick wall about two feet deep and can be beautified with an aerating waterfall. A concrete and brick pool must be washed with water several times before using it.

Regardless of which type of pool you choose, four inches of mortar sand should be spread on the bottom to provide refuge for bottom-dwelling organisms. After filling the pool with tap water, wait a few days before introducing the selected organisms.

Stocking the Pool

Since it is difficult to establish and maintain a natural food web in a small pool, it is best to stock it with organisms that will coexist without preying on each other and will feed on prepared dry foods that can be given to them as needed. The quantity of such foods can then be regulated according to the population density of each type of organism in the pool.

Mosquito larvae can be found in nearly any stagnant body of water. They should not be cultured indoors without some special apparatus for keeping the emerging adult mosquitoes contained. Photo by Charles O. Masters.



A selected group of coexisting organisms for a mixed population in the pool may consist of 1/64-inch *Ceriodaphnia pulchella*, 1/32-inch colonial algae *Pandorina morum*, 3/32-inch *Daphnia pulex*, ⅛-inch *Hyalella azteca*, ½-inch bristle worms of the genus *Nais* and ¼-inch larvae of our domestic mosquito *Culex pipens* that will hatch from eggs laid on the water surface by the wild mosquitoes. There will be a natural appearance in the pool of microscopic rotifers such as *Philodina roseola*, which feed on bacteria near the bottom, and spotted worms of the genus *Aeolosoma*, which feed on plant and animal detritus in the bottom sediment. The pool bottom will no doubt also become populated by midge larvae (Chironomidae), commonly known as bloodworms. These organisms and some protozoan species such as *Paramecium caudatum* and many others usually appear in abundance in established pools, just as they do in natural pond habitats. Free-living bacteria will also appear in the pool and are essential for converting dead plants and animals and animal wastes into usable plant food. Wild single-celled alga species will also appear.

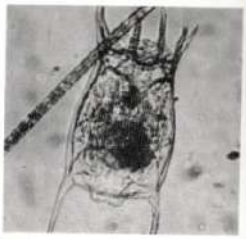
Alternately, another group of larger coexisting organisms can be selected. They might consist of 1/32-inch *Bosmina coregoni*, 1/8-inch *Daphnia magna*, 1/2-inch *Gammarus lacustris* and ¾-inch aquatic worms such as those sold by some culturists as oligochaetes. There are many other suitable organisms that could be selected to make up other community groups of smaller or larger species.

The feeding and living habits and size of the selected organisms account for their varying utility as fish food. The dwarf *Ceriodaphnia pulchella* make an excellent live food for baby fishes, and they act as a natural filter in the pool by consuming suspended bacteria and minute solitary alga cells, thus preventing the formation of unwanted green water. The slightly larger *Bosmina coregoni* makes a fine live food for larger baby fishes; this crustacean too serves as a filter, consuming protozoans and solitary alga cells. The colonial alga *Pandorina morum* makes a good bite-sized herbal food for herbivorous adult fishes and acts as a chemical filter, absorbing as its food the carbon dioxide and other waste by-products that become toxic to animals when not used as plant food. *Daphnia pulex* and the larger *D. magna* are natural live foods for many exotic fishes, and they feed mostly on single-celled algae and protozoans. Being very prolific, daphnia will soon be one of the most abundant organisms in the pool. Mosquito larvae are another natural live food of many exotic fishes, and their natural food consists of small protozoans and single-celled alga species. Free-flying

These are the larvae of chironomids, or midges. They inhabit the bottom mud of pools and make very nutritious fish food. Photo by Charles O. Masters.

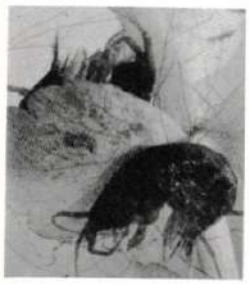
adult mosquitoes provide a constant supply of nourishing larvae throughout the summer. *Hyalella azteca* and the larger *Gammarus lacustris* are harmless crustaceans that feed mostly on live plants and on freshly killed animals. They are an important link in the natural food web of many fishes. *Nais* or bristle worms and oligochaetes are scavengers that feed on dead plants and animals that settle to the pond bottom, and they make a nourishing food for most adult fishes.

All of the above-mentioned organisms are able to survive through the winter in the pool by either hibernating in the sand, encysting into a dormant state or by producing temperature-resistant eggs that hatch in the spring when the water warms up again. Some of these organisms, especially the algae, produce temperature-resistant spores that also lie dormant until the next spring. In the late fall the pool should be covered with planks of wood and then covered over with leaves or straw to prevent the water from freezing solid to the bottom. All of these organisms can be cultured indoors throughout the year in aquariums.



Rotifers are multicellular microorganisms that dwell among threads of algae and bottom debris. They make good food for very small fry. Photo by Frickhinger.

Gammarids are small amphipods that grow to about ½-inch in length. Although they can serve as intermediate hosts to certain organisms that parasitize fishes, they themselves will not harm your fishes. Photo by Charles O. Masters.



Feeding the Organisms

Ceriodaphnia, Bosmina, daphnia and mosquito larvae will all do well on alternate feedings of powdered dietary products such as brewer's yeast, skim milk, malted milk or powdered desiccated liver. The powdered products are sprinkled sparingly on the water surface, and the feeding should be discontinued when the water starts to become cloudy. The feeding should be repeated only after the water becomes clear again.

Hyalella, Gammarus, Nais and oligochaetes will do well on alternate feedings of desiccated liver tablets, alfalfa or spinach tablets and calcium tablets. These products are available at health food stores. These organisms will also relish liver sausage, crushed snails and lettuce. They should be fed daily with just enough food to last for about two hours. A few days of experience at feeding these organisms will help you determine just how much food to introduce at one time.

The colonial alga *Pandorina* and single-celled alga species such as those

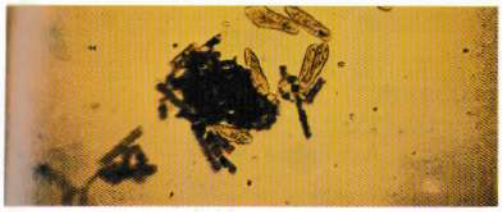
found in green water will feed mostly on carbon dioxide, but for a few days, until there are enough other organisms in the pool to produce the necessary amount of carbon dioxide and other plant nutrients, these alga species can be fed a few drops of liquid fertilizer such as that used for leafy garden plants. It should be remembered, however, that an over-supply of plant food can be detrimental to the animal populations inhabiting the pond. After the pool becomes established, the colonial algae and other plant life will be able to subsist entirely on the natural carbon dioxide production and other animal waste products in the pool, and as long as the plants are doing well no extra plant food is required.

Daphnia are easily cultured crustaceans that are greedily eaten by most tropical fishes. Photo by Dr. H.-H. Reichenbach-Klinke.

Collecting the Organisms

The collection of various organisms requires different methods according to the way each organism lives. *Ceriodaphnia* and *Bosmina* usually congregate in compact groups in the upper water regions in well lighted parts of the pool, and the easiest way to collect them is with a large syringe or baster. Daphnia also congregate, but in a more scattered group and more near the middle water level. They can easily be collected with a small fine-meshed net. The colonial algae aggregate at the surface in a thick compact layer and can be collected with a spoon. These mats of algae are usually found in the corners and around the edges of the pool. Mosquito larvae hang at the surface when not being disturbed and can be collected by quietly slipping a net under them before they dash to the bottom. *Hyalella* and *Gammarus* are roamers and are best collected while they are feeding around the food tablets, using a small pipette. Another productive way of collecting these roamers is by floating on the water surface a piece of white cardboard that has been smeared with liver sausage. They are attracted to the cardboard and can be netted out along with the cardboard. *Nais* worms, oligochaete worms and bloodworms usually hide in the sand or bottom debris during the daytime and can be collected after sundown using a flat net baited with a small tied-down piece of raw beef liver, which attracts them within a few minutes. These creatures are most abundant in the sand where the food tablets fall, and they can be collected during the daytime by scooping up the sand from those areas and rinsing it in clear water to expose the worms. The many microorganisms that appear in the pool serve as food for the larger introduced animals, but they can be collected with the bottom sediment and used as infusoria for baby fishes. The organisms with which you choose to inoculate your pool can be collected from stagnant ponds using essentially the same techniques that you use to collect them from your pool to feed them to your fishes.

Careful feeding and the proper balance of plants and animals in the pool will tend to maintain the water free of harmful

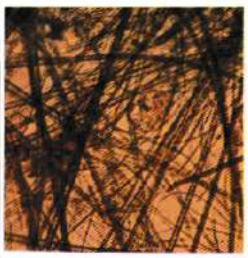


pollutants. Maintain a constant water level by adding water daily to make up for that which has evaporated or otherwise been removed in the process of collecting the animals for food. The pool should be shaded during hot summer days and protected from overflowing during heavy rains. Most of these pool organisms seem to prefer a pH near neutral and that can be adjusted using sodium bicarbonate when it becomes too acidic. Aeration is beneficial and can be provided by circulating the water with a small ornamental fountain, although aeration is not that necessary if you don't allow the animal populations to become too dense.

Gammarids are small amphipods that grow to about ½-inch in length. Although they can serve as intermediate hosts to certain organisms that parasitize fishes, they themselves will not harm your fishes. Photo by Charles O. Masters.

Paramecium are microscopic single-celled organisms that are found in most stagnant water. They are an excellent source of nutrition for very small baby fishes such as bettas. Photo by Charles O. Masters.

The constant supply of live fish foods produced in a garden pool, if fed to your fishes as often as possible throughout the summer and early fall, will produce growth and color on your fishes that is unmatched by any fish not receiving such a diet.



Mats of multicellular alga species usually grow around the edges and corners of well lit pools. Photo by Charles O. Masters.

Readers React

Diagnostic Services Available

As the demand for exotic fishes increases, so too does the demand for quality fish disease diagnostic services. Although some governmental institutions occasionally accepted tropical fish specimens in the past, they have become increasingly reluctant to handle diseased specimens from individual aquarists. Each month we receive numerous inquiries from hobbyists who wish to submit diseased specimens to fish pathologists for a diagnosis. In an attempt to satisfy the needs of the hobbyist, we sought the names of fish health specialists who would accept specimens from hobbyists, dealers, importers and commercial breeders of tropical fishes. To date we have the names and locations of seven such laboratories. As additional qualified persons respond to our solicitations, we will publish their names in the *Hobbyist*.

We suggest you contact the particular laboratory you have chosen regarding cost of analysis and their preferred methods for handling and preserving tissues. For histopathological examination, most laboratories find 10% buffered neutral formalin (B.N.F.) to be a satisfactory perservative. For bacteriological examination, the tissues should be submitted in the fresh or frozen state. If you are confused about how to obtain and prepare 10% B.N.F. or how to package tissues for mailing, we suggest the following: try to obtain some concentrated formaldehyde from your local mortician. Dilute this with 9 parts distilled water and add a pinch of borax as a buffer. Unless the formalin is neutralized in some way, formic acid crystals may form which interfere with the pathologist's diagnosis. This solution should be stored in a safe place, preferably in a dark bottle at room temperature. Tissues (or the entire fish with incised abdomen) should be soaked in the 10% B.N.F. for 24 hours, wrapped in formalin-soaked gauze and sealed in an air-tight plastic bag for shipping. A comprehensive case history must accompany the specimen. For more details, read the February fish health column entitled "Post-Mortem Examination."

John F. Kuhns, Research Director, Aquascience Research Group, 512 East 12th Avenue, North Kansas City, Missouri 64116, (816) 842-2590.

Instructions: $5.00 minimum charge to hobbyists, $10.00 minimum charge to businesses. Freeze tissues for bacteriological or virus analysis. For histopath. use 10% B.N.F. Taxonomic ID, water analysis and consulting services also available.

Species Accepted: No limitations on fish, inquire about invertebrates.

Dr. Robert A. Busch, Director of Research, Rangen Research Hatchery, Route 1, Hagerman, Idaho 83332, (208) 837-4464.

Instructions: Some diagnostic and consultative services may be available at no charge. Contact Rangen for policy before submitting specimens. Prefer fishes be submitted live or freshly refrigerated. All phases of laboratory diagnostic services are available excluding water analysis.

Species Accepted: All cold-blooded aquatic animals are accepted from fish culturists, breeders and importers—not from individual hobbyists.

Charles Dale Meryman, Director, Fish Doctor Laboratory, Inc., 9225 Bay Plaza Blvd., Suite #408, Tampa, Florida 33619, (812) 626-1805.

Instructions: All phases of laboratory diagnostic services are available including pond-side consulting in Florida. Also conducts pollutant bioassays, taxonomic ID and surgical procedures. Contact laboratory for fee schedule, preservation and shipping instructions.

Species Accepted: No limitations.

Dr. Donald F. Amend, Tavolek Laboratories, 2779 152 Ave. N.E., Redmond, Washington 98052, (206) 883-2150.

Instructions: 10% B.N.F.

Species Accepted: Tissues accepted from major importers or breeders only.

Dr. Raymond A. Bendele, Texas Veterinary Medical Diagnostic Laboratory, P.O. BOX 3040, College Station, Texas 77840, (713) 845-3414.

Instructions: $5.00 minimum charge per fish. 10% B.N.F. for histopath. exam. Freeze tissues for bacteriological and viral analysis.

Species Accepted: No limitations.

Dr. G.W. Klontz, Dept. of Fishery Resources, College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho 83843, (208) 885-6336.

Instructions: 10% B.N.F.

Species Accepted: Preference given to unusual disease conditions.

Dr. R.E. Wolke, Marine Pathology Laboratory, Dept. of Animal Pathology, University of Rhode Island, Kingston, Rhode Island 02881, (401) 792-2334.

Instructions: 10% B.N.F. or Bouin's fixative.

Species Accepted: Exotic marine fishes preferred. Preference given to importers, breeders, or public aquariums.

Mail Call

by Marshall E. Ostrow

If you have an aquarium question that you would like to have answered, send it to MAIL CALL. Letters containing questions of course cannot be acknowledged or answered personally, but each month a number of the most interesting questions and their answers will be published in this column. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., P.O. Box 27, Neptune City, New Jersey 07753. Please do not combine MAIL CALL questions with correspondence about subscriptions or book orders.

Puff the Magic Dragon

Q. I recently purchased a dragonfish in a local pet shop. The fish is about seven inches long and is mostly light blue with a slight opalescent sheen. Its head is very broad and seems too large for its eel-like body. The fish spends most of its time opening and closing its huge mouth while propped up on its leg-like pelvic fins. I have checked several good hobby references and can find no information on it. If possible, please tell me its correct name, origin and some suggestions for its care.

Ron Goldie
Ocean, New Jersey

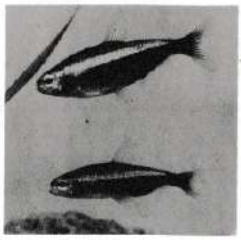
A. *We could not reproduce your sketch, but it does seem to be a goby species belonging to the genus* Gobioides. *One species,* G. broussonneti *is colored somewhat like your description and inhabits brackish-water marshes along the Atlantic and Gulf Coasts of the southern United States. This fish is a brownish-purple color and has pale chevron markings on its sides that point toward its head. Another species,* G. peruanus, *is found in similar habitats along the coast of Peru. It is more of a brownish color. Both species have a broad flat head, a large mouth, an elongate dorsal fin and sucker-like pelvic fins. Specimens of both species have been found that exceed 17 inches in length. Being a brackish-water fish, it will probably fare best in a mixture of fresh and sea water. Little is known of its feeding habits, but its upturned broad mouth suggests that it is a predator that snaps up small fishes as they swim by.*

Redder Bellies

Q. Most cardinal tetras available in local fish outlets have a distinct silvery-white belly. This color covers a fairly large area and contrasts sharply to the red lower flanks. Other cardinals have occasionally been available that have the red extending right around the underside of the fish, making the fish, in my estimation, much more attractive. Both types appear otherwise identical.

I have been working on the "all-reds," trying for a spawning, but without much luck. I realize that these fishes are at best difficult to breed, but I am wondering whether these cardinals are from wild stock and the other type from fish farms, or whether they are merely from different South American populations. Hopefully, the non-wilds would be easier to spawn. Any assistance or comments would be most appreciated.

Robert Channen
Elmira, Ontario, Canada



A pair of cardinal tetras, *Cheirodon axelrodi*. The female (upper fish) has a distinctly fuller abdomen giving the illusion that it has more red on the lower portion of the body than the male. Photo by M. Chvojka.

A. *Dr. Axelrod has collected cardinal tetras from a number of different areas and populations over the years and has never encountered an "all-red" strain. Therefore, we suspect that what you are seeing is a strain that has resulted from years of selective inbreeding on fish farms. If this is true, then by all rights your wishful thinking regarding their ease of breeding should also be true. An excellent treatment of the care and breeding of* Cheirodon axelrodi *is given in* Breeding Aquarium Fishes, Book 1, *by Dr. Herbert R. Axelrod. This book is available in most tropical fish shops.*

It's All in the Teeth

Q. I recently purchased some fishes that my dealer called rainbow cichlids, but he did not know their scientific name. They are about 1½-inches long and have a black line that runs laterally from the preopercle to the end of the caudal peduncle. These fish have light blue at the base of the anal and pelvic fins, and the rest of the body is light yellow.

I am pretty sure that they are South American cichlids of the genus *Cichlasoma*. I would appreciate any information you can supply on their scientific name and their care and breeding.

Paul Trettevik
Seattle, Washington

NOTICE

Tropical Fish Hobbyist traditionally has its pages open to a broad spectrum of editorial features covering widely differing points of view. It also is open to commercial announcements of all sorts regarding products and services for sale. In fact, in most cases we are prevented by law from discriminating among advertisers.

There are a number of long-established and reputable mail order houses in the tropical fish field. There also are a number of firms that lack experience with this highly specialized method of selling and are not always willing or able to cope with the problems it creates for them in terms of customer satisfaction. On that basis, readers should always be aware of the dangers involved with making purchases by mail. Additionally, they should bear in mind that price alone—even for a standard manufactured item like a pump or filter—is not the only basis for deciding from whom it should be purchased. A "bargain" or "discount" price on an item may not be any bargain at all when it comes time to service the item or obtain information about it; what one seller offers by way of price may be more than offset by not having a reputable local tradesman to back up its servicing and delivery of full satisfaction. In general, products available locally should be purchased locally.

Herotilapia multispinosa, commonly known as the rainbow cichlid, is small and rather docile for a cichlid, except at breeding time. Photo by Dr. Robert Goldstein.

A. *The fish you have described are* Herotilapia multispinosa. *This species is a small relatively docile cichlid that is found in Costa Rica and Nicaragua. The fish is very closely related to members of the genus* Cichlasoma, *but it is placed in a separate genus because of its radical departure from* Cichlasoma *species in its dentition. Whereas* Cichlasoma *species have conical canine-like teeth,* Herotilapia multispinosa *has compressed tricuspid teeth except for the front outer teeth, which are truncate incisors very much like those of a mammal. This does suggest that in the wild it may subsist on more vegetable matter than most of the* Cichlasoma *species, although there are some cichlasomas that do eat a lot of vegetable matter.*

As to its care and breeding, it should be treated as you would any other Cichlasoma *species. A detailed account of its care and breeding appeared in the December, 1976 issue of* Tropical Fish Hobbyist *is an article entitled "The Amazing Rainbow Cichlid," by Dr. Burt R. Frank.*

Shaggy Fish Story

Q. About three years ago I purchased two *Plecostomus* catfish. Now that I am a little more familiar with catfishes I am wondering if I have a pair of *Plecostomus* or a pair of *Ancistrus dolichopterus*.

For the last year and a half my catfish have been breeding almost regularly in my community tank. The female lays about 30 to 40 off-white eggs at every spawning. The male has forked bristles on his snout that are about an inch long and the female has no bristles. From my description, can you tell me which catfish I have?

I have been told that the breeding of these catfish is rare in a community tank. If so, do I have something to write about?

Marion Glass
Doraville, Georgia

This bristle-nose sucker catfish is a member of the genus *Ancistrus*. Photo by G. Marcuse.

A. *There has been a lot of confusion over the nomenclature of the South American sucker-mouth catfishes. The name plecostomus has become the common trade name for nearly all of these fishes. The fishes that were once classified in the genus* Plecostomus *are now classified as* Hypostomus. *The fish that you described is most likely a member of the genus* Ancistrus, *and is probably* A. dolichopterus.

Although the spawning of this fish in captivity is not what one might call an everyday occurrence, it is not an uncommon event, and over the last few years we have published several articles on their spawning.

Puissant Plant

Q. I recently saw a photo of Java moss in *Tropical Fish Hobbyist*, and I would like to know how to care for it. I have never seen such a beautiful moss, and I can't seem to find it in any local shops. Can you tell me where I might purchase it?

I would also like to know how to sex kissing gouramis.

Michael Yackwak
Dover, New Jersey

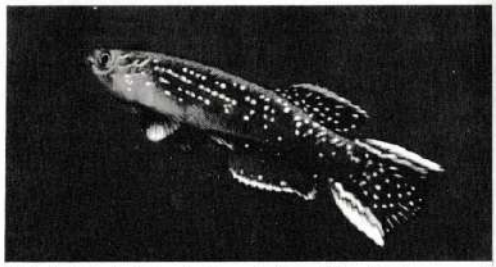
A. *Java moss is one aquarium plant that is practically indestructible. It will grow on stones, wood, glass and even as an epiphyte (non-parasitically on other plants). It can tolerate extremes of acidity or alkalinity, soft water or hard water, warm water or cold water and will even grow in practically no light at all. Of course, like any other living organism, it does have a set of optimum conditions. Soft slightly acid water in a temperature range of 62-76° F with moderate lighting seems to produce the best growth. If your local shops don't carry it perhaps a dealer would be willing to order it for you. Many killifish enthusiasts use Java moss as a spawning medium for their plant-spawning killies. Perhaps a local dealer may know such a hobbyist with whom he can put you in touch. A local aquarium society might also be able to help.*

Save your copies of Tropical Fish Hobbyist—*they are valuable.*

Java moss, *Vesicularia dubyana*, can tolerate almost any water and will grow in the very worst light conditions. Photo by Dr. C.D. Sculthorpe.

To our knowledge no one has yet offered a plausible explanation for the odd "kissing" behavior of the kissing gourami. Photo by G. Timmerman.

As to sexing kissing gouramis, that is indeed a very difficult job, for they show little, if any, sexual dimorphism. The only way we know of sexing them is to look for a fuller abdomen on a gravid female. Keep in mind that this fish grows to over a foot in length in its wild habitat, so it will be fairly large before it reaches sexual maturity.



This is a hybrid male that resulted from a cross between a male *Aphyosemion australe* and a female *A. gardneri*. Only males resulted from this crossing, and they were rather feeble and completely sterile. Photo by Col. Jorgen Scheel.

Killie Hybrid

Q. I have a pair of *Aphyosemion gardneri* and a pair of *Aphyosemion australe* in the same aquarium. Recently the male *A. gardneri* spawned with the female *A. australe*. Can you please tell me if the eggs thus produced are fertile and if I may expect the young to mature?

Noe Reyes
San Francisco, California

A. *Some of these hybrid eggs may indeed be fertile and a few of them may hatch, but it is doubtful that very many of those that hatch will mature. A. australe and A. gardneri are two very distinct species, with the former having only 15 chromosome pairs and the latter having either 18 or 20 chromosome pairs, depending upon which population it was derived from. During the process of fertilization some of the chromosomes in the sperm cell will not be able to pair with homologous chromosomes in the egg cell. Accordingly, even if some of the young are able to mature, they will carry genetic anomalies that will no doubt render them sterile.*

In Rivulins of the Old World, *author Col. Jorgen Scheel reported such a crossing from which only one fish matured. It had the appearance of a male but genetically it may have been an intersex.*

Most aphyosemions are prolific spawners, and males will attempt to mate with any fish that even remotely resembles an aphyosemion female of nearly any species.

Have You Tried Europe?

Q. I live near Los Angeles and there are quite a few aquarium shops around, but none of them ever seem to carry any of our native species such as the sunfishes, sticklebacks and killies. Can you please give me some information on how I can acquire some specimens?

Shawn Bird
Hawthorne, California

A. *An old cliche says the grass always looks greener on the other side, and unfortunately for us, the ornamental fish industry has chosen to give that overused cliche its overwhelming support. We have heard reports on juvenile native American sunfishes such as the pumpkinseed,* Lepomis gibbosus, *being sold in European shops for prices as high as $20.00 each!*

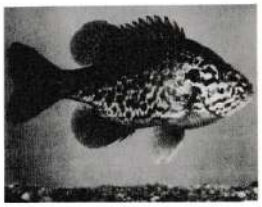
On the other hand, in this country what is so exotic about a fish that is found almost anywhere you find fresh water, even though the breeding colors of a male pumpkinseed are nothing short of spectacular? Because they come from the ponds of Poughkeepsie, New York rather than the swamps of Sri Lanka or the shores of Lake Kivu, they just don't have enough "snob appeal" to cause American hobbyists to demand them.

Of course, there is also the very real problem that the laws of many states prohibit keeping many of the species you mention alive in aquariums. It seems that in some states it's okay to catch them and eat them, but it's not okay to keep them alive as ornamental pets.

So if you want them, you'll have to go out and catch them yourself, but before doing so, be sure you check with your local fish commission on regulations concerning the species you wish to keep.

International Betta Congress Convention

The International Betta Congress National Point Show & Auction will be held June 24-26, 1977 in Toronto, Canada. The show will be sponsored by the Toronto Betta Buffs. Convention inquiries and trophy fund donations should be directed to Keith Brown, 296 Woodsworth Rd., Willowdale, Ontario, Canda, M2L 2T6.



The pumpkinseed sunfish, *Lepomis gibbosus*, in breeding dress is one of the most colorful native American fishes. Even out of breeding season the males are quite colorful, retaining much of the fiery orange belly color that is so prominent during breeding season. Photo by M. Kocar.

One of four known subspecies of the red-spotted newt, *Notophthalmus viridescens*, is the broken-striped red-spot, *N. v. dorsalis*. Photo by Dr. Herbert R. Axelrod.

So What Else is Newts?

Q. I have two newts in my five-gallon aquarium. One is almost all black except for his fiery red belly, and the other one is yellow and green with two broken red lines on his back. Could you tell me what species they are?

The red and black newt sometimes climbs up the glass and tries to get out of the aquarium. What should I do?

Finally, how do you tell male and female newts apart?

Rachel Spencer
Toronto, Ontario, Canada

A. *There are several European and Asian newts that could fit your description of the red and black newt, but in these there are also black markings on the red belly. The only one we know of that has a plain red belly and is black on the back and sides is* Taricha rivularis, *a newt that is indigenous to the west coast of the United States. Your other one fits the description of* Notophthalmus viridescens dorsalis, *a subspecies of* N. viridescens *that is indigenous to the eastern part of the Carolinas.*

An obvious solution to the climbing problem would be to cover the tank, but unless there is an air supply feeding into the aquarium, your newts might be in trouble. A better solution is to provide a six-inch square of Styrofoam and float it on the water. The newts will probably prefer to lie on this "island" and bask rather than climbing out to bask on your carpet or under someone's foot.

As to sexing them, this was covered in detail in Jerry Walls' article "A Newt for All Seasons," which appeared in the February, 1977 issue of Tropical Fish Hobbyist. *But to provide you with a quick method in or out of breeding season, males have larger hind legs than females. Using this method for sexing, however, requires that you have one of each sex for comparison.*

Discus Nursemaid

Q. I have two mated pairs of royal blue discus that are spawning at six to ten-day intervals, but the problem is that the males are fry-eaters. They wait until the eggs hatch and the fry are wiggling on the slate, then they feast on them. I have tried putting other fish in the tank, but that doesn't help. I have been able to keep the fry alive for no longer than four days by raising them away from their parents. I feed the free-swimmers with egg yolk. The fry seem to feed well for a few days, then they begin to die. I have heard that there is some sort of supplemental feeding that can be used to rear discus fry away from their parents, but I don't know what it is.

I have seen at least 40 spawnings get eaten or die, and unless I get some help, my males will be feasting on baby discus for the rest of their lives. I certainly don't want to throw in the towel now, so any help you can offer will be appreciated.

Gary Lahmers
Dover, Ohio

A pair of discus with newly hatched fry feeding on the parents' body slime. Photo by G. Budich.

A. *We cannot comment on why your males are eating their young except to say that apparently the parental instinct is not becoming fixed in your fish. This could be the result of some environmental abnormality or it could be the result of some genetic deterioration. Whatever the cause, rearing the fry away from the parents seems to be the only logical solution.*

In the TFH book All About Discus, *Dr. Axelrod discusses a method of feeding discus fry that was developed by the late Mr. Carroll Friswold. The technique is rather involved and would be difficult to discuss in any detail in this column, but it does involve the use of a special commercial egg-yolk preparation. We suggest you purchase a copy of the book. The technique is discussed on pages 128 to 135. If your local dealer does not carry the book, he can order it for you.*

Tiger barbs, *Capoeta tetrazona*, if kept in large schools and given plenty of swimming room and dense thickets of plants in the background, will seldom bother other fishes in a community aquarium. Photo by G. Timmerman.

Jack the Ripper is not a Fin Nipper?

Q. In the January, 1977 issue of *Tropical Fish Hobbyist* there was a letter in the "Mail Call" column about different types of community fishes. The writer said that you recommend tiger barbs and guppies as community fishes, but he finds that you can't keep them together. I agree with this in theory, because tiger barbs are aggressive fish and would tear the guppies to pieces.

Here is my point. I have three four-inch Jack Dempseys and one large female guppy in a 15-gallon aquarium. I realize that this is a bit overcrowded, yet all these fishes have lived in peace for several months. Everybody knows that Jack Dempseys are more aggressive than tiger barbs. I don't understand this. What do you have to say about it?

Dan R. Scoles
Riverside, California

A. *In answer to Mr. Lowler, the letter writer to whom you refer, we said in essence that tiger barbs can be a bit aggressive if they are kept singly or in small numbers, but we also said that when kept in schools of six or more they are not aggressive. The fact is that in a large school their fin-nipping behavior is redirected into schooling activity where they continually chase each other and pay little attention to other fishes in the aquarium. Under these conditions, and in the proper aquarium setup, tiger barbs are definitely NOT aggressive fish.*

As to the odd behavior of your Jack Dempseys, the only comment we could make without actually seeing your setup, or at least having a description of it, would be that under the varying circumstances in which hobbyists keep cichlids these fishes are predictably unpredictable. To be able to keep three Jack Dempseys of that size living peacefully in a 15-gallon tank, with or without the guppy, is in itself a small miracle! We would like to know your secret so that we can pass it on to other interested hobbyists.

A Different Breed of Cat

Q. I have two *Synodontis multipunctatus* catfish that are about one year old and about five inches long. One is light gray with dark silver spots and the other is brownish-black with black spots.

This unidentified *Synodontis* species closely resembles *S. multipunctatus* except that its spots are a little larger and a little less numerous. Photo by G. Marcuse.

I would like to know something of their breeding habits and to what size they will grow in an aquarium. What types of foods are best for them, and where do they come from?

Richard E. Becker
Michigan City, Indiana

A. Synodontis multipunctatus *is a rarely imported catfish belonging to the family Mochokidae, the same family to which the common upside-down catfish belongs. This fish is found on sandy flats in about 30 feet of water in Lake Tanganyika in Africa. It is not a rock-dweller like many of its close cousins, and it is not necessarily nocturnal. But since it does not live in shallow water, it is a bit light-shy. It was first described by Boulenger in 1898, and his holotype was 240 mm (about 10 inches) in length.*

Since the fish comes from Lake Tanganyika, it will probably do best in hard alkaline water, and temperatures in the seventies will suit it well. It should do well on a diet of worms and other meaty foods. Some of its cousins eat algae, so some greens in its diet will probably be appreciated. Little is known of its breeding habits.

Greater Akron Aquarium Society Show

The Greater Akron Aquarium Society is having its annual show on August 5, 6 & 7. The show will be held at the Summit Mall in Akron, Ohio. For additional information on entries and show rules contact John Zampino, Show Chairman, 1896 Auten Drive, Akron, Ohio 44320.

Support your local aquarium society.

AFRICAN CICHLIDS

From Lakes Malawi and Tanganyika for both Hobbyists and Dealers

The photo below shows one of lake Malawi's most beautiful fish, a mature male *Aulonocara nyassae* Regan, commonly called the "Peacock." This male appears bright metallic blue with orange markings and contrasting white trim. He stopped growing at 7" which must be about the maximum for this species.

Mild tempered, hardy, and active, "Peacocks" are ideal aquarium fish, that begin breeding at 2". The female mouthbroods the fry for 3 weeks before releasing them. The fry can immediately eat baby brine shrimp and grow fast. Our current list offers 1¼" juvenile "Peacocks" together with many other African cichlids, including some close relatives of the "Peacock" such as the "Sunshine Peacock," "Regal Peacock," "Ivory Peacock" and "Butterfly."

We'll send any interested hobbyist or dealer a list with details about how to order our African cichlids. The list contains complete information about shipping and our live delivery warranty. You'll also receive an illustrated brochure with more information about keeping and spawning African cichlids. Just send us a business size (4"x9"), self-addressed, stamped envelope.

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Meet the Hobbyist

A Boyhood Dream Becomes Reality For Dr. Burt Frank

by Marshall E. Ostrow

When Dr. Axelrod introduced me to Dr. Burt Frank about five months ago I was totally overwhelmed by Burt's exuberance as he busily prepared himself for his trip with Dr. Axelrod to the Brazilian jungle. As he leafed through book after book and slide after slide, gathering information and making notes on what he anticipated finding in the Amazon, his intense enthusiasm reminded me of a small boy opening his birthday gifts.

It all began for Dr. Frank when he was 11 years old. As has happened to so many of us, his father gave him an aquarium as a birthday gift, and Burt quickly became enraptured by the hobby. Like most of us, he ran the gamut from guppies to exotic cichlids and was never without an aquarium of some sort. However, Burt departed from the usual activities of most young aquarium hobbyists, because he spent his summers as a teenager at the shore, collecting, raising and breeding native marine and freshwater fishes and invertebrates.

Dr. Frank's interest in seeing fishes in their native habitats continued on through medical school. He began to visit such places as the famous New Jersey Pine Barrens and the Florida Everglades, as his career as a physician began to develop, he spent some of his vacations observing and collecting fishes in various parts of the Caribbean Sea.

As one of his many side interests, Dr. Frank serves as a school physician for the district in which he lives, and because of his many collecting trips and the fascinating experiences he has had on these trips, as well as his easy-going manner, he has developed a marvelous rapport with the children in his school district. He is often invited to visit some of the local schools to present programs to the children on the fishes and invertebrates he has observed, photographed and collected.

Attached to his home, Dr. Frank has a large greenhouse in which he raises exotic plants and fishes. The greenhouse contains two pools connected by a flowing stream. In these pools he has raised many beautiful livebearers and cichlid species.

Dr. Frank shows Dr. Axelrod a likely fishing spot. Photo by Dr. Herbert R. Axelrod.

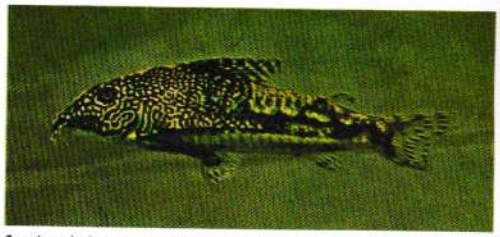
Except for the surrounding vegetation, a typical mountain stream in southern Brazil looks very much like one you might find in New England. Photo by Dr. Herbert R. Axelrod.

Brazil. . . My Dream Come to Life!

About six months ago Dr. Frank and his wife decided to vacation in El Salvador, a country in Central America. Through a mutual friend Dr. Frank met Dr. Axelrod, from whom he sought information on the aquatic fauna of El Salvador. After chatting with Dr. Axelrod for a very long time, he was invited to join him on his second 1976 expedition to the Amazon. Here began the most exciting phase of Dr. Frank's activity as an aquarium hobbyist and amateur ichthyologist. Rather than trying to relate the excitement of his trip to you second hand, I asked Dr. Frank to write a first-hand account of his adventures in the Amazon. So with no further ado, I am delighted to present. . . Dr. Burt Frank in Brazil!

Was it for real or was I just dreaming? I've always been intrigued with Brazil. I recall, even as a youngster, anxiously awaiting the arrival of my monthly *National Geographic* so that I could hunt for articles concerning the flora and fauna of Brazil, the Amazon River, Rio de Janeiro and many of the beautiful and remote places in this large South American country. As a young hobbyist, most of my fishes and plants came from Brazil, and I couldn't help but wonder how and where these fishes lived. The thought fascinated me and I dreamt about someday collecting my own tropicals in their natural habitats.

Now my dream was being realized.



Corydoras barbatus is one of the largest *Corydoras* species known. It reaches at least 4 inches at maturity. In addition, it is a beautifully colored catfish. Photo by Dr. Burt Frank.

One of the most thrilling parts of this realization was the fact that here I was, about to embark on an exciting adventure with one of the world's foremost authorities on tropical aquarium fishes, Dr. Herbert R. Axelrod.

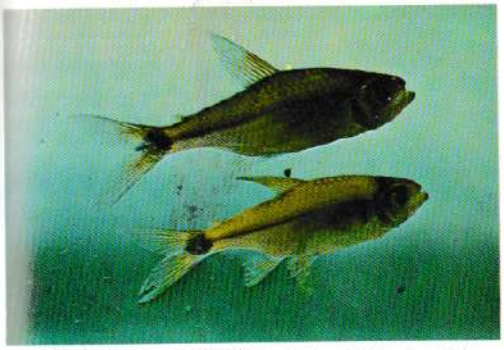
Once in Brazil, Dr. Axelrod and I were joined by an extremely friendly young Brazilian scientist named Alfeo. We visited his lab, which was south of Rio de Janeiro. He was conducting research on mass shrimp production for human consumption. While in the vicinity of Alfeo's lab we attempted to collect some *Cynolebias* species which were supposed to be located in this area. . . unfortunately, we found none. Perhaps the pools had not been full very long, so that the *Cynolebias* would have been very young and difficult

As we drove toward our first destination, a remote mountain village, we could see the city of Rio de Janeiro with its white beaches and the Atlantic Ocean behind us. Photo by Dr. Burt Frank.

to spot. This was a rather frustrating experience—I had been in Brazil for two days and not yet collected one fish.

Throughout our 20-mile return trip from Alfeo's lab to our hotel in Rio my enthusiasm ran high, and I kept asking Dr. Axelrod and Alfeo to stop at this stream or that pool. Finally, after listening to my wailing too many times, my companions decided to stop at a small drainage pool that was no wider than four or five feet. It was nothing more than a murky-looking stagnant puddle. "Could there be any life in here?", I thought to myself. After all of my pleading to stop at every puddle and stream I didn't want my companions to think that I was not a knowledgeable expert on Brazilian fishes; so reluctantly I dunked my small dip net into this dead-looking mud puddle. To my great surprise I found a dozen or so small tetras in the net. I had finally collected some native Brazilian fishes, and my enthusiasm reached a new high. I could hardly wait until the next day, when we would spend the whole day collecting fishes in the jungle.

The following day we left crowded Rio about 8:00 a.m. Our first destination was a mountain stream about 80 miles northwest of Rio de Janeiro. The scenery as we drove through the mountains was



As we fished a drainage pool about 20 miles south of Rio and about 5 miles inland we found many of these small *Hemigrammus*-like tetras. Photo by Dr. Burt Frank.

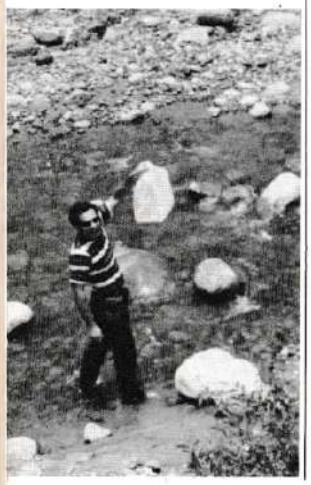
breath-taking in its beauty. Wild flowers such as impatiens were growing along the roadside. Beautiful rhododendron and philodendron were abundant everywhere. Looking behind us, I could see Rio, with her white beaches and the Atlantic Ocean in the background. What a magnificent spot for a retreat house! As we drove on we passed many drainage ditches, canals, streams and small ponds. Again, I wanted to stop to explore every little puddle. Unfortunately, we couldn't stop, because we had a lot of territory to cover in a small amount of time. One advantage in traveling with seasoned explorers was that I learned the importance of being organized and planning ahead.

About two hours from Rio we arrived

at a peaceful mountain village—a complete contrast to Rio, which was big, noisy and congested with people and cars. The mountains that nearly surrounded us rose to a height of about 4,000 feet, and the setting was beautiful. As we drove past the village we came upon an interesting and picturesque stream. The water was crystal clear, and the bottom was covered with pebbles and small boulders. A few of the native women were washing their clothes downstream and another family was bathing in a deep pool. The pebbly bottom and riffles of this stream reminded me of many such streams I had seen in the White and Green Mountains of Vermont and New Hampshire. Naturally though, the water here was a bit warmer, and the surrounding vegetation was much more lush.

This was our first stop. We had been told by a member of the Rio de Janeiro Aquarium Society that this general area was the habitat of a number of different catfish and *Cynolebias* species. I wasted no time as I bounded out of the car, nets and bucket in hand. In old sneakers I began wading downstream. I worked the edges of the stream where the water was

Dr. Frank calls to Dr. Axelrod to come down to the stream to see the giant *Corydoras* he just caught. Photo by Dr. Herbert R. Axelrod.



An unusual feature of the giant *Corydoras* which was later identified as *C. barbatus*, is the bristles that surround the lower part of its face. Photo by Dr. Burt Frank.

less turbulent and easier to explore. I finally came to an area that was abundant in overhanging vegetation . . . a likely spot . . . it was a fairly quiet pool with a fine white sandy bottom. Suddenly something moved on the sand. A closer look revealed a colorful catfish, the likes of which I had never seen before. I slowly placed my clear plastic net in front of the fish, then chased it into the net. "Got-cha!" I hollered, and quickly ran over to Herb, who was close by, to show him my prize catch. Both of us were rather excited, because at first glance Herb thought it was a new species. The fact that it was later identified as a known species, *Corydoras barbatus*, did not make its discovery less exciting, for it was a very large and beautiful *Corydoras*.

After our initial excitement subsided a bit, I got right back to collecting, for I was anxious to catch many more fishes. As it turned out, I only caught a few more catfish along the edges of shallow quiet pools; a few were hiding under debris which I carefully lifted, and some were resting motionless on the sand. The yellow and black-spotted body of this fish was easy to detect from above. All the catfish I caught seemed to be adults and were about four inches long, an exceptional size for a *Corydoras*. My companions did manage to net some juveniles of this species, but they were not nearly as brightly colored.

It was time to move on. I felt like a kid who was just called to supper in the middle of a hot basketball game, but we wanted to catch some *Cynolebias* near Macae, which was still a hundred miles away, and be back in Rio by nightfall. We ate at a stop along the road and ended our delicious lunch with big cigars. This was Heaven. . . what a day, so far!

Again we moved on, passing many inviting streams and ponds along the way. I wanted to stop at every one of them, but we had to reach our next destination without delay. When we arrived I was, at first, rather disappointed. The "pond" that we approached was nothing more than a mudhole in the middle of a cow pasture. Herb explained that farmers dig some of these holes to collect water for their cattle, but in other areas these mudholes are natural depressions where water collected. The surrounding terrain was flat, with few trees and little other vegetation except the grass that the cattle grazed upon. It was not a very pretty sight, but it was the habitat of the species we were looking for. Apparently birds, while drinking or looking for food, carry *Cynolebias* eggs on their feet from one area to another, thus distributing the species into pools that would otherwise contain no fish fauna. When the mudholes dry up during the dry season, the eggs that are buried in the muddy bottoms pass into a dormant state until water again fills the holes when the rainy season arrives. We stopped at some likely puddles, and Alfeo and I used a small seine net to capture a few of these species. Some *Cynolebias* species are attractive fishes, these were not very handsome. They were merely olive-brown with few other markings. Although the fish themselves were rather disappointing, as was their habitat, this phase of our trip was not without some excitement, for it was very interesting to see first-hand one

Dr. Frank and Alfeo pull up a seine full of *Cynolebias* and some small characoids. Photo by Dr. Herbert R. Axelrod.

Hoplerythrinus unitaeniatus is one of the smallest members of the family Erythrinidae, commonly known as the trahiras. Trahiras are predatory characoids that lurk in the weeds for their prey. These small specimens were found in a small mudhole along with some *Cynolebias whitei*. Photo by Dr. Burt Frank.

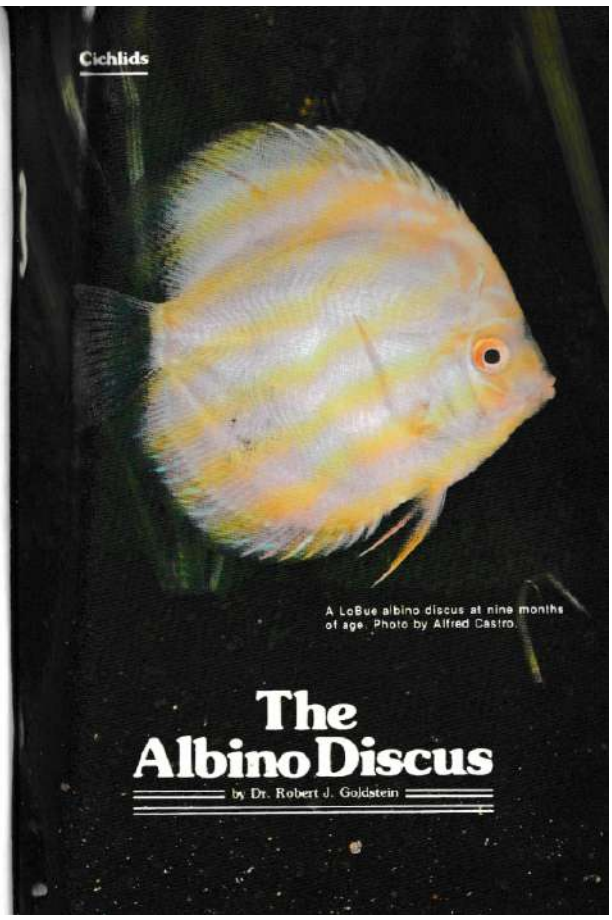
of the most unusual ways that Nature provides for the survival of her species.

It was getting dark as we left the Macae plains. We had been out all day and were now very tired. We reached Rio and our hotel exhausted but in excellent spirits. This was the end of a fantastic day!

There were many other interesting and exciting days on this trip. I shall leave the description of those adventures to Dr. Axelrod and to Dr. Martin Brittan, who joined our party a few days after this most eventful day of my life as an aquarist. Their accounts of our adventures and discoveries will be published in future issues of *Tropical Fish Hobbyist*.

We caught several female *Cynolebias whitei* as we seined in a mudhole in a pasture near Macae. Photo by Dr. Burt Frank.

Cichlids



A LoBue albino discus at nine months of age. Photo by Alfred Castro.

The Albino Discus

by Dr. Robert J. Goldstein

In the October, 1976 issue of *Tropical Fish Hobbyist* an article announced the appearance of the first albino discus known in the hobby. The day of their appearance, April 20, 1976, was just another day of discus spawning at Discus Haven in San Jose, California. Len and Sylvia LoBue, owners and operators of this discus breeding establishment, have been in business for several years and cranking out large numbers of discus for almost two years. A few days after this first spawning of a pair of royal blues, albino fry were noted in the tank.

Len LoBue observes the increasing streaks of blue coloration in one of their albino discus spawns. Photo by Bruce Stull.

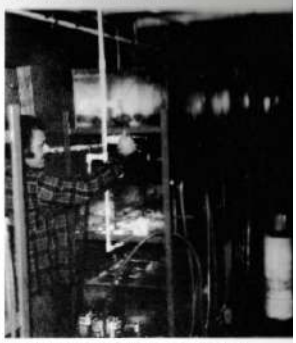
As of this writing the parents have produced 16 spawns, all with some albinos. Records were kept for the five most recent spawns, with the following results: the parents produced an average of 83 fry per spawn, with 29.3% of the fry being albino. The survival rate of the albino fry was 15.6%.

From these data a number of conclusions may be drawn. First, the low number of fry produced per spawning is probably a reflection of the high frequency of spawning and is not significant. Second, the low survival rate of the albino fry may be associated with a lowered ability to compete with their normally colored siblings for food; this phenomenon is probably one of the major reasons why albinos of any animal are rarely found in the wild. Albinos in general do better in lower light situations than normally pigmented fishes because their eyes lack protective melanin pigments. Third, the albinism rate of 29.3% (122 of 416 from five spawns) is sufficiently close to 25% to suggest that we are dealing with a simple one-gene recessive trait. Fourth, the one-gene recessive indicates that both parents are heterozygous for albinism; that is, considering the particular pair of genes in each parent that is responsible for the mutation (there actually could be a number of different gene-pairs that would produce this mutation), only one of the gene-pairs in each parent is actually mutant, while the alternate gene in each parent is normal. Fifth, and finally, the siblings of the parents must, to some extent, also be heterozygous, but the percent of siblings actually carrying a single mutant gene cannot be calculated from the available data. This is because the normal gene is probably dominant here and whether the fish carries one normal dominant and one mutant recessive or two normal dominants, the visible result is the same; that is, in either case the fish has normal pigmentation. Which particular normally colored offspring are carrying the albinistic trait can only be determined when each one of them is bred to either one of the albino siblings or back to one of the heterozygous parents.

Albinism is common among many aquarium fish species and among some cichlids in particular. The condition can arise, even in a single species, from a variety of mutations. To understand the significance of this phenomenon it is important to understand how albinism is produced. Albinism is just one of the results of a defect in the genetic system of the biochemical pathway involved in producing melanin pigment. If only one gene, responsible for one step in this biochemical synthesis, fails to perform its predetermined task, the end result of the pathway, the appearance of melanin pigment, will not occur. This can happen even though the rest of the genes in the pathway are normal.

Since any one of several genes in this pathway may be defective (and rarely is it more than one at a time), it is only when there is a matching of deficient genes of identical origin and function from each parent that albinism can be produced in the offspring. Because the albino strain could be produced as a result of a mutation in a different gene in someone else's fish, it is important that the strain we are dealing with here be called the LoBue albino discus. If, for example, a LoBue albino were to be crossed with another albino whose mutation resulted from a defect in a different gene, the offspring of this cross could turn out considerably different from either parent. Hypothetically, there could be a different degree of pigment loss in the offspring. For instance, perhaps they would have normally colored eyes but lack melanin throughout the rest of the body. Theoretically at least, this is how the pink convict cichlid, *Cichlasoma nigrofasciatum*, which has normally colored eyes, could have arisen.

However, all this is predictive based on the analysis of the number of albinos in five of sixteen spawns. At present, the oldest albinos will probably not be of breeding age until late May or June of this year. At that time we will learn whether they can breed normally. If so, then based on the conclusions in this article, we may expect 100% albino offspring from them. What we need to worry about is not whether albinism causes behavioral problems in getting them to breed due to lack of color or pattern signals, and secondly, whether the pink recessive will have an effect on maturation or longevity if there are multiple effects from this one mutant gene.



Len LoBue gives his discus fry their daily water change, filling 18 of the many tanks at the LoBue hatchery simultaneously. Photo by Bruce Stull.

In the interest of furthering our knowledge of the genetics of albinism, particularly in tropical fishes, any hobbyists who have had their discus produce albino offspring should keep accurate records of the number of albinos produced, of their survival rate and of any spawnings of the albinos and the data on their offspring. All of this information should be forwarded to Marshall E. Ostrow, Articles Editor of *Tropical Fish Hobbyist*. Your cooperation will be greatly appreciated.

(Piranha: *continued from page 14*)

prey. The face is blunt so that great power is exerted by the jaws. Piranhas can bite through alligator hide and even some woods. Their teeth are triangular, making them highly efficient for tearing and shearing, and their bodies are compressed, making them fast swimmers.

Piranhas Make Poor Friends

Piranhas are very cannibalistic when confined together in aquariums. In an attempt to spawn our red-bellied piranhas we placed three large specimens together. The two males were approximately 12 inches long and the female 15 inches. We had set up a two-to-one ratio because some piranha species, as do many other fishes, gang spawn. Gang spawning occurs when a female releases her eggs in a random fashion throughout the water followed by several males who fertilize her eggs by releasing their milt. We placed the piranhas in a large aquarium with an unlimited supply of fish to eat and left them alone overnight. When we looked in on the trio the next morning we discovered that the female had eaten her two suitors. A similar event occurred in my lab one weekend when a 6-inch piranha jumped from his side of a divided aquarium into his slightly larger neighbor's side. On Monday morning I looked at the partitioned aquarium that had housed the two fish and found one empty side and one very full piranha! Still another time, I was transporting three small piranhas in a plastic bag. During a 10-minute car trip one rather ambitious fellow ate his two bagmates!

The juvenile *Serrasalmus nattereri* with its longer snout and black-spotted pattern looks quite different from the adult of this predatory species, but it is no less dangerous to other fishes of an appropriate size. Photo by H.J. Richter.

Professor Hubert Markl of Darmstadt, Germany has studied the intraspecies aggression of piranhas. He found that piranha species that live singly in the wild

attack conspecific fish (others of the same species) in a ritualized fashion that ends when the subordinate fish darkens in color and takes flight. As is true of most conspecific animals, direct attacks are usually the exception, with the bulk of the aggression being only display behavior. In aquariums, however, the subordinate piranha is attacked repeatedly with bumps and nudges and occasional bites until it eventually dies more from exhaustion than its wounds.

Markl has found that piranhas recognize each other entirely by visual cues, specifically by their characteristically egg shaped (in profile) bodies. Dummies with a length-height ratio of 1.5-2.5 are reacted to and treated as other piranhas. Markl found that a dark eye and protruding fin made the dummy more effective. Body color does not release behavior patterns. For example, *Serrasalmus nattereri* individuals have bright red bellies yet do not respond to any greater degree to dummies with red bellies than to dummies with no coloration.

Piranhas and Other Man-Eaters

Within the animal kingdom, predators have always captured our interest and imagination, especially those occasional man-eaters such as sharks, lions, tigers, crocodiles and piranhas. Our interest in man-eaters is understandable; their consuming interest in us reminds us of just how vulnerable we are in a face-to-face encounter where speed, size, numbers or native habitat—rather than brain size and technology—determines the final outcome.

Piranhas occupy a special place among the man-eaters, since they are the only vertebrate man-eaters that are smaller than man. What they lack in size is compensated for by their characteristic group attacking behavior. Because they are aquatic, piranhas share the sinister reputation of sharks and crocodiles. In water, human frailty is magnified to such frightening proportions that we seem to regard aquatic man-eaters as more terrifying than terrestrial man-eaters. Lions and tigers are represented often in fables and legends as kingly, noble and wise. They are popular as stuffed animals; they are cute and cuddly as babies. Aquatic man-eaters, however, are not well represented in stories, do not have desirable human traits attributed to them, are not widely used in the stuffed animal business and are not appealing when young. Rather, aquatic man-eaters are regarded often as the embodiment of evil: expressionless, unpredictable creatures whose only motivation beneath the water seems to be destruction and death. The movie *Jaws* is a classic example of how an aquatic man-eater can be made the subject of the ultimate horror story. Perhaps we can anticipate a starring role for piranhas someday in a film no doubt entitled *Many Jaws*.

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