

TROPICAL FISH

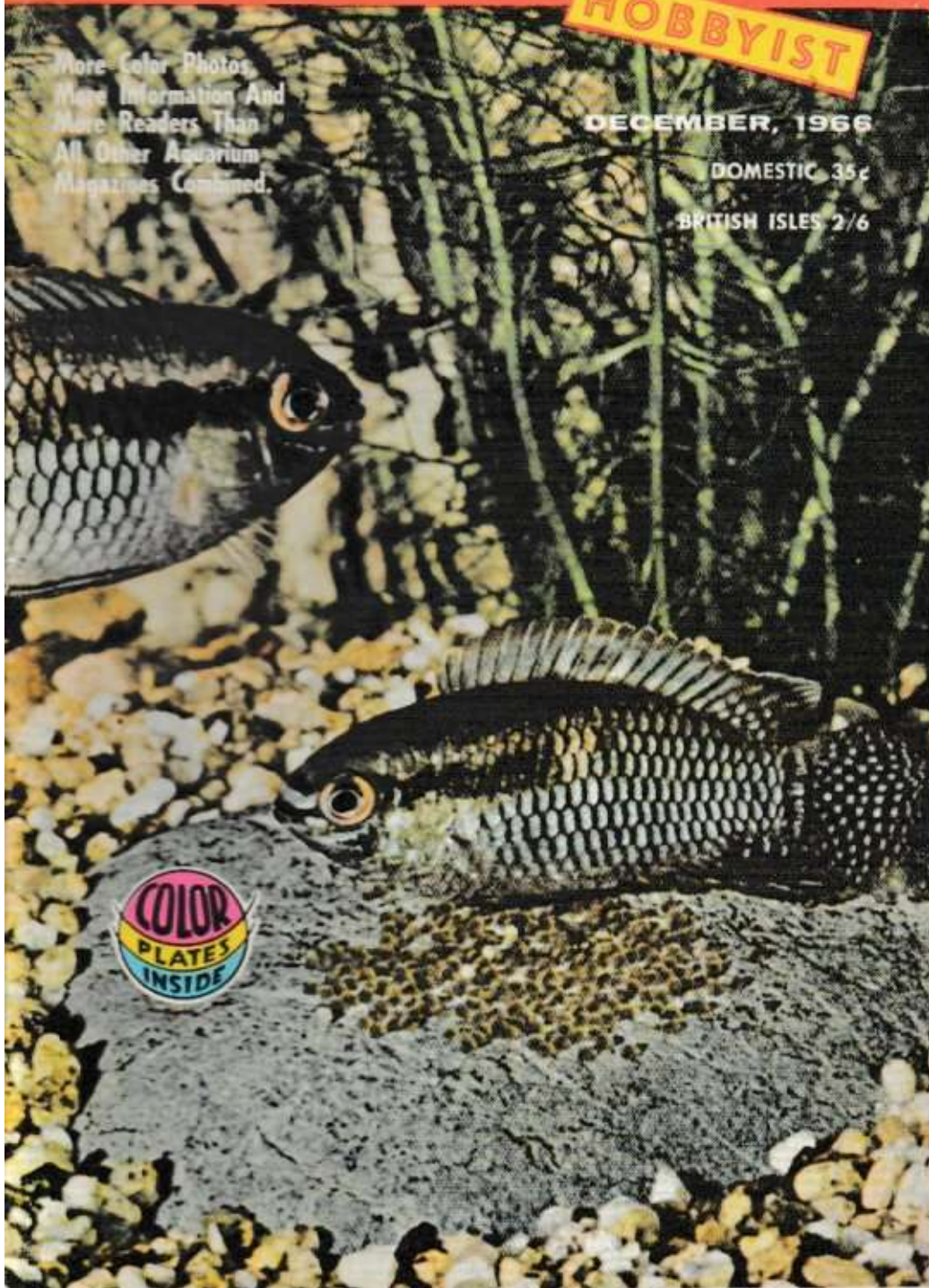
HOBBYIST

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GOLDFISH PRIMER
by William Vorderwinkler
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In spite of the great interest in tropicals, goldfish are still the single most popular pet fish in the world. In a book especially written for the beginning goldfish fancier, William Vorderwinkler has considered the essentials of goldfish keeping.

Goldfish Primer begins with a brief review of the history of the goldfish. Selection of an aquarium, gravel, filtration equipment, and decorations are fully described. The location of the aquarium, aquascaping and planting are discussed.

Proper illumination of the goldfish aquarium is given careful consideration, and the various types of reflectors and hoods are described. The all-important questions of how many fish per gallon and what and how much to feed are also answered. The prevention and cure of common goldfish ills are carefully considered. An entire chapter is given to noxing and spawning the goldfish and raising the fry.

In all, *Goldfish Primer* describes more than a dozen varieties of goldfish from the common ones such as the comet, shubunkin, and fantail to the rarer types such as the celestial, bubble-eye, and the pearl-scale. The book is illustrated with select photographs of goldfish, plants, and equipment.

TROPICAL FISH HOBBYIST

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COVER
When it comes to the breeding activity of tropicals, most aquarists would agree that the temperate ones are the easiest, the ones behind the most beautiful, but the cichlids, the most interesting, colorful, and the most demanding, spawning the previous generation and care for both eggs and for young generation after generation of hobbyists. Yet, a surprising number of hobbyists have made great leaps in the past year but the usual cichlid. This includes those from those basic old cichlids and the rough to handle, *Aequidens paraguayensis*, the flag cichlid, to just over the line border of being a deep species to a little over 2 inches) is included when not spawning and carry through with. This means you can keep them in your community tank, they are not so hard to breed, they breed quite easily, and you have the usual, there is just waiting for their eggs. For more about this fish and more the spawning photo, and the baby beginning on page 37. Photo by Ronell Lohel.

EXOTIC TROPICAL FISHES SUPPLEMENTS
Pages 23 and 24, 31 and 32. These pages are published for many months, and published to fit into the latest Edition of EXOTIC TROPICAL FISHES.

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EDITORIALLY . . .

Have you ever stopped to consider how convenient and thoughtful a book or a magazine subscription would be for a fish hobbyist as a Christmas present? Next to keeping them and looking at them, a hobbyist can't get more pleasure from his fish than he does by learning more about them. If he knows their habits and requirements he can give them what they are accustomed to and want. Also, such a gift allows a hobbyist to find out what others have learned about the species in which he is interested, and to evaluate any new ideas that he runs into. Shucks, half the fun of keeping fish is knowing about them and being able to discuss them. There are limits, of course, and I don't doubt you have met some people who ride their hobby so hard that they will invariably swing the conversation around to a "fishy" level and then make complete bores of themselves. (A bore, by the way, is often defined as a person who keeps interrupting a conversation that you are trying to interrupt.)

All of us at TFH wish our readers a very merry Christmas and happy New Year, and hope that we will enjoy many, many more of them together. We have worked 14 years to give you a great deal of readable fish literature, and hope to do so for many years to come!

William Vorderwinkler

Annual Fishes for Research on Aging

BY ROY L. WALFORD, M.D.
UNIVERSITY OF CALIFORNIA SCHOOL OF MEDICINE

Life span in the animal kingdom varies from the more than 152 years of certain tortoises, to a matter of days or hours, but all animals grow old and die. Why this is so is a major unsolved problem of biology. One fact impeding investigation of the problem is that the research worker has a lengthy wait before an experiment on aging can be completed with customary laboratory vertebrate animals. Mice and rats, for example, survive 2 to 3 years and rabbits and guinea pigs much longer before reaching senility. A few years ago I learned from aquarist friends that annual fishes were reputed to have very short life spans compared to other vertebrates. Here, I thought, might be an ideal animal. Therefore, in the summer of 1962 and accompanied by Dr. William Hildemann, I made a field expedition to South America hoping to bring back breeding specimens of *Cynolebias elongatus*, *C. wolterstorffi*, *C. ulloffi*, *C. bellotti*, and *Trigonectes strigabundus*.

Our first hunting ground was southern Brazil. We were to be met at the airport in Porto Alegre, capital city of the State of Rio Grande do Sul, by

Trigonectes strigabundus is found in isolated jungle pools. The male (below) has a black chin mark and longer, less-rounded fins than does the female (above). Photo by Harold Schultz.



The genus *Cynolebias* boasts many very attractive species. Above, *C. bellotti*, photo by Hansen. Below, *C. wolterstorffi*, photo by Harold Schultz.



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A. Viggo Schultz, Professor of American literature, and an avid aquarist. A man with an olive green Bavarian hat was standing in the airport waiting room waving a small orange fish net through the air. This net seemed too small for butterflies. We figured he must be Professor Schultz and that these incongruous gestures were meant to single him out to us.

"Thank God you were on that plane," he said. "They were about to take me away as a lunatic. Now then, let's not be formal. What're your handles?" "Roy and Bill," we said, a little puzzled. We learned later that in his capacity as Professor of American literature, Viggo had a vast stock of detective stories and westerns on his bookshelves, and used his knowledge of slang in a somewhat archaic, funny fashion. It was charming, and we became fast friends.

We were not so lucky with the fishes. That year the rains had come later than usual to southern Brazil. The territory around Porto Alegre is indeed wet country at any time of the year, even summer, for the city sits on a ridge of hills at the junction of five waterways including four tributaries of the Jacui River and the 100-mile-long Lagoa dos Patos. But *Cynolebias* live in impermanent water; small ponds, or water holes that dry up in summertime. Before the pond goes dry, the fish spawn. The eggs survive in the slightly damp mud, mature, and hatch with the next winter's rains. The ponds and puddles around Rio Grande do Sul were of only a few weeks duration—in short, new water, and no mature specimens of the larger members of the genus *Cynolebias* could be found. We did catch a number of *C. melanotaenia*, the fighting gaucha, in the 18-inch deep hole made by a cow's hoof the year before in the soft mud. This is a typical place to find *Cynolebias*.

During our field work around Porto Alegre, Bill observed that there were no mosquitoes in those habitats of *Cynolebias* which had not been treated chemically for insect control several years previously. In areas which had in fact been treated, mosquitoes were plentiful. The chemicals had killed the fishes as well as the insect population. The insects returned the following year, but the fishes had been eliminated. It seemed that the presence of *Cynolebias*, voracious eaters of live food, was a better and more continuing insect control than were insecticides. On the basis of this field observation, we later suggested to the World Health Organization (*Journal of Tropical Medicine and Hygiene*, 66:163, 1963) the use of annual fishes as biological control agents. They could be spread as eggs, would populate and provide fishes that can survive in impermanent waters (precisely the type of waters that are such troublesome mosquito breeding grounds and in which *Gambusia*, if employed as control agent, must be restocked each year). Field trials are now under way in several parts of the world on the basis of this suggestion.

Viggo, Bill, and I wandered around the coastal area of Rio Grande do Sul for a week, from Porto Alegre to the seaport city of Rio Grande at the tip

Tropical Fish Hobbyist

of the Lagoa dos Patos. In this area, the hilly land of the interior is fringed by a wide coastal zone of alternating sand bars, dunes, and extensive lagoons. July in South America is winter. We spent most of the week in hip-deep cold water with the wind blowing in from the South Atlantic, and caught many fishes, but no *Cynolebias*. Finally the two Norte Americanos headed north towards Sao Paulo for the next leg of the hunt. We decided over our hot toddies in Sao Paulo that a good-friend-and-aquarist contact like Viggo was worth a week's wading about in the cold, and, indeed, later that year Viggo sent us large supplies of *Cynolebias walterstorffi* and *C. adloffi*.

Bill became sick in Sao Paulo and had to return to the United States. Meantime, I teamed up with Werner Bokerman for a trip to the Mato Grosso in search of another large annual, *Trigonectes virgibundus*. Werner is librarian at the Natural History Museum in Sao Paulo, as well as being an experienced field naturalist. On the map of Brazil you can see little towns scattered here and there over the upper reaches of the Amazon. These seemingly remote places are in fact easily accessible. You don't have to steam for a month upriver in a clanking old riverboat piloted by Humphrey Bogart. In order to encourage population expansion into the interior, the Brazilian government subsidizes major airlines to make biweekly flights throughout the interior. The local inhabitants of each small town (some have a popula-



Prof. Viggo Schultz and son in *Cynolebias* habitat near Porto Alegre. Note that the square hand net used has a rigid handle. The fishes are collected by holding the hand net in the water in front of you and then dashing forward.

Salt-Water Aquarium Fish

by
Dr. Herbert R. Axelrod
 and
William Vorderwinkler

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Dr. Axelrod took four years to write this book with the assistance of Mr. Vorderwinkler. He journeyed 135,000 miles from Pakistan to Hawaii to Australia to the Fiji and Hawaiian Islands, through Japan and Ceylon, Singapore and Hong Kong, as well as Europe, the West Indies and South America, not to mention Africa and the Mediterranean, to collect and photograph fishes which have never appeared on a printed page before!

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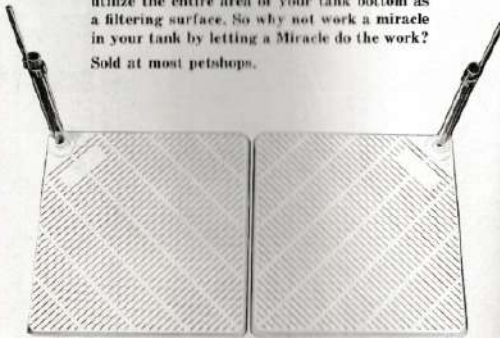
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tion of less than 200) keep a dirt runway cleared for the two-engined DC-3's to set down upon.

It was a 2-day, 1800-mile flight from Sao Paulo to Forte Principe, our destination on the Guapore River. The Guapore is one of the main tributaries of the Amazon and separates Bolivia from Brazil. It borders the famous Mato Grosso country in the deep south hinterland of the Amazon basin. What with an overnight stop in the capital city of Cayaba, founded 2 centuries ago by gold seekers, the flight required 2 days. The plane set down en route at many very small towns, even villages, let off or took on a few passengers, tradesmen with their wares, and a crate of chickens now and then. Refueling, when required, was accomplished by means of hand pumps from 50-gallon drums stacked up at the edge of the runway.

East of Sao Paulo one can view from the air the tragedy that is being



Dr. Roy Wolford fishing for *Trigonectes* in a Mato Grosso jungle pool. He is using a round "hula-hoop" net. Such a net is particularly good for catching fishes that spend most of their time near the surface. When the net is submerged, its widest part is near the surface. The part deepest down is not nearly so wide and, therefore, does not create much resistance that slows the movement of the net.



Dr. Hildebrandt collecting *Cynolebias* in a pool near Porto Alegre. Note that the square hand net he is using has no rigid handle. Most commonly, one uses it by grasping it on both sides and scooping forward through the water. Although it takes more effort to use such a net, it can be moved through the water more rapidly and accurately than one with a handle.

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slowly perpetrated on the Brazilian soil. Farming begins with the burning down of several square miles of underbrush and forest growth. The ashes render the soil highly fertile for about 3 years, then it's exhausted, and the farmer moves on to burn the next few miles. The partially denuded, exhausted terrain extends for hundreds of miles from the southeast coast into the interior. Because of the vast land reserves, natural resources (including the world's largest supply of unmined iron), and small population, the country is regarded by the Brazilians somewhat as an El Dorado not requiring development but merely exploitation, "to reap the fruit without planting the tree," as the saying goes. Fortunately we were going beyond these scenes of exploitation and at last were winging above great stretches of jungle.

The Mato Grosso is often mountainous, with deep gullies, tablelands, and rugged cliffs, and it is criss-crossed by waterways. Only a tiny part of this second largest state in Brazil is inhabited, and the territory is relatively inaccessible except by air. The Great Forest, from which the name Mato Grosso comes, covers the northern part. To the south are large swamps, dry steppes, and scrub and semi-deciduous forests.

Forte Principe has a population of about 250, which includes an army garrison. The village takes its name from the picturesque ruin of a fort laid out in the multifaceted manner of the old French ramparts constructed by the architect Vaubin. Across the Guapore River on the Bolivian shore is another "fort," also garrisoned. These two face each other, without another civilized soul on either side of the river for several hundred miles.

We landed at mid-afternoon. Only a few people disembarked at Forte Principe. There are of course no regular accommodations, but Werner arranged with the barefoot station master for us to sling up our hammocks in an empty airline shack. The shack was perched atop 12-foot stilts because of periodic floods from the muddy Guapore. A whole regiment of bats hung silently from the underside of the roof and, as we later found out, would swish in and out all night long through the open door and windows. It was agreed that we eat two meals a day with the station master's family. All of his 10 children had survived such meals, and while conditions were primitive, we figured (rightly, as it turned out) that this was a good recommendation. Black Brazilian beans, chicken, rice, eggs, and wonderful coffee were the staple diet. If you're ever at the headwaters of the Guapore, I particularly recommend the beans.

In the late afternoons in Forte Principe we bathed in the Guapore before dinner. It's a big river even this far up. There were said to be "not too many" piranhas at this point along the shore, for the natives fish them out for eating. Nevertheless, our dips were pretty much in and out. I quickly grew accustomed to bathing naked on the riverbank right in front of the villagers, but

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what I never got accustomed to was our blasted outhouse. It was directly behind our shack in perfect view of everyone, had neither sides, nor back, nor door, nor roof—just a seat. I took a blanket out with me and put that over my head and pretended, ostrich-like, that no one could see me, or else that everyone had disappeared. If you can't get rid of your civilized inhibitions, you can sometimes trick them. I have, as a matter of fact, since then tried the blanket trick on unwanted guests at home. Believe it or not, it *does* make them disappear.

The fishing grounds were inland, about an hour's walk through partially cleared and planted fields, then thicker and forest. This was not the typical rain forest, called the *selva*, of the more northern region of the Amazon, with the filtered light and the dark, brush-free jungle floor. It was dense undergrowth, vines, trees, and mud. All in all, the going was tough.

We used a regular seine net for fishing in the larger pools, and once scooped up a 5-foot crocodile in waist-deep water. This experience should be enough to surprise any aquarist. Werner knew little English and I no Portuguese, but we both spoke German. I don't know what language the crocodile spoke, but the guttural exclamations we made greeting his appearance probably surprised him too. In any case, all three of us lit out in different directions.

We finally located *Trigonectes* in the middle of the deep jungle in a pool about 15 yards in diameter and 2 feet deep. It was a pool Werner had remembered from an earlier trip. It seemed quite charming to me to fly thousands of miles and drop into this one little pool in the dense jungle where the rare fish could be found. We caught about 90 specimens and took the plane back the next day for Sao Paulo. I left the fish there with a commercial exporter for transshipment to Los Angeles. Alas! The story has an unhappy ending, for they died in his tanks. But at least now I have an excuse to go back again sometime for another dish of those beans!

The next stop, and the most successful collecting portion of the journey, was to Argentina where I met Dr. Rogelio Lopez of the Natural History Museum in Buenos Aires. We fished for 4 days in flat cattle country about 50 miles south of the capital. Shallow ponds extended along each side of many of the small roadways through this area, very muddy and partially choked with aquatic plants. These were the homes of *Cynolebias elongatus* and *C. bellottii* and we caught hundreds of each species. *C. elongatus* is the largest annual that I have encountered, and indeed Rogelio showed me preserved specimens 7 to 8 inches in length. It was with these two species that I returned to Los Angeles, the several species promised by Viggo Schultz arriving later.

We now have ample populations in our tanks at the University of California School of Medicine. The annuals are maintained at two different

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temperatures, 59° F. and 68° F. They live up to their reputation, for under controlled laboratory conditions they evidence signs of true senility and die in about a year's time. Senility is manifested by humping of the back, exophthalmos (pop eye), a decrease in length (just as human stature decreases a few inches with advanced age), and arthritic degeneration of the vertebral column. Fishes kept at the lower temperature of 59° F. have a longer life span and, what was rather unexpected, a much faster growth rate and larger final size than those kept at 68° F. Certain changes in liver enzymes correlate with age and with the temperature at which the fish have been maintained. There seems little question that the annual fish will prove a very useful animal for gerontologic research.

NOTES FROM ALL OVER

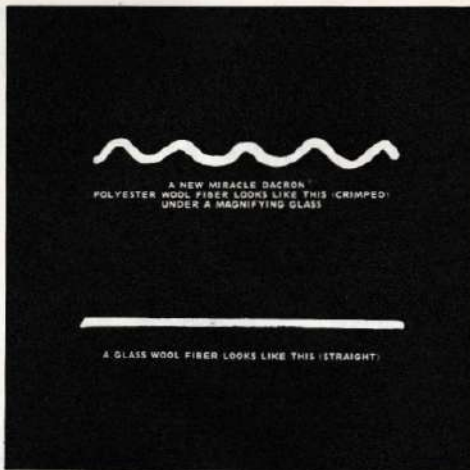
MARINE WORLD TO BE BUILT IN REDWOOD CITY, CALIFORNIA

Marine World, which may well become one of the nation's most unusual recreational, educational, and entertainment centers, is no longer a dream for Redwood City, but a reality. After negotiations that took several years, the \$5-million-dollar, 85-acre project will soon get underway.

Committed to open by 1968, initial plans for Marine World call for two 1500-seat stadia for whale, dolphin, porpoise and seal shows. Also to be featured will be the world's first "walk through" under-water reef and shark exhibit. In addition, a special water show arena with a 2500-seat stadium will permit the presentation of water skiing entertainment shows and competitions for the first time on the West Coast. There will also be a museum with display tanks and other aquatic visits including freshwater specimens.

Plans also include the establishment of an extensive Oceanographic Institute for scientific research of the sea. This will permit further explorations in such areas as mining the sea for both minerals and food, human survival under the sea, and underwater communications. The facilities of the Institute will be available to selected college students who might want to undertake field projects or engage with the staff in on-the-spot studies under the auspices of accredited colleges or universities.

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Secrets About Mysteries

BY JERRY CURRIER AND MARTY SMITH

Using snails in the aquarium is quite often one of those things that a hobbyist is discouraged from undertaking either by a dealer or by various cautions listed by authorities on fish care.

And no wonder! Some varieties of snails are disgusting headaches. Take the red ramshorn (*Planorbis corneus*) or the pond snail (*Physa*). These little beasts have ravenous appetites, and invariably they have a particular fondness for that beautiful amazon swordplant that sets off the new show tank so well! Also, they multiply with alarming rapidity and can completely denude the aquarium of plants and cover the glass with their jelly-like eggs. In a few weeks after a few are introduced, there are usually so many snails and snail eggs that it is hard to see the fishes!

But not all snails are so undesirable. There are a few that can make the hobbyist's lot easier and also become interesting pets for his aquarium. The so called "mystery snail" (*Ampullaria cuprina*) is one of them and is our subject.

There doesn't seem to be anything mysterious about this snail except where it got its name. It is a member of the group which are commonly called

The mystery snail, *Ampullaria cuprina*, (left) is compared to its larger relative *Ampullaria gigas* (right). Photo by Dr. Herbert E. Aischrod.





apple snails. All of the other members of this group are destructive plant eaters, yet *Ampullaria cuprina* seems to be relatively disinterested in living plants. It is very unlikely that you will find any apple snails other than *A. cuprina* in your fish dealer's tanks, but the mystery snail is easily distinguished from the destructive varieties by the depressed channels around the spiral of its shell. The other varieties have no channel and a much lower spiral.

We have raised *A. cuprina* to a maximum diameter of 1 to 1 1/2 inches, but when purchasing mystery snails it is best to buy them small, say 1/2 to 3/4 inches in diameter, as the larger ones may be quite old. A healthy snail's shell is a deep walnut color with four or five thin black stripes running along the top and around the spiral. The side of the shell toward the spiral has a pale cream colored stripe that follows the spiral to the tip. The shell should be completely free of white blotches, as these are indications of an eroded, weakened shell caused by overly acid water conditions.

The mystery snail has a small plate that can be closed like a trap door over the opening in its shell after the body is drawn inside. This offers him the maximum protection from all but the largest and strongest-jawed fishes, as the healthy shell is quite hard. A rather large "foot" is common and is interesting to study when the snail crawls along the glass sides of the aquarium. A series of ripples start at the front of the foot and move towards the rear, giving the appearance of small rolling waves, and in this manner the snail propels itself. In spite of his cumbersome looks and all of the legends about the slowness of snails, the mystery snail can move quite rapidly. It can crawl the length of a 15-gallon tank in less than a minute!

The mystery snail is equipped with both gills and a lung. Consequently it uses both oxygen that is dissolved in the water and atmospheric oxygen. In our experience, it seems to rely heavily upon atmospheric oxygen. Frequent trips are made to the surface of the water, and a flat organ that can be rolled into a tube is extended above the surface and the snail proceeds to pump itself up with air. This action can be quite amusing, as the entire shell bounces up and down and gives the appearance of an armored car with the hiccups!

Small snails are capable of "walking" under the surface of the water and gathering in bits of food that may be floating. The large foot pad is apparently held by surface tension. Only after the snail gets so large that its weight cannot be supported by surface tension is this interesting habit discontinued. Being quite versatile, the larger snails will crawl to the surface, make a funnel by curling the front edge of the foot pad, and pull surface water and floating food in.

The mystery snail has four feelers, two short ones close to the mouth and two long ones at the base of which are the eyes, mounted on short stalks.

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The feelers are usually extended and seem to be used to help locate food. The mouth is a tubular organ that can be pressed against glass or rocks and is equipped with two small squirrel-like teeth. When the mystery snail is eating algae on the glass sides of an aquarium these teeth can be seen. They are used with a scraping motion to pry the algae free. It is also possible that mystery snails have a very keen sense of smell, for they will make a bedline for food dropped in the aquarium some distance from them.

A myth that persists about these snails is that they catch and eat fishes by using their feelers as tentacles. (Probably this myth arose because it is common to see a group of these snails clustered around any dead fish in the aquarium.) In truth nothing could be more unlikely. At the slightest motion of any object the feeler comes in contact with, it is drawn in and is not extended again until all semblance of danger has passed. Moreover, it is very difficult to imagine the possibility of these weak feelers catching and holding a healthy fish.

As stated before, living plants are safe from the mystery snail unless it is driven by extreme hunger. In the average aquarium, the leftover food on the bottom is preferred. However, the diet of mystery snails should be varied and, if possible, should contain a large percentage of vegetable matter; boiled spinach, lettuce, and the like are ideal. Frozen brine shrimp and small bits of meat also are eaten happily. Dry fish food is eagerly consumed but should not be fed as a steady diet if you are planning to breed your snails.

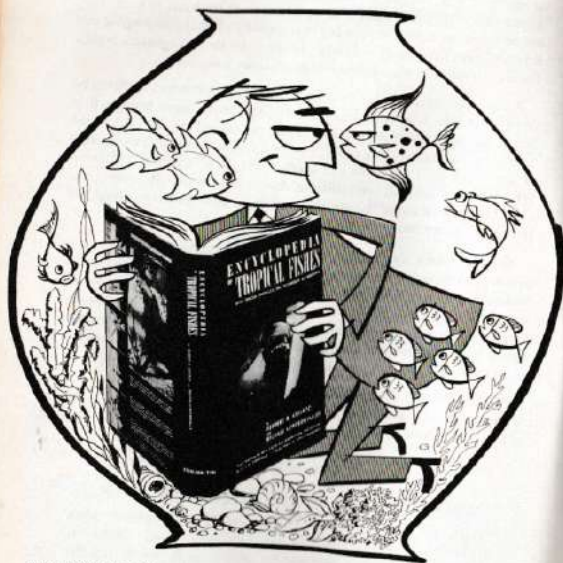
Properly fed and conditioned, the mystery snail is easily bred. Here the feeding of large quantities of vegetable matter seems to be important. We can find and have observed no way of sexing mystery snails. It seems

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December, 1966

feasible that, as reported in several references, these snails carry both male and female characteristics. Their eggs are large (about $\frac{1}{8}$ th of an inch in diameter) and are laid in grape-like masses up to $1\frac{1}{2}$ inches in length and $\frac{1}{2}$ inch deep. They are white and when dried have a hard shell enclosing them. They are extruded down the front of the foot and placed together above the water on the glass side of the aquarium or even on the inside of the hood. Because of this the eggs are easily seen and removed if desired by waiting a day or two after they are laid and then scraping them off with a razor blade. Otherwise, given a warm, moist atmosphere, the baby snails hatch in 2 to 6 weeks. They break through the egg shell and fall into the water. Since they are very small (about $\frac{1}{32}$ nd of an inch), they will seemingly disappear in the gravel on the bottom. Properly fed, however, they grow rapidly and are soon visible.

We have found that the mystery snail is an invaluable assistant in fry raising tanks. Many baby fishes require large quantities of food for proper growth. To provide ideal conditions, feed small portions several times a day. As it is with many hobbyists, this feeding schedule is difficult for us due to our working hours. Frequently there is a great deal of food left over, as we feed heavily in the morning and evening. This leftover food settles to the bottom and can cause all the problems attendant with rotting material in an aquarium. The introduction of a few mystery snails remedies this situation as they eagerly consume any food the baby fish miss.

Another use in fish breeding arises as a result of the fact that mystery snails will overeat on a diet of spinach or lettuce. When they do this, their droppings contain a great deal of partially digested vegetable matter. This in turn becomes an excellent culture medium for infusoria, which most baby fishes require for the first few days of life.

It should be recommended that when purchasing your snails, you insist that they be tank raised. It is possible for a pond-raised snail to be the host of various internal parasites that will prey upon your fishes. The aquarium-raised varieties are usually clean of such parasites.

Since highly acid water is detrimental to the shell of the mystery snail, you must be careful not to place them in an aquarium with this type of water chemistry. If white erosion marks appear on the shells, the water is too acid and should be adjusted to a neutral pH (7.0). Because most of the fishes kept in the home aquarium are best maintained at this level anyway, the mystery snail becomes a kind of barometer for proper water condition, but they should not be relied on as the only indicator, a pH test kit being best for this.

Using the information outlined here, the mystery snail can become a valuable helper in proper aquarium maintenance as well as being an interesting, attractive, unusual, and easily kept pet.

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This male flag cichlid strikes a handsome pose, absolutely still with fins fanned wide.

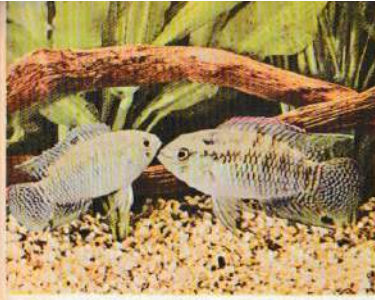
Breeding the Flag Cichlid, *Aequidens curviceps*

BY RUDOLF ZUKAL
BRNO, CZECHOSLOVAKIA
Photos by the author

German hobbyists call this fish "Tüpfelbuntbarsch" (spotted cichlid), and it certainly is one of the most attractive cichlid species. The first specimens came to Europe from the central Amazon region in 1909, and then again in

36

37



The author's male and female flag cichlids eye one another in the spawning tank.



The female has selected a rock as a spawning site, but she is having trouble attracting the male.



An occasional half-bearded peck is all the help the male gives his mate in cleaning the spawning site.



The female lays some eggs as the male stands by ready to fertilize them when she is done.

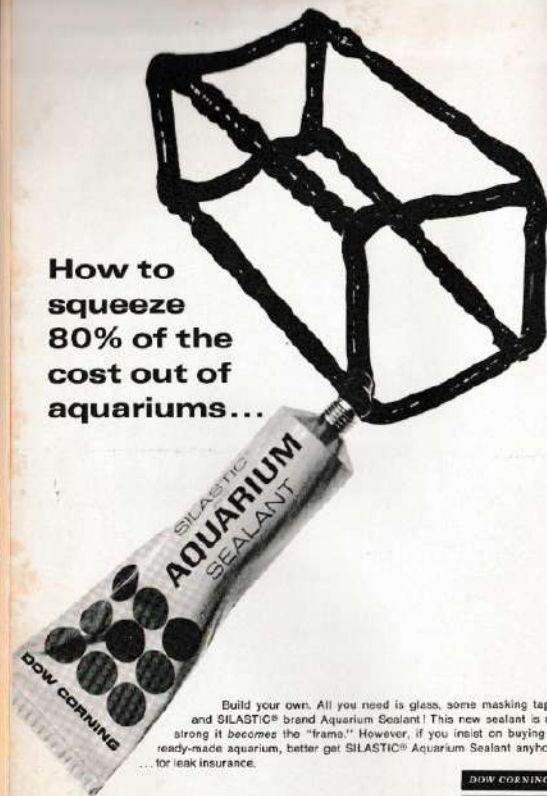


The female does not necessarily stay near while the male fertilizes the eggs, but she will return when he is done.



The male and female share the jobs of guarding and fanning the eggs.

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1955. A great deal of literature mentions additional shipments, but I believe these never occurred. (Translator's note: I saw them for sale in New York City as early as the late 30's and early 40's; dealers called them "*Acara thayeri*." W.V.). Many hobbyists who like small, peaceful cichlids were really pleased when, after World War II, they again were able to get this fish.

In the Amazon region (unfortunately, I do not know the precise location) flag cichlids are found in small slowly flowing or standing bodies of water. The colors cannot be fully appreciated unless there is proper lighting. During courtship and spawning, the males especially have lovely colors. These vary so frequently that sometimes the impression is that the fish is a different species. Flag cichlids do not dig into the gravel bottom and do not bother plants. They are somewhat shy, a welcome change from aggressive cichlids.

Determining sex is fairly easy when the fish are mature. The dorsal and anal fins of the males are more elongated, and the females, which get to be about 2 inches long, are rounder in the belly. A medium-sized tank, normal tap water, 74° F. temperature, and live foods, contribute to the well-being of these hardy fishes.

My six *Aequidens curviceps* were purchased in the autumn of 1965 in Dresden. They grew very rapidly, and when they were about 9 months old they were mature and ready to spawn.

I used a 3-gallon, all-glass tank with well-aged water of 7 pH, 12 DH. This, a gravel bottom with a few sprigs of *Myriophyllum* inserted, a background consisting of a wall of cork, and two round stones provided a proper breeding-place for a pair of these little cichlids.

For almost an entire week the pair remained hidden among the plants, until one day there was a greater amount of activity. I could observe that the female was swimming out frequently. Her spawning tube was clearly visible, and I began to look for a possible spot where the spawning could have taken place. As I walked around the tank, she immediately became shy and hid with her mate among the plants. They had not yet spawned. During a real spawning, I later found, the pair loses its timidity, and they do not allow themselves to be disturbed.

An unusual thing was that with this pair, the female seemed to take the

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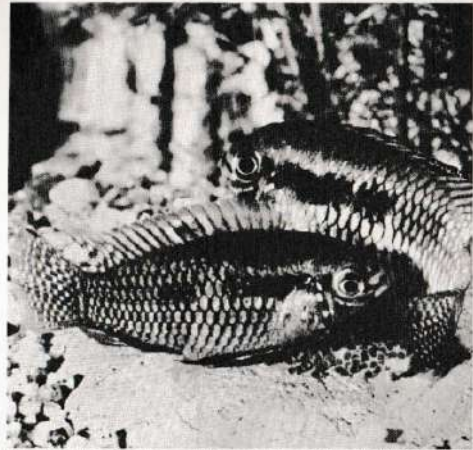
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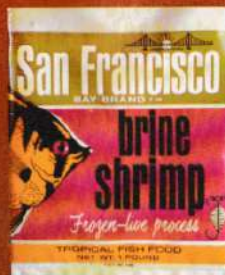
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Here, the female and male are traveling around in a tight head-to-tail circle. As she lays her eggs, he follows directly behind with a spray of sperm.

spawning initiative. (I had never seen this before with any of the other *Aequidens* species.) She swam from one stone to another, searching for a suitable place to spawn. The male followed hesitantly. When a proper place was finally chosen, the male merely watched shyly. Without being given any assistance whatever from the male, the female cleaned the rock meticulously. Then, when this chore was finished, the pair began to circle the spot. The female tried to start her eggs coming, and the male followed reluctantly. Finally, in the same manner as I have seen with the closely related *Aequidens pulcher* and numerous other cichlids, the first eggs began to put in an appearance and were immediately fertilized by the male. Later, the female would lay a whole line of eggs and then swim away to have her place taken by the male, who fertilized them.

Both parents took excellent care of the eggs, which hatched in 50 hours; after 6 to 7 days the fry became free-swimming and began to eat brine shrimp at once.



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The black neon *Hyphessobrycon herbertaxelrodi*... not as brightly colored as the neon tetra, but beautiful in a more subtle way. Photo by Dr. Herbert K. Axelrod.

The Black Neon

BY HUGO BENNINGER
Bern, Switzerland

Without a doubt the Black Neon is one of the most beautiful introductions since the Cardinal Tetra (*Cheirodon axelrodi*). In spite of this I find it deplorable that this fish should have the word "Neon" in its popular name. We have become spoiled by the brilliance of the other Neon Fishes, such as *Cheirodon axelrodi* and *Paracheirodon innesi*, and our expectations are likely to be a bit high when it comes to another fish which carries the name "Neon." So we must look upon this name for *H. herbertaxelrodi* as a burden rather than an apt description.

A year ago I was able, by chance, to get 10 specimens of *H. herbertaxelrodi*, which at the time were only half-grown and showed no sex differences. They were put in a 10-gallon tank, together with peaceful breeding specimens of Neons and Rasboras. Then, as today, the tank held clean Bern (Switzerland) tapwater which averaged 15 DH.

Some hobbyists will say that this water is much too hard, but I can say with a clear conscience that several thousands of so-called "problem" fishes have seen the light of day in this water. All were from parents which were kept and are being kept in such water. Hardness and pH value are certainly among the most easily measured water factors. They are, however, only a small part of a whole. But the ease with which they are measurable leads to the fact that these factors are given great importance and others, which are



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much more important, are ignored. Today, however, there has been another step made in that conductivity can be measured, instead of just measuring hardness with the means at hand. In this way we get a much more accurate idea of the water's characteristics, because it is well known that all salts are not builders of hardness. I pay little attention to pH value but make certain that the water is fresh, clear, and rich in oxygen. When introducing breeders I softened the water a few degrees to a DH of 8. I can say from wide experience that dropping or raising the pH value of the water had practically no influence at all over the desire of the fishes to spawn.

For this reason I place particular emphasis on the raising and care of my fishes. While growing they should be daily able to eat their fill, and above all their food should be very richly varied. We hobbyists must know that from a fish's point of view (and not just our own), an aquarium is a highly primitive imitation of nature and offers mostly only the very lowest level of existence. For this reason, only the best foods are good enough. When generously fed with brine shrimp, *Cyclops*, *Daphnia*, *Tubifex*, gnat larvae, Grindal worms, and good dried foods my Black Neons reached maturity in late autumn. The males were left behind by the females in size and body circumference.

As I had no instructions on the breeding of these fish, I began by putting three pairs in a 5-gallon tank. As a spawning medium I used nylon floss. The hardness of the water as has been said before, averaged 8 DH. The pH (measured with an ionoscope) lay around 6.8 or 6.9. The temperature was 77°. On the third day one of these pairs spawned very early in the morning. The eggs, which were somewhat yellower than those of a Glowlight Tetra, were mostly fertile and hatched normally. Later spawnings showed that in the breeding of *H. herbertaxelrodi* and that of our well-known Glowlight Tetra there is scarcely any difference. Both usually spawn on the third day after being put out, and both prefer just about the same temperature and will spawn even in an aquarium which is less than a gallon in capacity. Spawning in pairs offers just as much of a chance for success as group spawning. Both are raised in very much the same manner, too. Newly-hatched brine shrimp is taken at once in either case.

With good feeding the Black Neon can be bred at an age of five months. It cannot be assumed, however, that the key to success is water with a hardness of 8 DH and a pH value of 6.8 to 6.9. I am convinced that they spawn in quite alkaline water, and also in harder or softer water. If this fish is properly cared for it gets the urge to spawn.

I know that some hobbyists swear by old water. Why, then, are fish never found naturally in very old water, whereas in fresh water we find millions? A great many of our fishes come from the Amazon region, a place where the rainfall is one of the heaviest on the Earth's surface. Should such fishes feel good in old water?

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MAIL CALL

By William Vorderwinkler

If you have an aquarium question that you would like answered, send it to MAIL CALL. Each month the most interesting questions received and their answers will be published in this column. Letters containing questions cannot be acknowledged or answered personally. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., 245 Cornelison Avenue, Jersey City, N. J. 07302.

Hyphessobrycon or Aphyocharax?

Q. 1. On page 128 of Sterba's "Freshwater Fishes of the World" there is a fish mentioned called *Hyphessobrycon erythrinus*. This corresponds exactly in color description with another on page F-48.10 of EXOTIC TROPICAL FISHES called *Aphyocharax erythrinus*. The common name according to Sterba is the "Red-Tailed Tetra". I am wondering if the two are in fact one and the same fish. There is one major discrepancy, however: this fish was first described by Arnold and Ahl in 1928 (again, according to Sterba) and not by Eigenmann.

2. I have two brown discus in a 20-gallon tank. I have noticed that they tend to come out in fungus-like blotches or spots when fed on fatty steak or calf heart. The discus are given a diet of daphnia; glass worms; scurped raw haddock, sole, and whiting; raw

steak; and beef heart. Occasionally they are fed scampi. I have been living with this problem for some time but feel convinced that it is, in fact, the fatty extract in the meat that causes the

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blotches. Could you comment, please?
 3. I wonder if it would be possible to place the advertising at the beginning and end of TFI magazine, instead of among the articles? At the moment it appears that the articles fill in the ads and not the other way around!

Adrian J. Mandel,
 Renfrewshire, Scotland
**A. 1. No, they are two distinct genera. I recall when I first collected *Aphyocharax erythrurus* in Guiana that I thought I had found a new species, but when I returned, I found that Eigenmann had beaten me to it by about 50 years and described it in "The Freshwater Fishes of British Guiana" in 1912. A fish collector must take these things with a smile.
 2. A fish is poorly equipped by nature to digest fatty meat substances, and you must be careful not to feed meats that have not had the fat carefully cut out.**

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expensive fish species such as the discus, the panchax group, and a few other species. In fact, it is impossible to get most species that are common in America. Although we cannot obtain these fishes, I enjoy reading about new species being found, and for someone to say that TFI should be confined to certain fishes (the ones that are bought in petshops) is unjust. We can read in dozens of books about common species, but I am glad that TFI does tell us about new species because one day we may be able to buy them in petshops. Finally, most of the magazines on tropical fishes do not come anywhere near the standard of this magazine. Personally, I would like to see more articles on new species. Even if we cannot buy them, we can learn about them and appreciate the work that is being done to put them in petshops.

W. Lamb,
 Auckland, New Zealand
A. You can't please everybody, Mr. Lamb. I am writing your letter so that our readers can see how far our little magazine travels and what a different set of conditions is met with in other countries. Thank you for your high opinion of our publication.

Mosquito fish
Q. In regard to your February 1965 issue, could you tell me where I could buy or get some *Heterandria formosa* or

some other kind of fish that I could use in an experiment to control mosquitos? I would like to introduce a fish to ponds that would eat a great many mosquito larvae in the hopes that I can keep our city from using pesticides.

Martin Allen,
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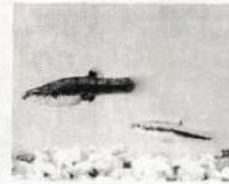
New post office regulations make it essential that you include your zip code on all correspondence to TFI for which a reply is expected and on all subscription or book orders. Thank you.

A. *Heterandria formosa* are not very colorful, and most dealers shy away from stocking them for fear that they would be "stuck" with them. But in a place like

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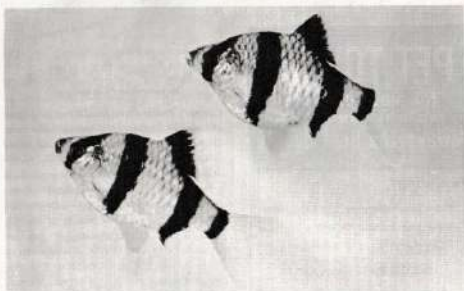
Heterandria formosa pair.

Corpus Christi: there should not be a lack of small livebearing species like the Gambusia group, and nearly all small fishes eat mosquito larvae greedily. However, what you propose to do may not be a great factor in mosquito extermination. Here's what happens: you exterminate larvae from the local bodies of water, and for a while everything is fine. A mosquito is a very feeble flier and stays within a short distance of where it was hatched, until one day a breeze takes it and carries it for miles. So, after you have eliminated all the larvae in your city you get a new infestation blown in from an outlying swamp, and the city officials think it comes from your treated area, so they tell you that as a mosquito exterminator you should be driving a taxicab or something. Then, after all your work, they spray anyway.

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Indigenous fishes

Q. I was greatly interested in the article on indigenous fishes in the June 1966 issue, and have a few questions about their care:

1. What temperature would be best?
2. Must these fishes have live foods, or can they be acclimated to prepared foods?
3. Can crayfish be kept in with cichlids?
4. What kind of food do they eat?

Jon Schwartz,
East Hartford, Conn.

A. You must remember one thing always: a fish taken from its home waters is adapted by nature to life in these waters, and in order to accept the conditions we give them, should get a reasonable facsimile of the natural conditions.

1. Most indigenous fishes can adapt to an unheated tank in a heated house. They should get unacidified conditions, filtration, and a good amount of aeration.
2. As with our tropical species, live foods are greatly preferred, but must can be educated to accept prepared foods. Even then, however, they should get frequent feedings of live foods.
3. If you can get a crayfish to live at the temperatures required by cichlids, yes. You must take into consideration the fact that a crayfish that has shed its shell (which it does regularly) is completely helpless until its new shell has solidified, and it must be given a place where it can hide at this time.
4. Crayfish make excellent scavengers, and will clean up all sorts of foods that have been left by fishes. A bit of raw fish or a fish that has died is greatly relished.

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box cover and see colonies of worms, lift them out with a pair of tweezers and then place them in a saucer with a bit of water in it. They will then crawl along the edge of the water and leave the bits of soil behind them. They may then be fed to your fishes.

Unusual female betta

Q. 1. After my male betta squeezed the eggs out of the female, he picked them up and spit them into the nest. After the female recovered, she went down to the bottom of the tank and also picked up the eggs. I figured she would devour them, but to my surprise she went back to the bubble-nest and spit the eggs in. Is this common or do I have a pair of weird fish?

2. In your May issue the writer of the article *Breeding Bettas* tells how to accomplish a good spawning but in all his tips he does not mention a light or what wattage to use; could you clear this matter up for me?

3. I have a pair of lyretail mollies and the female had 44 babies. A friend told me that all the babies wouldn't turn out

to be lyretails. He says they won't breed true. If this is so, could you please tell me how I could get a true-breeding pair?

Frank Cutler,
Niagara Falls, N.Y.

A. 1. Frequently this happens with two fish that have become fairly well "acquainted". A male gets a bit panicky when he is not quite sure if the female will or will not eat the eggs, but calms down when he sees she is only helping him. I seem to be coming very close to confusing intelligence with instinct, for which I hope my readers will forgive me.

2. Evidently the writer did not mention any special lighting requirements because nothing unusual is required. Avoid lighting too brightly.

3. No strain of lyretails is 100% true-breeding. There is always some retrogression. The thing you must do is get those that grow into common types away from the lyretails as soon as you can distinguish one from the other. Your strain will breed truer if you continue to sort your fish in this way and breed only lyretail to lyretail.

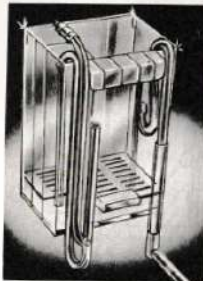
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- 1 *Pelmatochromis guentheri* (4-1/2 inches) - \$2.00.
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By Paul Hahnel

Bottom filters

Q. I enjoy your column in TFH and only wish it were longer. Being interested in guppies, I turn to your column first. Please advise me on the following:
1. With bottom filter working with bubbles coming from both ends, why is sand dirty when stirred? Water is clean as can be. Watersprite fares quite well. Fish seem to do well.

2. Catch small fry when born and keep in breeding cage (10" x 5" x 4"). Keep suspended in 10-gallon tank where the parents are. If left in cage I have little loss but if put into section of 10-gallon tank (about 1 1/2) alone they seem to die off (I lose about half). Why? Don't transfer until about 3 weeks old. Same temperature, same water, etc. Tank separator is plastic. Plants are also kept in this section. Why do I lose them?

3. Where can I see Paul Hahnel guppies? Where sold?
4. How often is it necessary to change water completely? I seem to have good results adding aged water when necessary after siphoning the bottom every 5 weeks or so. Is this OK or should it be oftener?

A. Hogberg, Bridgeport, Conn.
1. Because of the way a bottom filter works, you should not stir the sand. This is where all the sediment goes and stays until it disintegrates.

2. I do not use fry cages. Guppy babies born in my tanks are raised with their parents. I use floating plants for the

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babies to hide in, and if the parents are fed well they are not likely to eat many of the babies.

J. Aquarium Stock Co., 31 Warren St., New York 7, N. Y.

4. I clean each tank completely every 3 months.

Fish in a rain barrel

Q. 1. My watersprite's leaves break off and new plants grow from them. Is this OK? How can I raise these plants?

2. My 1-month-old guppies are 1 inch in length. Is this a big average? I feed them baby brine shrimp and small

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local daphnia until they stop eating. Is this a good way to feed?

3. What should a delta tail male's tail look like when he is 2 months of age?

4. By 2 months my delta males had their dorsals well developed and their tails started. Is this slow or fast growth?

5. I have 12 males in a 25-gallon rain barrel stocked with mosquito larvae and daphnia. Should I watch for any special problems? It's on a covered patio. Is their food supply OK or should it be supplemented? The temperature is 70-85° F.

Diane Miller, West Covina, Calif.

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A. 1. This is the usual way for this plant to propagate. Plant the little plants in the sand as early as possible and they will grow up.

2. I never had a guppy 1 month old that was 1 inch long. You are doing very well, and your guppies seem to prosper with the food you are giving them.

3. At 2 months they may have a squared off tail, about 3/8 of an inch.

4. They are doing very well.

5. The fish in your rain barrel get mosquito larvae and daphnia, and to that you could add brine shrimp, and maybe some dry foods.

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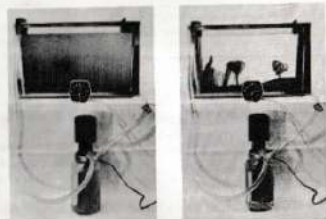
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Salts From The Seven Seas



By Alfred A. Schultz

Q. My local dealer has told me that I should never mix Atlantic fishes with those from the Pacific area. Is this true?

Don Deacon, Westfield, N.J.

A. This is false. Pacific and Atlantic fishes can be kept together. However, in any case, be sure that the fishes in your tank are compatible whether they come from the same waters or not.

Q. 1. In the future I am going to set up an all-plastic marine aquarium. In it I am going to keep dwarf sea horses. Would the commercial gravel sold for freshwater aquaria be suitable for the bottom of the aquarium?

2. I intend to use an undergravel

filter and a standard heater. Is overhead light or any direct light necessary?

3. What is the correct hydrometer reading for a sea horse?

4. Since sea horses are slow eaters would baby guppies be eaten by them?

5. Would a medical hydronector be suitable for use in this aquarium?

6. Are there any plants that would live in this type of aquarium?

George Lill, Port Credit, Ont., Canada

A. 1. Yes.

2. There should be some light when the fish are being fed.

3. 1.025.

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4. If, as you say, you are going to keep dwarf sea horses, baby guppies would be too large for them to handle.
 5. If it has calibrations between 1.015 and 1.020, yes.
 6. No.

Q. Since I live just a block from the ocean, I can gather many kinds of fishes. I would like to know if I can keep a trigger fish, an anemone, and a baby octopus in the same tank.

Douglas Harpham,
 Honolulu, Hawaii

A. How I envy you your ability to get fishes so easily! Since you do get them so easily, why not give the combination you suggest a try, and let me know how it works out?

Q. Can brine shrimp eggs be hatched in the same aquarium with dwarf sea-horses?

Bridget Standridge,
 New Sheria, La.

A. No; brine shrimp eggs should be hatched in a separate container. After they are hatched feed them to your sea-horses. Those that are not eaten immediately will stay alive and be consumed at a later time.

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Q. I have two saltwater black angelfish that I have had for 2 years. They are kept in a 100-gallon tank and have grown to almost 7 inches tall. Can you tell me if they have reached their full size?

Alex Margolis,
 Corona del Mar, Calif.

A. I have seen black angels swimming in the ocean and in large public aquarium that have grown to over a foot tall. However, in your tank, I would not expect too much further growth.

Q. Do all starfish have five points?
 Norman Hatzberg, Bangor, Maine
 A. No. Generally the common species have five arms. Right now, the New York Aquarium has the "Sunburst Starfish", which has as many as 15 arms.

YOUR FISHES' HEALTH

BY MIKE REED

Fungus

Fungus infections are fairly common in tropical fishes. These infections appear first as short, slender, grayish-white "threads" which protrude from the infected site. As the fish loses strength and the fungus gains a foothold, longer and more numerous strands appear, finally forming large tangled masses that look much like clumps of cotton.

The organisms that cause fungus are plants, and their spores are present in large numbers in virtually all water. Even the cleanest of aquaria can contain literally millions of fungus spores. However, these spores cannot attack your fishes if they are healthy and uninjured.

Your fishes are most likely to become infected by fungus as a result of being bruised or cut or as an infection that is secondary to a more serious disease such as ich, velvet, fin-rot, etc. When the fungus is secondary to a more serious disease, the fungus should not be treated; the other disease should be treated, and chances are that if it is cured, the fungus will disappear as well. However, in cases where the fungus remains after the elimination of another disease, in cases where fungus has developed on a bruised or cut area, and in cases where fungus seems to have developed on uninjured, undiseased tissue, the fungus must be treated as quickly as possible. Speed is necessary because the fungus organisms are actually sinking rootlike structures into the fish, and the longer these are allowed to grow, the more mechanical damage they do to the host and the more difficult it becomes to combat the developing parent plant. Another reason to avoid delay in treatment is that fungi grow and multiply with amazing speed.

Most authorities recommend the use of dyes such as methylene blue and malachite green to combat fungus. I have found two relatively simple treatments to be extremely effective. One treatment is used to treat the first signs of the infection, when it is merely a few strands of fungus on a small spot on the fish. The other is used when the fungus has advanced to a more severe stage. In either case, the affected fish should be isolated if possible. This serves two purposes: first, it prevents the spread of any more-serious primary disease that may be present but not yet obvious, and, second, it allows the sick fish an opportunity to rest completely if it so desires. Be sure the water in which your fish is isolated comes from its original tank. This

eliminates any chance of weakening the fish due to a sudden change in temperature, pH, or hardness of its water.

Treating Minor Infections

To treat the early stages of a fungus infection, the stages in which the fungus "roots" are not yet deeply, firmly, and extensively embedded, you need only use iodine or mercurochrome from your medicine cabinet. (I prefer iodine.) First catch the fish carefully with a mesh (rather than solid cotton) net. Then lay the net and fish down gently on a flat surface in a position which restricts the fish from moving and faces the infected spot upward with the net resting flat upon it. Next, put a drop or two of iodine (or mercurochrome) on the spot by dropping it on the portion of the net over the infection. You need wait only a second or two to assure adequate contact of the disinfectant with the fungus. The fish can then be returned to its aquarium. (Be sure you rinse the net after the treatment.)

If after a day or two the fungus has not disappeared or at least begun to disappear, repeat the treatment. (Be sure the fungus is still there and that you are not treating just a spot where the fungus was. This sore spot may heal slowly as compared to the time that the fungus will take to disappear.) If after the second or third treatment there is still no improvement in the fungus, it is probably too deeply rooted to be killed using this method, or the fish is too weak to resist new invasions after each treatment. In such cases, it is best to treat the fish in some way in which it will be medicated continuously. My second treatment, the one I use for more seriously infected fishes, is

This *Haplochromis burtoni* is suffering from fin-rot. Fin-rot is caused by bacteria, but the site of the bacterial invasion is very susceptible to secondary infection by fungi. Photo by Zukal.






Fungus organisms virtually cover this dead fish. Note how much the growth resembles cotton. Photo by M. F. Roberts.

just such a method, and fishes that do not respond to the treatment just described should be treated as seriously infected.

Treating Serious Infections

I consider a fish to be seriously infected by fungus when it is fungused over a large area of its body, when it is fungused in many small areas, when it is fungused in a single small area which cannot be cured by using iodine or mercurochrome spot treatments, or when it is fungused on its mouth, eye, or anal opening. For such infections, I find the standard progressive salt treatment to be extremely effective. Although salt is not as strong as iodine by any means, its use allows medication 24 hours a day over prolonged periods of time. Most fishes can take fairly high concentrations of salt without adverse affects. When treating fungus, start by adding 1 teaspoonful of salt for each gallon of water in the tank in which your fish is isolated. After waiting a day for your fish to adjust to the presence of the salt, add another teaspoonful of salt per gallon. If the fish is a catfish, neon tetra, or cardinal tetra (or any other fish that seems to be becoming uncomfortable from the salt) do not add any more salt unless the fungus does not clear up within the next 2 or 3 days. With most other fishes, particularly the livebearers, considerably more salt could be added, but only a third teaspoonful should be necessary.

As soon as the fungus clears, lower the salt concentration slowly. This should be done by changing about one third of the water in the treatment tank every day for 4 or 5 days using water from the fish's original tank. Finally, your fish is ready to be returned to its home.

 Can you identify this fish? Do you know where it comes from? What are its spawning habits?  How about this one? Could you breed it for money? If you can answer these questions definitively, or if you can get an authoritative answer in a jiffy, don't read further. But if you don't know all the answers and can't get them in a hurry — in short, if you are a hobbyist who really is bent on learning all there is to know about tropical fishes, aquarium management and, yes, commercial breeding, — buy this  book. Its 892 pages alive with almost 600 illuminating color photographs by the world's foremost authorities makes it the best investment you, as a hobbyist, can make. Exotic Tropical Fishes is available at your pet shop in two editions: hardbound and looseleaf to accommodate supplements by the authors.

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A rare Catfish.

Corydoras macropterus

BY HARALD SCHULTZ *
São Paulo, Brazil

The Brazilian City of São Paulo has a population of four million and lies on a plateau which is elevated 2500 feet and is located about 20 miles from the very flat Atlantic coast. Climatically the highlands and the lowlands are very different. The Atlantic winds, which are laden with moisture, are caught up by the steeply rising mountains and forced into precipitation. The result is a damp climate on the slopes and coastal regions where the mountains drain. At the edge of the plateau, at the exact spot where the city begins, there are dense fogs and misty rain. The air and water temperatures above are naturally quite a bit lower than on the flat coastal areas, where it is always hot.

To make the example more concrete: In São Paulo the air temperature in the dry winter can fall almost to the freezing point. At the same time, however, these drops in temperature are of only a short duration, and the shallow waters (and these are the only ones that concern us!) remain at about 50° to 52° F., seldom lower. In the summertime the water temperature seldom exceeds 80° F. This does not take into consideration the deeper pools or very shallow areas near the banks.

In the flowing waters of the flat coastal regions corresponding temperatures seldom drop below 64° F., and in the summer these waters, which are usually bordered with dense shrubbery, seldom rise above 78° to 81° F. The air is always tropically warm and frequently exceeds 90° F. The ocean is warm enough to permit bathing throughout the year.

The natural result of these topographic and climatic differences between the highlands and the lowlands is a wide variety of fish fauna. Many of the highland streams belong to the La Plata system, whereas those along the coast have other origins. Small streams and brooks have their origins in the rises leading uphill. Others originate near the plateau rim, combine to form small streams, then wind in endless turnings through the flat coastal area to end in the salty ocean, forming channels across the white beaches.

In the streams of the plateau, we find many Catfishes which are not to be found below. This is not to say that the little coastal streams have been independent for a long enough time to develop their own species. Anyhow, not too far back geologically they came into frequent contact with each other. Therefore the general fish fauna of the coastal regions is largely the same, although there are some differences in the fish population of some of the

*This is one of several articles that remained in our files or were about to be sent to us at the time Harald Schultz, our late expedition chief, passed away (January 8, 1966).

73

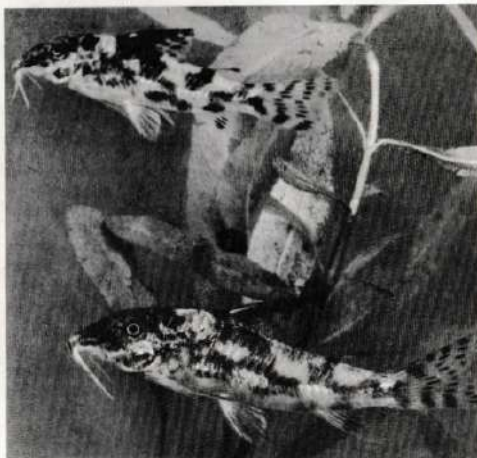
Tropical Fish Hobbyist

streams. *Mimogonistius barberi*, the Chocolate Tetra, is found almost exclusively in black-water streams, while *M. microlepis*, on the other hand, occurs in clear waters. Other species are found in both.

In these waters we find at least two very beautiful and interesting Catfishes: *Corydoras barbatus* and *Corydoras macropterus*. Despite the fact that they have "whiskers" which are scarcely larger than those of the other Armored Catfishes, *Corydoras barbatus*, according to its specific name, is the "bearded one." More exact is the name *macropterus* for the second species. Its dorsal fin and pectoral spines are truly gigantic, and I would suggest the popular name "Giantfin" or "Veiled Catfish." Take your choice!

C. barbatus is the more numerous. It occurs in almost all bodies of water along the São Paulo coast. Yes, we even found it in streams along the southern slopes of the highlands where the streams emptied into the ocean, frequently in the company of *C. nattereri*, which is mostly native to the flatlands around

A pair of *Corydoras barbatus*; the male below. Photo by Harald Schultz.



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December, 1966

Rio de Janeiro. These are found in very clear and quite fast-flowing streams. The bottoms are sandy, often with pebbles or broad slabs in places. The Catfishes remain near the banks in groups, preferring places where they can quickly disappear when danger threatens under dense shrubbery that hangs in the water. They are true bottom dwellers. They rest or root in groups of three to fifty or more.

There are considerable variations in the pattern of markings in *C. barbatus*, which are marked differently depending on the bottom of the stream in which they live. The basic color is almost always the same. I cannot say if these changes in the markings are sufficient to set up subspecies; this must be left to the specialists. With its checkered markings of dark brown on a background of ivory white, this is one of the prettiest Catfishes. In any case it is one of the largest Armored Catfishes I know of, measuring four inches and more. It behaves very well in the aquarium, but one must be careful when transferring them to be sure the temperatures are equal in both containers.

The Giantfin Catfish, *C. macropterus*, is considerably smaller. Its length seldom exceeds two inches. Both sexes share this length, while with the *C. barbatus* the females seem to be considerably smaller than the males.

I have caught *C. macropterus* only twice in the last ten years. Both times it came as a surprise. It seems to require special environmental conditions. It cannot be found in most of the "normal" coastal waters. Even in the waters where it occurs it is not at all easy to locate. More than ten years ago my friend Karl-Heinz Stegemann and I, accompanied by our families on a Sunday excursion, examined the different waters along the coast. To do this we crowded over the only trail, a narrow embankment with the tracks of a narrow-gauge railway on it, reaching deeper and deeper into the lush vegetation that covered the coastal flatland. The narrow-gauge railway led to the extended banana plantations far in the interior of the land and served the purpose of bringing out the ripe fruit (which to keep from spoiling was still green). From here the bananas went to Santos, where they are exported by the millions all over the world. The narrow-gauge railway extended far inland. From here a little winding donkey path led us still further in. Here we soon found a small brook in the half-light of a dense but low jungle. The shores of this brook were muddy and hard to get through. The water was deep brown, the bottom of the brook covered with fallen leaves which were partly decayed and had turned into a brown muddy-looking mass. There were no underwater plants, but there were plenty of fallen branches and twigs. These were novel surroundings. The water in the brook moved very sluggishly.

Whenever we came to a body of water which was new to us, we made a little game of trying to guess what fish species we would find there. Because of the color of the water we figured on finding Chocolate Tetras, which we did, and naturally some *Asynxax* species, which was also a correct guess. The

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Astyanax, however, were brown, not silvery, in color. Surely this was because of the water! I must remark here that fishes in deeply tinted waters seemingly absorb some of these colors, thereby helping them to match their waters. This does not seem to be a physiological adaptation. Once they are put for a couple of days in clear, untinted water they soon get back their normal colors.

Naturally we found the almost ubiquitous livebearing *Phallostercus caudomaculatus*. More rarely (as always!) we found the prettier spotted subspecies which is so aptly called "pepper-and-salt" by the Brazilians. We also caught *Hollandichthys*, *Gymnotus*, and only a few *Otocinclus*, which occur by the thousands in faster-flowing streams. It might be said here that this species does not thrive very well in the aquarium. They seem to require too much oxygen! Of course that prime predator of the South American fishes, *Hoplias malabaricus*, was also met with in very small sizes. And there were tiny cylindrically-shaped Catfishes of the family Pygidae. Then came the big surprise: there were brown Catfish with darker horizontal bands; the dorsal fin was very long, as were the pectoral rays. A beautiful sight in an aquarium! The dorsal fin reached almost to the tail or beyond, and the pectoral fins to the anal. But they were very scarce and we caught only a few of these beauties. These Catfish have the unusual characteristic of not always spending their time near the bottom, and seem to prefer staying in the middle reaches. They are frequently found resting atop a horizontal leaf like *C. hastatus*, the well-known Pygmy Catfish, which is not a strict bottom-dweller, either.

It was not for many years that we ever found this wonderful Catfish again. We did not take the trouble to walk the long distance on the narrow embankment to the little stream again. Meantime the coastline had changed greatly. Bathing resorts had been built, and private estates had also encroached upon the beaches. A perfectly straight concrete highway ran a short distance from the coast right through a point where our best and most secret collecting spots once were, and are now gone forever.

When Dr. Martin Brittan, Professor of Ichthyology at Sacramento State College in California visited us in May, 1964, we rode in "the wrong way"

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The *Corydoras macropterus* female does not have the flowing fins of the male, but she is still quite attractive due to her irregular and interesting color pattern. Photo by Harold Schultz.

The male *Corydoras macropterus* displays more pointed, better developed, flowing finnage than does the female. His body is a rich brown and is not patterned like that of the female. Photo by Harold Schultz.



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and landed at a little brook with dark brown water. The bottom was covered with a crumbly black mud which was like coffee grounds and mixed with branches, leaves, twigs, everything together. From the banks there hung some grass into the water, and a little further away stood a church and a lot of new houses! What became of the jungle?

Stegemann and his assistant are never afraid of any body of water. Why be afraid? Snakes? These are seldom seen and they are just as afraid of people as people are of them. One thing, however, is to be feared: a disease called schistosomiasis, which is caused by infection by a trematode worm of the genus *Schistosoma*. It is almost impossible to cure, attacking vital body organs. Modern cures are so poisonous that afflicted persons could be killed either from the disease or the medicine. There is one method of protection from this frightful disease. It can only take hold when there is a mollusk host for the worm cercariae, usually the *Planorbis* or ramshorn snail and some of its close relatives. For this reason I examine first to see if there are any of these unwelcome snails in a body of water I want to fish. Here in the tropics one cannot fish without stepping into the water. And if the snails are not detected at once? There are certainly some just about everywhere. Perhaps they are not infected, which happily is usually the case. Otherwise the disease could be the cause of a miserable death. Hygienic measures have not been able to keep up with the disease. Ramshorn snails, the carriers, have to be eradicated. Therefore be careful when fishing in the tropics!

No, there were no such host snails to be found here. Stegemann put his square-framed net with the edge on the bottom of the brook, keeping one end above the surface. His assistant did the same about 60 feet upstream and worked slowly down toward Stegemann. As soon as the nets met, they were quickly pulled up. They were full of the crumbly brown mud that looks like coffee grounds. Some very pretty *Mimogonistes barberi* jumped about. Again there were some brown *Astyanax* species. And here, wriggling in the mud, half hidden and very dirty, are little brown fish with still darker vertical bars. Something new? The hard little fellow goes from hand to hand. Even our guest is not sure. Is it a new *Corydoras* species? Here? Then Stegemann caught a beautiful male with a wide, long dorsal fin and pectoral fins which looked like big feelers directed back. *Corydoras macropterus*, we all agreed.

In the aquarium *Corydoras macropterus* behaves normally and is peaceful, quickly at home, takes all sorts of foods, and grubs on the bottom. After ten years we have it again, and it is also scarce here. Perhaps some day will find a place where they are more numerous!

Thus I would like to present this unusual and interesting fish to my hobbyist friends, because although it is an old acquaintance to science, I think that it is a newcomer to the hobbyist.