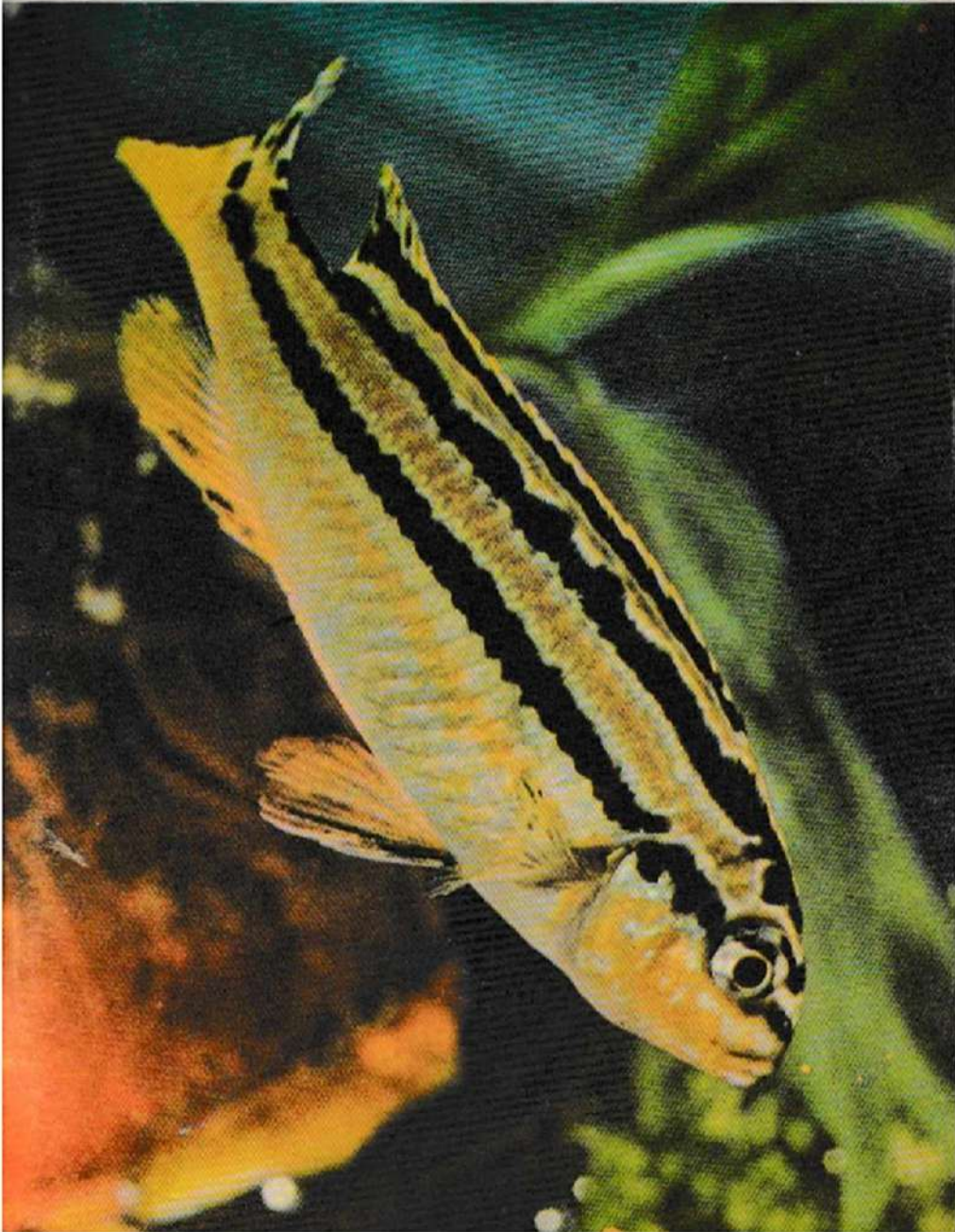


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THE AQUARIUM

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On The Cover

For February, THE AQUARIUM cover features *Pseudotropheus auratus*, a most eye-catching Nyasa cichlid. See P. 8 for a full color story on this magnificent species. (Additional credits appear on P. 53.)

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EL TIGRE



By BRAZ WALKER

It is somehow fitting that since the jaguar, or *El Tigre* (the tiger) as he is called, is not only the largest and most terrible of American felines and one of the few beasts which will stalk Man himself, any namesake would be a characteristically ruthless killer. Appropriately, *bagre tigre*, the tiger catfish is not only a devastating predator of South American jungle streams but has also a breathtaking beauty of his own seldom surpassed in the fish world just as his terrestrial counterpart has among the most handsome of cats.

Pseudoplatystoma fasciatum (Linnaeus) is one of the "shovel-nosed catfishes" of the family Pimelodidae, the most familiar of these being the strangely handsome



Sorubim lima. Although *Sorubim* has a respectable capacity for engulfing sizeable fishes, when a comparison is made to the tiger catfish there's no contest. The underslung, almost sharklike mouth of the shovelnose cannot begin to match capacities in same-size specimens with the yawning maw of a hungry tiger catfish. His relatively easy-going attitude during the day belies the werewolf nature of the creature. At night, he becomes a relentless glutton whose hunt is over either when day light returns or he is so tightly stuffed that he is unable to make the effort to keep his sagging stomach aloft.

continued on page 77

THE AQUARIUM SNAIL

by WILBUR L. HANFORD



I am kind of "fed up" with some aquarium hobbyists and their snobbishness, discrimination and lack of charity toward your friend and mine, "The Aquarium Snail". People that act this way are, no doubt, akin to those people who can't stand seeing a neighborhood squirrel in their birdfeeder. Whatever their reasons they are overlooking a great bet and a fine aid in plant growing and aquarium housekeeping. It is not unusual to visit a pet store and hear a customer bemoaning the fact that he just can't grow plants, and that his fish (livebearers) do not attain much growth. It is easy of course to blame it on lack of light, water quality, poor plant stock, etc. At one time, I used these excuses myself! Then, I heard of a hobbyist (and friend) who was actually pulling handfuls of plants out of his tanks so that his fish could have an open area in which to swim. I looked at his setup and noted that he had a good population of ramshorn snails. He wasn't very worried about overpopulation. Some of his more robust fish took care of that. A close look at his tanks showed little concentration of unsightly algae. He had used no chemical "wonder product" to achieve this. It was simply left to the action of the snails.

When you mention "ramshorns" to anyone, they immediately start worrying about eventually having too many. I have, for some time now, kept a piece of common shale rock leaning against my inside filter or some other ornament or piece of rockwork. Originally, I did this to hide the filter but I soon found that many snails collected there. When I felt that I had too many snails in the aquarium, I simply lifted the piece of rockwork out of the water and crushed a number of snails; they then became "fishfood".

continued on page 44

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SPAWNING PSEUDOTROPHEUS AURATUS

By ROSARIO S. LaCORTE

WORDS CANNOT EXPRESS EITHER MY amazement or impressions upon seeing the Lake Nyasa cichlid, *Pseudotropheus auratus*, for the first time. It was a startling encounter as will be understood from the accompanying photos of this beautiful fish. Before obtaining a pair, I readied a 30-gallon tank so there were no problems as to where they would be placed. My water is naturally soft, approximately 2 DH and 7.4 pH, so there were no problems despite the fact that some of the lakes of Africa are extremely alkaline.

The fish settled down immediately and accepted food very quickly. The male became quite aggressive and rather than subjecting the female to constant chasing, I decided to separate them by a sheet of glass. The tank had a luxuriant growth of water sprite at the surface as it was directly under a skylight in my hatchery.

Two peat filters were placed into each partitioned section to give the aquarium water the utmost clarity. All this occurred during the early spring when I had been collecting the woodland black mosquito larvae which makes its appearance in extremely large numbers about the second week of March. Also to be found in these waters is the beautiful fairy shrimp, *Chirocephalus grubei*. Two finer foods would be hard to find and these were eagerly consumed. The fish were also fed bits of shrimp meat as well as beef, chicken, earthworms, and daphnia. They are voracious feeders and are constantly on the lookout for food. Nyasa cichlids are without a doubt the most active cichlids that I have seen to date, quite unlike the many South American cichlids which are shy and slow-moving.

The reader may wonder how these fish can be acclimated to soft water, especially when the Great Lakes are so hard and alkaline. I wonder myself at the tremendous ability of many cichlids to withstand extreme ranges of pH and hardness. If my memory serves me correctly, the old New York Aquarium for many years kept *Tilapia mossambica* in marine water, which illustrates the adaptability of some cichlids.

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FLOATING PLANTS

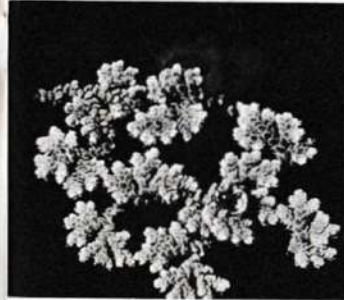
By WILLIAM A. TOMEY

In some lighting situations in the aquarium, it may be necessary to reduce the amount of light by the use of floating plants of some sort. For example, at one point in the aquarium there may be sufficient light, but an end with cryptocorynes just may have too much light. The following story, told in pictures, sketches briefly the world of floating aquatic plants that may serve in the largest pool or the smallest tank. ●



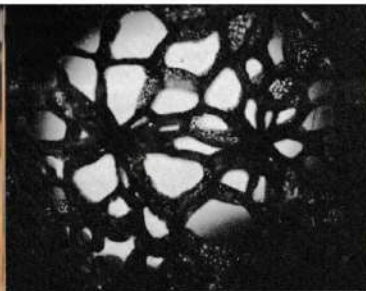
I guess we are cheating a little on this one for it is the biggest (but most beautiful) tropical floating plant that we know. This is *Victoria amazonica*, native to central Brazil and the area of the Amazon River. As can be seen, the edges of its leaves are quite high, the diameter of the leaf itself reaching six to eight feet! Thus, these plants are suitable only if we have a tropical greenhouse of some sort but, we did want you to see a really big floating plant!

This small plant, *Azolla caroliniana*, grows so rapidly in the aquarium that it tends to become a nuisance. Native to North America, Mexico, the West Indies and parts of South America. It has a pretty pale-green leaf which becomes somewhat reddish under strong lighting. For best results, the plant must be kept at 68°F minimum.



This is another *Azolla*, *Azolla filiculoides*, a native of South America. It is a rather larger plant than *A. caroliniana* but very easily kept in the aquarium. The small, divided leaves have a rosy tint.

Here is the popular water fern, *Ceratopteris thalictroides*, originally from tropical Africa and Southeast Asia. It is peculiar in that new leaves form directly on the old, as can be seen in the photo (the new leaves are lighter). It is, of course, strictly a tropical plant and must be kept warm.



Before we leave the water fern (and actually we are talking about the floating variety, variety *cornuta*) let's examine a cross-section of a stem. Notice the large air spaces. This gives the plant even greater buoyancy.



Almost everyone has seen pictures of the water hyacinth, *Echhornia crassipes* (a clump of which can be seen in the picture of *Victoria amazonica*). Here, however, is a picture of its flowers. Although a large, showy plant used outdoors, it is not easily kept in the aquarium.



Hydrocotyle leucocephala is a very beautiful aquarium plant which can grow under as well on top of the water. This is the floating leaf form. A native of central Brazil, it grows rapidly under strong lighting and a temperature of 75°F.



This is the aquarium form of *Pistia stratiotes*, smaller and much more suited to the hobbyist's needs.

An interesting plant from Mexico, the West Indies and the northern portions of South America, is *Limnobium stoloniiferum*. Its leaves are in rosettes on very short stems, and hairy white roots hang down in clusters in the water. Propagation is by runners. The leaves are somewhat glossy and drops of water roll easily from them.



Pistia stratiotes, although originally from South America, is now distributed all over the world. It is a pretty plant with a rosette of broad-topped, velvety pale-green leaves floating on the surface of the water. Its thick roots hang down to a length of almost one foot, and are invaluable for spawning or fry protection.

continued on page 49



THROUGH THE KINDNESS OF A GOOD FRIEND, we have recently come into possession of a copy of *Application for Potentially Harmful Tropical Fish Permit*. We thought aquarists might like to see what nonsense they face should their own States ever become so afflicted (applications mentioned above are available from the Texas Parks and Wildlife Department, John H. Reagen State Office Building, Austin, Texas 78701). The application begins: "I, *John Doe*, of *X Street, XX City, XXX State*, request a permit to import, sell, possess, or release into Texas the following live fish and/or eggs. (Then follows space for a listing of species, number and size). From *John Doe of X Street, XX City, XXX State*. Fish and/or eggs to be used as follows: (Then follows several lines for this information). Date shipment will be made: *X*. Date: *XX*. Signature of Applicant".

The application is accompanied by a three-page copy of the original proclamation, rules and regulations issued and adopted by the Parks and Wildlife Commission of Texas. The following fishes are listed as currently being restricted: *Osteoglossum bicirrhosum* (aruana), *Arapaima gigas*, *Serrasalmus nattereri* (this and the following four species are piranhas), *Serrasalmus punctatus*, *Serrasalmus nattereri*, *Serrasalmus rhomboides*, *Pygocentrus piraya*, *Electrophorus electricus* (electric eel), *Belonesox belizanus*, *Ophicephalus melasoma* (this and the following three species are snakeheads), *Ophicephalus striatus*, *Ophicephalus micropeltes*, *Channa asiatica*, *Cichla ocellaris* (the peacock cichlid), genera and species of the Trichomycteridae family (a misspelling of Trichomycteridae; the family and the following three genera are the so-called "parasitic" catfishes or candirus), *Vandellia* sp., *Tridens* sp.,

continued on page 18

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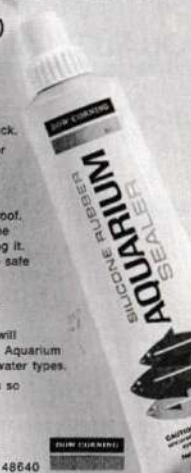
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from page 14
Pygidium sp., *Paratrygon hystrix* (this and the following three species are fresh water stingrays), *Paratrygon motoro*, *Paratrygon brachyurus* and *Paratrygon bruni*.

Also described are some of the additional rules with which a permit holder must comply (subject to a fine of from \$50 to \$200). For example, an annual report must be submitted within 30 days following August 31 of each year to the Parks and Wildlife Department, showing the species and numbers of fishes imported and/or possessed under permit, and disposition of these fishes and their offspring. Any individual specimens of species or their eggs listed now in the hands of aquarists, may be disposed of by making them available to public aquariums either by gift or sale. However, reports of such transactions must be reported within 30 days.

The stupidity of this Orwellian legislation is clear to anyone. Aquarists have to account for every fish and every egg of the 18 species, 3 genera and 1 family listed. How many entries the list will contain one year from now is anyone's guess. Experience, however, teaches us that such lists get longer, not shorter.

It is our belief that few aquarists will pay much attention to this legislation. Our forebears tossed English tea into the drink and directed King George III to pedal his papers elsewhere; their descendants are not likely to subject meekly to this form of bureaucratic emasculation. What really concerns us is that since unreasonable laws such as this one (putting the onus on the innocent) are bound to be broken, respect for bona fide law and order lessens a little bit more. This is something American Society can ill-afford these troubled days.

If honest aquarists are not worried now, they will be when they read the following resolution (Number 9) passed by the American Fisheries Society at Toronto, Canada, September 15, 1967:

"WHEREAS many state laws permit the indiscriminate importation of fish, so long as they are accompanied by a legal bill of sale; and

WHEREAS many undesirable introductions of fish have been made in these states; and

WHEREAS many state and provincial agencies lack adequate legal powers to control these introductions;

NOW THEREFORE BE IT RESOLVED, that the American Fisheries Society recognizes this problem and urges the conservation agencies of the United States of America and the Provinces of Canada to seek adequate legislation to control all importations; and BE IT FURTHER RESOLVED that copies of this resolution be forwarded to the Secretary of Interior and to the Secretary-Treas-

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ADVERSARIA is a column of controversy, dedicated to the uninhibited exchange of relevant opinion. Contributions to **ADVERSARIA** from readers is encouraged. "When a thing ceases to be a subject of controversy, it ceases to be a subject of interest." William Hazlitt.

From Eric Friese, College of Fisheries, Seattle, Washington:

"Yesterday I received the latest edition of *THE AQUARIUM* (Vol. 1, No. 1). It took me about a day to cool-off after having read the article, *Big Brother Is Watching*. Even today it is still beyond me how such a piece of immature journalism could have appeared in a magazine which, I understand, plans to be taken seriously by responsible ichthyologists.

"It is not my intent to re-hash the multitude of unsubstantiated, irrelevant and often distorted generalities in said article, but I would like to express my serious doubts that such a piece of writing (?) could have, in all sincerity, passed the desk of your listed "Consulting Ichthyologists".

"I am particularly appalled by the apparent lack of knowledge of the very fundamentals of ecology. Ever since the introduction of the European carp into American waters, native American species have been increasingly suppressed by additional introduction of other alien species, mostly from aquarium hobbyists. Some of the best examples come from the extinct or nearly extinct endemic Cyprinodonts in the Southwest, which have been almost completely replaced by various spiny-rayed fishes from eastern Washing-

ton. In Seattle the rehabilitation of a native trout lake produces goldfish in large numbers. These are some examples of what happens to an ecological system once alien species are being introduced. Incidentally, if you check closely into your supported pheasant example, you will find that only regular re-stocking for hunting purposes maintains this species in most areas. (But this is beside the point!).

"I am fully aware that most laws are far from being perfect, but then again so is democracy. Nevertheless, I would like to go on record of favoring almost any kind of legislation that will keep non-native fishes out of native waters, even if this means keeping some of the tropical species completely out of the country. Despite the ridicule attempts in said article—which is poor journalism indeed—I suggest it might be wise for the staff of *THE AQUARIUM* to examine the work that is being done by most State and Federal agencies dealing with fish and fisheries. This might lead to the conclusion that there are also other fishes than the ones that come from tropical waters!

"I have occasionally frowned upon some of your "sharp-shooting" attempts, which not too frequently involve completely irrelevant points of discussion, but this time I am

truly disappointed that you have given your seal of approval to this article. In substance it deals in pure emotionalism without suggesting any real solutions. If this is going to be the policy of the magazine I most likely will not renew my subscription. It is not my intention to get involved in lengthy correspondence on the above subject matter. I merely stated my position, especially since one of these days I might very well become involved in the "utter futility of all this legislation!"

EDITOR'S REPLY: In fairness to our Consulting Editors it should be stated that they did not see the article in question before publication. As the name implies, they are consulted only when technical problems in ichthyology arise and ordinarily have nothing to do with editorial policy. On the other hand, it is ironic to note that the article itself was suggested by one of the country's most prominent ichthyologists who, like ourselves, is repelled by attempts of fisheries interests to ramrod through restrictive legislation in favor of one hobby at the expense of another.

Mr. Friese's remarks regarding the distribution of the European carp in American waters were rather injudiciously selected as this event was a direct result of the efforts of the U.S. Commissioner of Fisheries in the 1870's, Spencer Baird. Indeed, the California Fish Commission was responsible for turning loose that very undesirable fish in California waters in the 1890's. But this, as Mr. Friese suggests, "... is beside the point."

Any reasonable aquarist is for conservation and would support laws making it a punishable offense to release non-native fishes into local waters. This certainly is our view on

the subject and it was made clear in our article when we referred to "... unthinking persons who wantonly release exotic fishes into native waters..." When Mr. Friese and others, however, bombastically attempt to emasculate the aquarium hobby (... I would like to go on record of favoring almost any kind of legislation... even if it means keeping some of the tropical species completely out of the country...) just so that their friends who can afford to escape the ghettos can catch trout, then it is time to call a halt. We have been fisherman and aquarist alike for over twenty years, but never once were presumptuous enough to dictate which should have precedence over the other. AJK

CREDITS

PHOTOS:

P. 4-5, Braz Walker; P. 6-8, THE AQUARIUM; P. 10-13, William A. Tomey; P. 33-35, THE AQUARIUM; P. 39-45; THE AQUARIUM; P. 49-50, William A. Tomey; P. 73-75, THE AQUARIUM; P. 76, Wolfshiemer Aquaphoto; P. 77, Braz Walker; P. 78, THE AQUARIUM.

FISH:

Pseudotropheus auratus supplied by Goldenrod Aquarium, Long Island City, N.Y.; Aquarium Snails supplied by Grassy Forks Fisheries, Allendale, N. J.; *Sorobim lima* (P. 78) supplied by Dade County Fisheries, Bronx, N.Y.

urer of the International Association of Game, Fish and Conservation Commissioners for distribution to member organizations."

The American Fisheries Society, under the guise of conservation, primarily represents the fishing interests in this country. We say "guise" because to fish, one must kill. Accordingly, we have the ironic situation where one group interested in killing fish, is attempting to regulate and control a group dedicated to keeping fish alive.

And so, we have our lists of "restricted" fishes. Or, as the Lord High Executioner said it in the Mikado:

"You may put them on the list—you may put 'em on the list;

The task of filling up the blanks I'd rather leave to you. But it doesn't really matter whom you put upon the list.

You may put them on the list—you may put 'em on the list." AJK

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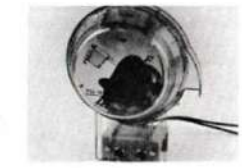
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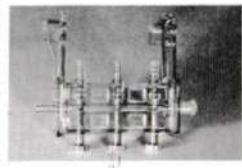
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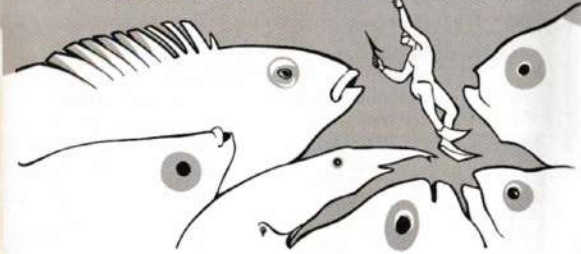
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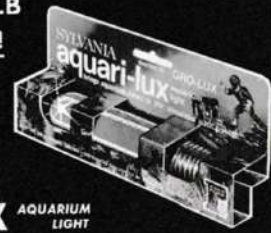


By HELEN SIMKATIS

Aqua Jewels, published by the Aquarium Society of Broward County and edited by Doris Vilda, is always an invitation to reading because of its excellent typography, attractive cover and layout, and its well selected articles. The November issue is no exception, and we were particularly captivated with Philip Marraccini's *Mollie Safari*, reprinted from *The Ichthyophile*. Perhaps the 12 inches of snow we waded through to get home the evening we read the piece had something to do with it, but the idea of a "Mollie Safari" seemed especially appealing to us and, as we read it through, the material granted the promise of its title. The author took us to the drainage ditches surrounding miles of tomato fields south of Miami where he has gone many times to collect the beautiful sailfin mollie. He begins by telling us that the day was mild and pleasant (we guessed that), and his description of the area is so poignantly realistic, we felt, we too, had been there wielding a dip net. What we didn't guess is that it is actually a morality story. He manages this by slipping into phantasy, after he informs us that the sailfin mollies have vanished from the drainage ditches as a result of insecticides which were used on the tomato fields. The phantasy involves a conversation with a porcelain mermaid in his aquarium who serves as a spokesman for the sailfin mollies. Her points are well taken and they don't say too much for mankind. She covers aquarists who crowd fish and haven't discovered the value of a few choice specimens over that of a mass of unhealthy fish, the release of foreign predators in streams and lakes (something aquarists should consider carefully), and the pollution of streams. We also liked Hal Storick's account of breeding *The Rainbow Cichlid*. This species is suspected of being *Cichlasoma crassa* although the author is not sure if this is the proper nomenclature for a species a Miami breeder

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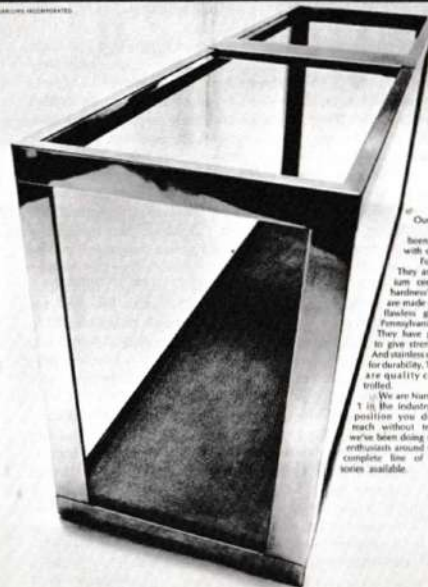
has dubbed the Rainbow Cichlid. His pair were placed in a 10-gallon aquarium furnished with a red clay pot with the bottom removed and turned on its side. The Rainbows were timid at first but in about 10 days began to spawn in typical Cichlid fashion. The first spawning was destroyed but 10 days later eggs were again laid for a successful hatching. The youngsters were eating newly hatched brine shrimp and some dry food in 12 days. From Author Storick's account, these are not a difficult fish to handle. Dean Younger in his *My Nemesis* tells some tales about sharks that are not reassuring and this is followed by a poem in the same vein by John Ciardi of *Saturday Review* renown. We gather that sharks will never make it with people. *Aqua Jewels*, published by the Aquarium Society of Broward County, is available to those interested for \$3 per year. Write to the society at P. O. Box 115, Fort Lauderdale, Florida 33302 for information regarding the club and its publication.

The November issue of *Betta Breeder's Newsletter*, published by the International Betta Congress, carried a detailed report of the IBC Convention, held over the Labor Day weekend in Waukesha, Wisconsin, by Gene Lucas, producer of the *Betta Breeder's Newsletter*. The report contains a history of the IBC, the background of the Convention, and records its highlights. Discussions were held on showing classifications and judging standards and methods, representing the groundwork of how judging will be handled in future competitions. The Second Annual IBC Convention will be held in June, 1968, the 21st, 22nd, and 23rd being the tentative dates, in Columbus, Ohio. An official IBC publication, separate from the *IBC Newsletter* was discussed and Walt Maurus accepted the editing chores. This issue also contains a report by Ed Prentice on Lysergic Acid Diethylamide (LSD-25) behavioral effects on Bettas. The outstanding reaction seems to be the suppression of all positive aggressive responses in the adult male. This is a highly technical paper directed specifically to those interested in behaviorism. An impressive list of papers on the subject is supplied. Those interested in becoming members of the IBC should write to Gene A. Lucas, Department of Biology, Drake University, Des Moines, Iowa 50311.

Two informative articles on breeding appear in the November issue of *ILLIAS*, published by the Illini Aquarium Society. The first is an account of breeding Kissing Gouramis by Connie Kolaz. She points out the quarrelsome nature of the species and does not recommend them for the community tank. When these fish became about 6 inches long, they were given a 15-gallon tank. The female is conspicuously deeper bodied than the male and in this particular instance, the more aggressive. No bubble nest was constructed and the eggs float on the surface of the water. The parents should be removed from the tank immediately after spawning takes place. The young are good eaters and grow rapidly.

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The second article on breeding is concerned with *Apistogramma ramirezi* by Dorothy Janesse. Author Janesse points out that "Rams" are clock watchers and on several occasions she has noted that they begin the cleaning procedure about 10 p.m., and two hours later, spawning commences, continuing to about 2 a.m. Good instructions are given here for artificial incubation. The eggs are removed from the parents' aquarium to a one-gallon receptacle, aerated. The eggs take about 3 days to hatch and infusoria serves as a "first food." Eight feedings are recommended a day and 6 days later, newly hatched brine shrimp are offered. Small portions given frequently will produce larger and healthier fry than large portions offered only a few times a day, the author tells us. *ILLIAS* is the official publication of the Illini Aquarium Society. Write to the society at P. O. Box 951, Springfield, Illinois 62705 for information regarding the club and its publication.

The November issue of *Anchor*, published by the San Francisco Aquarium Society, carries a tribute to the goldfish with what must have been a most attractive cover by Kappy Sprenger (it was removed from our copy before we had an opportunity to see it) and an article entitled *Golden Notes* by J. R. Tingle, giving painstakingly prepared instructions on breeding this species which certainly holds the most venerable place in the annals of fish-keeping. Starting off with good fish is advised and one tank (recommended size not given) is enough to bring a pair or trio into breeding condition. Breeding condition can be recognized when the male shows erect fins, small tubercles on the gill plates and pectoral fins, and by the attention it shows to the female. The female's fins should also be erect and the ventral area should appear full and rounded. Breeding condition may be achieved by paying special attention to the position and temperature of the tank, good light and space, and high protein food such as chopped earthworms and dried liver. The author gives instructions on how to prepare the latter. Temperature should be between 65 to 70 degrees. This is a sample of the information that can be found in this reference piece and certainly anyone starting out with a breeding program in mind for newly acquired goldfish will benefit by having read this material carefully, or better yet, to have it close by his base of operations. The Golden Gate Guppy Society will have a permanent column in *Anchor*, the first of which appears in this issue. *Ten Little Guide Lines* are given and readers are invited to address their questions and comments to The Golden Gate Guppy Society, 4754 Mission Street, San Francisco, California 94127. Robert P. Dempster of the Steinhart Aquarium always writes an informative, easy-to-read article based on his years of experience at Steinhart and his *Collection and Diseases* on techniques for the collection and care of Aquarium Fishes, appearing in this issue of *Anchor* is no exception. Here, Mr. Dempster, covers most

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THIS IS MY PROBLEM

by HELEN SIMKATIS

FROM: Mark Sikora, Union, New Jersey

I have a female betta in a partitioned betta tank. She jumped into a male's compartment and tore his fins. Is she changing sex? What should I do with her?

ANSWER: She may be ready to spawn and if you are interested in breeding your fish, you might select a mature young male and prepare a 10-gallon tank for this purpose. Otherwise, you had better keep a glass over the tank in a way that no escape hatch is available to her.

FROM: Mrs. Carol M. Cohran, Chalfont, Pa.

I have 5 beautiful large Emperor Tetras in a 20-gallon community tank and although they have gone through a dry run, not one egg was laid. How can I induce these fish to spawn?

ANSWER: It may be that your fish are still too young to spawn. These fish are group spawners and when the females are heavy your specimens should be placed in an aquarium to themselves. Plenty of small live food such as brine shrimp should be offered for conditioning. Water conditions do not seem to be a problem as long as no extremes exist pH-wise. The young are very small and difficult to see but as soon as they

are free-swimming brine shrimp (newly hatched) should be offered.

FROM: Mrs. Dean Hibbs, Lexington, Nebraska

I am wondering if using distilled water will cause fish to die. The kind that is used for drinking. Isn't it that they take the minerals out of the water when it is distilled, and fish would need these minerals? I used anti-chlorine in the city water to check the chlorine but I would like to keep the aquarium filled and, as the water evaporates, I wondered if distilled water might be added. I use charcoal and glass wool as filter media.

ANSWER: Using small amounts of distilled water certainly will not cause fish to die. It seems an added expense, however, to do so when chlorine will escape from aquarium water if it is allowed to stand in an open-mouthed jug, or a plastic or enamel pan. Distilled water does have the minerals removed, or rather water is removed from the minerals when distilled but fish receive minerals from food. Some fish like soft water (water without as much dissolved material in it as hard water has), but others prefer hard water. As fresh-water fish take in very little water, however, no matter what type of water they require (hard or soft),

they receive most of the minerals they need from their food.

FROM: Gary Gastenbaum, Brooklyn, New York

I am interested in setting up a fry guppy tank. I am aware of the facilities needed. The convenient place for the tank would be the bottom of a tank stand. Above it would be a 30-gallon tank. What I would like to know is if the fry will live in front of the radiator? Also, what can I do to keep the fry alive if the heat from the radiator will affect them?

ANSWER: Aquarists have always been warned against setting up a tank on top of, or next to a radiator. In that radiators give off a good deal of heat during the day and early evening, and are usually shut off, or nearly so, during the night when outside temperatures generally drop, suggests that the water in the aquarium would fluctuate accordingly. Many fish have been cooked to death as a result to a close proximity to a radiator. It would seem to me that the aquarium on the top shelf of the stand would be in the same danger. Unless you can insulate the aquariums with asbestos, or some other kind of insulating material, you will have to find another place for your two tanks to avoid disaster.

FROM: Allen Robertson, Montreal, Canada

I purchased a 4-inch long *Electrophorus electricus* (Electric Eel). I was happy with it until I read that it can send a voltage of 800 volts. Is this fish dangerous?

ANSWER: The 800 volts probably referred to the discharge of an adult fish. However, if you are squirmy about the potential of your fish, I suggest you donate it to your new local public aquarium. There are plenty of oddball species of fish you can keep that are less formidable.

FROM: Brandon Nash, Brookerville, Maryland

How do you tell a Scalare's sex? Are

they egg layers?

ANSWER: Scalares are most difficult to sex. People who have raised them over a long period develop a fifth sense in this regard but most hobbyists are content to acquire 4 or 5 specimens and allow them to choose partners. The fish are never wrong. They are egg layers but, of course, they are Cichlids and spawn in Cichlid fashion which is considerably different from other egg layers. I suggest you go to your public library and consult *Exotic Aquarium Fishes* by William T. Innes. If you do not know the spawning habits of Cichlids, you will be most fascinated when you read about them.

FROM: Mark Schwarzentraub, Kirkwood, Missouri

My Congo fish will not have any other fish live with her. She just stays in her pot. I put some other fish in with her and she killed them and ate them. I feed her six shrimp pellets a day but she still is nasty. When I first got her with a male Congo, she killed him.

ANSWER: Many Cichlids do not make good community fish. You might acquire a more mature male and introduce him to your female. It may be that they will spawn as these fish spawn readily in captivity. In the meantime, you might make a pet of your fish. Sometimes they will take tiny pieces of washed green shrimp from your fingers if you have patience enough to work with her in this fashion.

FROM: Roy Wolfe, Harrisonburg, Virginia

Is it possible for an amateur aquarist to sell the fish he has raised?

ANSWER: Sometimes dealers are willing to purchase tank-raised fish if they are healthy. However, it is often more rewarding to trade fish with another hobbyist. Joining an aquarium society is one way of meeting aquarists and to participate in trading fish for desired strains. ●

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ABOUT OUR AUTHORS



WILBUR L. HANFORD

Will Hanford was born in 1928 in Hartford, Conn., but by the time he was ready for school, he and his family moved to "The Hardware City Of The World", New Britain. After several jobs as printer's assistant, radio repairman and others, Will joined the U.S. Army Signal Corps and attained the rank of Sgt. Upon leaving the service he attended school in the evenings and graduated with an Associate degree from the University of Hartford.

In spite of a chronic ailment which limits his physical activity, Ed writes magazine articles for various hobby and church magazines. (He previously did some Christian Education Work for his local Church.) His interest in fishes is mainly in studying their habits and behavior, rather than in their breeding. He keeps a number of tanks holding livebearers primarily.



EDWARD L. WARNER

Ed Warner first became interested in tropical fish while attending the University of Illinois. A Chinese student presented him with six baby guppies and from that moment on, he became an avid fish hobbyist. Born 37 years ago, Ed now operates an aquarium store and breeds about 90% of all fish he sells. He believes that the aquarium industry could profitably apply recent developments in research in problems in controlling fungi, internal and external parasites.

Ed, a member of The AMERICAN KILLFISH ASSOCIATION, is now specializing in killifish breeding. In the future, he plans to go into commercial breeding.

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BASICS OF ANGELFISH BREEDING

by EDWARD L. WARNER

PERHAPS MORE HAS BEEN WRITTEN ABOUT the angel fish than any other aquarium fish except the guppy. This account draws from my own personal experiences and should be used merely as a guide rather than as hard and fast rules which may not be broken. I state this because of the differences which may be found in my area compared with other localities pertaining to pH, temperature and hardness of water.

To begin with, one must select the proper size aquarium in which to spawn his angels. I believe any tank of twenty gallons or more will suffice. Of course, the larger the tank the greater the chances will be.

After the tank has been selected, the arrangement of the tank is made. I use an undergravel filter covered with about two inches of gravel and a bottom filter with glasswool and charcoal. A thermostatic heater set for 80 degrees F is employed. The plants used should be of the large leaf variety for two reasons. First, they are more durable as it is common knowledge that cichlids, prior to spawning, may be destructive toward plants. Second, the plants may be used as a spawning site for the angel eggs. Also, it is desirable to place in the tank at least one large piece of slate, a large piece of flat stone, and the plastic cover of a breeding trap. These items will be selected by the angels as spawning sites. A selection is necessary because angels are quite particular as to where they will deposit their eggs. The greater the selection, the better the chances for success. Having made these conditions available in the aquarium, we come to the important task of selecting a pair of angel fish.

Unless one purchases a guaranteed pre-spawning pair of angels, the task of selecting a pair is left to you. Although much has been written about how to determine the sex of angels, I don't believe any of them would bet a week's pay on their ability to sex them. I let the angels themselves do the sexing. (Who would know better?) Using my method, at least six large angels are placed together to pair off. This readily can be seen when two angels pick a site by themselves, forcibly keeping all other fish away, and actively clean the site with their mouths. This process may take hours. After a pair of angels have paired off, all other fish should be removed; this includes both catfish and snails.

The proper size aquarium and a pair of angels selected, we now must put these fish in breeding condition. This is the most important aspect of spawning any egglayer. Without providing the proper conditions and conditioning the fish, spawning will not occur.

I condition my angels with a well-balanced diet. A dry flake food is fed at least four times a day. Feed adult brine shrimp and live white



worms at least once a day each. The feeding of white worms alone will bring about constipation which will delay the spawning activity. Since brine shrimp has a laxative effect upon fish, the two together seem to counteract each other.

The pair will select a flat surface upon which to put their eggs. This may be on stone, slate, plastic, lids, heater, airline tubing, or plants. A partial change of water (approximately 10%) will sometimes encourage spawning. The site will be very thoroughly cleaned and inspected by both parents. The female will gently press her abdomen upon the flat surface and expel the eggs. They are immediately fertilized by the male. As many as 300 eggs may be laid but the number is usually closer to 100. Spawning is completed when the parents take turns fanning the eggs with their fins. This creates a gentle flow of water about the eggs.

I now remove either the breeders or the eggs, whichever is the most practical. If the eggs are removed, the tank must not be less than ten gallons. I remove the slate, or whatever the parents used, and place it in a ten-gallon aquarium, leaning it against the side of the tank with an airstone close to it operated with gentle air pressure. The temperatures in both containers should be identical. At this time, place the double amount usually specified of acriflavine in the water (eight drops per gallon). The choice of fungicide is yours but I find methylene blue worthless. (Editor's Note: Amen!)

At 80 degrees F, the fry will leave the spawning surface and fall to the bottom in three days. They will spin around on the bottom for

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Oranjestad is a "free port", and goods of all kinds may be purchased at considerable savings. These are examples of Guatemalan tablecloths which, including 8 napkins, cost about \$7 or \$8.

AN AMAZONIAN ADVENTURE

by ALBERT J. KLEE

"ANOTHER B-25? Not on your life!" This was my reaction to Jon Krause's proposal that we organize another aquarium expedition to the Amazon River Basin. (See "A Peruvian Adventure," *AQUARIUM JOURNAL*, January through September 1965, Vol. XXXVI, Number 1-9.) "That last B-25 of yours still had flak holes in it from World War

II," I added. However, Jon assured me that this one was decidedly different and in painstaking detail, described the changes brought about in the aircraft when it underwent an executive conversion a few years ago (radar equipment, jet-assisted takeoff, wingtip fuel tanks, etc., not to mention a built-in bar!). I weakened fast and when I had viewed the plane myself, my resistance evaporated completely. On this plane, even "small details" such as the hydraulic system worked!

It fell to my friend, Win Rayburn, a Cincinnati aquarist and old "companero," and me to work out the details of the trip. We had had enough of playing Russian Roulette by flying over the Andes in twin-engine aircraft, so we restricted our flight to over just water and jungle. Oh, we might fly over a few teensy-weensy mountains, but we would be darn sure that they were low ones (as I remember, we set the maximum at about 15 feet).

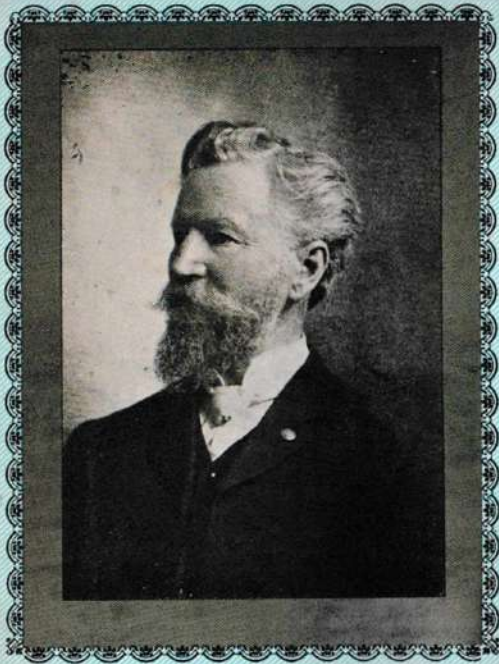
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A HISTORY Of The AQUARIUM HOBBY In AMERICA PART 3 By Albert J. Klee

WE HAVE SUGGESTED previously that one feature of our history of the aquarium hobby in America is the identification of the five greatest American aquarists of all time. Chronologically, William Emerson Damon was the first to enter upon the scene, but Damon was a product of his times. Without denigrating his remarkable achievements or denying his rightful place in this exalted group, we may correctly observe that when no one has preceded, it is easier to set records. Under such circumstances, every accomplishment is a record. Our second man, however, is most likely the greatest of them all. Using adjectives such as "real" and "true" to skirt technicalities upon which purists may carp, we may say that he was our first real aquarium writer, our first aquarium plant expert, our first cultivator of the fancy goldfish, the publisher and editor of our first true aquarium magazine, the one who introduced *Sagittaria subulata* (= *Sagittaria natans*) to the hobby and single-handedly exhibited and popularized aquarium fishes after Barnum, a confidant of ichthyologists, and an expert breeder of fishes and propagator of plants alike. This man was none other than Hugo Mulertt.

Rightfully, Mulertt can properly be termed the "Father of the Aquarium Hobby in America". We can forgive those chroniclers of aquarium history before us who have overlooked Damon, but we cannot forgive those who have denied Mulertt his just due. The reason he has been so overlooked is clear enough. First of all, the record shows a noticeable scarcity of aquarium historians, whatever their capabilities. Those who have appeared upon the scene took but a superficial, unorganized glance at the subject. Writing history is not easy; it involves much hard, tedious work, searching out the facts. Secondly, Mulertt's activities spanned the period from the 1870's through to shortly after the first decade of the turn of the century. These 45 or so years, however, still mostly preceded the mainstream of the organized hobby in America. In a sense, the hobby took up where Mulertt left off. The significance of Mulertt's contributions were, therefore, not apparent to those active from the period 1912 on.

Hugo Mulertt was born in the town of Delitzsch, near Leipzig, Germany. It is thought that he emigrated to the United States about the year 1869, but this is conjecture. In any event, it is known that he settled in Cincinnati, Ohio. By 1875, Mulertt had established himself as a florist in downtown Cincinnati, sometime later advertising himself as "Aquarist and Florist", specializing in "Native and foreign ornamental fish, amphibians for ornamental and scientific purposes, aquatic plants of every description, native and foreign." His store handled tanks of all sizes and shapes made of cast-iron, sheet metal, terra-cotta, and Cincinnati faience (a sort of ornamental, glazed earthenware). Along with the aquarium accessories of the time, e.g., tuffstone ornaments (Mulertt



Hugo Mulertt, Father Of The Aquarium Hobby In America.

introduced tuftstone into the hobby in this country), sea-sand, aquarium cement, plant tongs, prepared fish foods, etc., he also dealt in tulip bulbs, gladioli, lilies, iris and tuberoses.

From the start, Mulertt was fascinated by the lore of natural history and although primarily a horticulturist, he became deeply interested in fishes. Some time during the 1870's, he was appointed Assistant Commissioner of Fishes for the District of Southern Ohio and the surrounding area. It turned out that the area around Cincinnati was ideal for the

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LaCORTE

from page 9

Pseudotropheus auratus has many points in its favor which make it a desirable fish for the aquarist. First and foremost, its coloration is magnificent. Second, water conditions are not critical, and third, you can keep them in a group of mixed species of equal size and they will display none of the nastiness of some cichlids. Its length at maturity is approximately six inches, a reasonable size that precludes having to house it in extremely large quarters.

The aquarist is indeed fortunate in that, of the group of Lake Nyasa cichlids, it is the most beautiful and, at the same time, the easiest to reproduce. Too many times it seems as though the most beautifully colored fishes are the most difficult to breed in the home aquarium, but this time we certainly got a break!

When the pair of *auratus* was first introduced into my aquarium, I felt that the female would show her ovipositor prior to spawning at which time the glass partition could be removed. I was wrong. After one month of heavy feeding, I noticed that the female was swollen about the throat, indicating that a spawn was being carried. The female carried the eggs for three days and eventually released them. They were, of course, infertile since there was no contact with the male. Again I began feeding the female heavily on live foods and making frequent water changes to condition her. The female *auratus* does not exhibit an extreme swollen abdominal region when filled with roe, such as we see in many other cichlids (e.g., *Pelmatochromis kribensis*, *Apistogramma ramirezi*, etc.).

Approximately five weeks later I noticed a small protuberance in the region of her vent and I felt that this was the signal I had waited for. It was Sunday evening and I decided to wait until the following morning before removing the partition. The following day she spawned alone once again, carrying the eggs for about 3 days, only to expel them again. I was really angry with myself and vowed not to repeat the error again. Several weeks later, after much heavy feeding, the female again showed the same signs and the glass partition was removed immediately. The pair put on a beautiful display of color, typical of most spawning cichlids. They spread their fins, quivered and lashed their tails back and forth. At this point, however, the male became quite aggressive and began chasing the female about the tank, after which she retreated into the water sprite.

The following morning I did not see the female but I knew that she would be hiding in the thickets of water sprite. I very gently poked about the plants and she quickly appeared, revealing a swollen throat and a much thinner abdominal region. The glass partition separating the pair was returned so that she would not have to undergo further abuse by the male. The male was removed on the 15th day after mouth egg incubation by the female commenced. At the time, I did not have any idea as to the length of the oral incubation; all I could do was wait.



(Above) The female of the species is clearly identifiable by her black stripes near-psychedelic canary yellow bands.

(Below) In his mature breeding color, the male *P. auratus* shines with highlights of electric blue and violet.



A fine mated pair of this fine species. (Several days after this photograph was taken, this pair spawned successfully. The fry are now being raised by the author.)



With a sense of drama equaled only by Barrymore, Mr. *Auratus* displays his noteworthy profile.



Not to be outdone, Mrs. *Auratus* strikes a pose equally as theatrical as her husband's.



An immature pair of *Pseudotropheus auratus*. At this stage of development, sexual differences are not distinguishable.

On the 24th day, the first fry was seen dashing about the tank. From time to time, the female would make an effort to catch it but to no avail. Her gills were still spread, indicating that fry were still within her mouth. A few hours passed and several more fry could be seen, scurrying about the tank. Finally, the following morning it was clear that she had released all of them. They were amazingly large, approximately $\frac{3}{16}$ to $\frac{3}{8}$ ths of an inch in length and exact duplicates of their mother. They are, without a doubt, the most colorful cichlid fry one could hope to see.

The behavior of this mouthbreeder is unusual in that no subsequent parental care of any kind is given by the mother. My fish would maintain a position at one end of the aquarium, the fry at the other. The fry did maintain a school of sorts; 15 or so would gather in one place, another group at a different place, all still at a safe distance from their mother. Since the female was of no use at this point, she was removed. Their first spawn totaled 27 fry. At a later spawn I decided to keep the female with her offspring to see if any parental care whatsoever would be offered. This was costly for this particular spawn totaled 31 fry, diminishing to



21 until I became aware of what was happening. Although I did not actually see her eat them, it was evident that she was doing so whenever one would come within her reach. My largest spawn, by the way, totaled 43. This is notable, especially in view of the large size of the fry.

The fry show their own aggressiveness at a very early age, giving short chase to one another. This was especially noticeable in the vicinity of a flowerpot which was lying on its side. Here the youngsters showed their instinctive drive to retain their territorial rights. They would position themselves beneath the pot and give chase to any intruder. When darkness fell, the fry sought refuge in the water sprite, each seeking a place of their own as there is no grouping whatsoever at this time.

The fry, being as large as they are at birth, can be fed newly-hatched brine shrimp, sifted daphnia and cyclops. Growth is extremely rapid and, depending on the feeding, they will reach a length of one inch in but a few weeks. As their growth continues, coloration intensifies but here again, one should provide an adequate selection of foods to insure proper development. Since algae are natural food for *Pseudotropheus auratus*, I feed my own prepared frozen food which is basically beef liver containing a large percentage of spinach. This, they thoroughly enjoy.

Pseudotropheus auratus does not have very large spawns and this may be just the factor needed for it to keep its desirability for advanced and beginning aquarist alike. All too frequently a beautiful fish arrives in the aquarium world only to become so common that they are ultimately neglected (e.g., neon and cardinal tetras—we don't see many aquarists reproducing these fishes today). They become so cheap that the attitude is, "Why bother?" Although my second generation offspring are less aggressive and seem easier to spawn, perhaps *Pseudotropheus auratus* will not meet this fate! ●



This close up of a mystery snail clearly show the rasp-like mouth which makes it such an able aquarium housecleaner.

HANFORD

from page 7

There are other very positive values in having snails in the aquarium. The ramshorns (I prefer the red) go over each and every plant in their search for algae. They free plants of choking algae. Remember, plants have to breathe too! Rockwork, its beauty long-marred by hard green algae, is often restored to its former fine appearance by persistent, persevering groups of snails. Plastic fish tanks that we don't want marred by scraping or rubbing, also can be helped by snails. And let's not forget the plastic plants that cleaning can beautify.

The snail does not do away with algae; it just helps keep it in check. Algae-eating fish get what they want too. It's rather sad (I think) to visit a pet store and find glistening, clear tanks containing so many hollow-bellied fish, fish that may be suffering from a lack of natural algae. No amount of dry food quite makes up for an absence of algae. Wiping it out with chemicals is not (to my mind) a beneficial step.

I have written so far of the ramshorns. I also want to mention pond snails which must be (for its tiny size) the greatest little housekeeper in the world. It keeps on the move, looking for bits of fallen food, rather than spending a great deal of time attacking well-established algae.

Mystery snails are popular and larger than the other snails I have mentioned, and breed in a most interesting way. Given a large enough area above the waterline, they will place their eggs out of reach of the fish. As scavengers they are equally interested in finding algae and over-



The pond snail is one of the smallest snails commonly used in aquariums. Yet many consider it, "the greatest little housekeeper in the world!"

Although a prolific breeder, the ramshorn snail is one of the most effective natural algae cleaners.

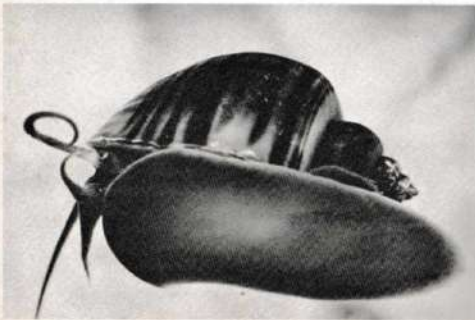
Of larger varieties, the mystery snail is most popular with aquarists. Moving it to a different aquarium often keeps it alert and active.



looked food. They seem to like flake food, and will sometimes hustle up to the water surface to get their share. If the water in the tank tends to be on the acid side, you won't have too many snail fatalities. If you notice a mystery snail in the same spot in the aquarium two days in a row, check to see if it is still living. (You would do the same thing for a fish who remained stationary behind a clump of plants for two days or more.) Mystery snails who "get lazy" and seem to do little work on the bottom of your aquarium can often be stimulated into more action by placing them in a different aquarium. I move mine around quite frequently. Of course, if you place a mystery snail in an outdoor pool or tub, it grows (as do our fish) to a size that has to be seen to be believed. Ramshorns don't seem to do as well out-of-doors, probably because the fish are robust and aggressive and can kill off this moderate-sized snail.

Dealers have for sale types of snails not mentioned in this article. My experience has been with pond, ramshorn, and mystery snails. I hope you will give them a chance. These little creatures have a part in "God's plan" too. ●

EDITOR'S NOTE: The principle objections to snails is that some (ramshorns, in particular) do indeed eat holes in the softer kinds of plants (water sprite, for example), and in quantity they are unsightly on the glass of an aquarium. There are many interesting types of snails, it is agreed, and aquarists would do well to consider them in their own right. As for algae, however, as a pool owner I very much appreciate the availability of chemical algicides. As there is a place for snails, there is also a place for chemicals. AJK.



46



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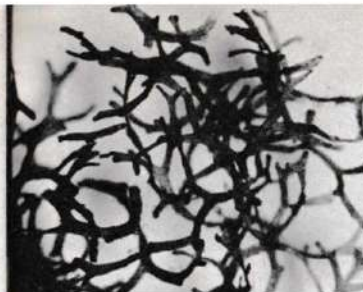
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48



An all-time favorite is Riccia fluitans or "crystalwort". Its masses of pale-green foliage grow in a branching form at the surface of the water. An excellent refuge for fry, it is also a good oxygenator. Grows easily but needs a good light.

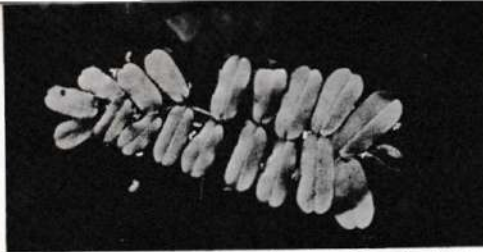
This is Salvinia auriculata, found in Cuba and South America. Its leaves are oval to heart-shaped, situated in opposing pairs along branching stems. It is one of the most widely used floating plants in the aquarium because it is so rapid-growing.



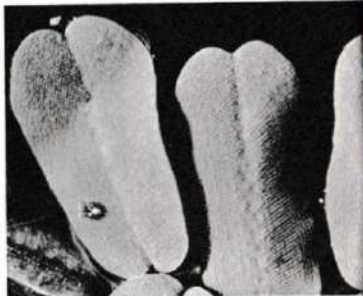
This is another species of Salvinia, Salvinia natans. The primary difference is that this plant is only sub-tropical in nature. Nevertheless, it still remains a very useful aquarium plant and is widely used in Europe. Its leaves are hearty, and more round than those of auriculata.



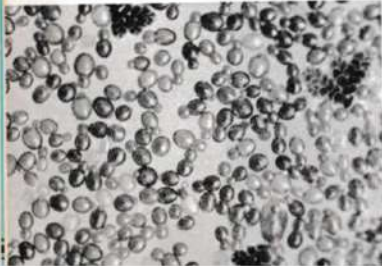
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Salvinia oblongifolia gets its name from its oblong leaves. It is a native of central Brazil, easily adapted to aquarium culture. Literature references state "seldom seen", but this is changing.



A closeup of a few leaves of *Salvinia oblongifolia*. Each leaf is three or four times as long as broad, and may grow to three inches. Hanging from the leaves are thick tufts of roots which project down into the water. The leaves themselves have small hairs by which they keep from getting wet.

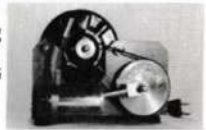


The smallest floating plant we know is *Wolffia arrhiza*. The leaves are about 1 mm long and are greedily eaten by many aquarium fishes. In strong lighting and relatively high temperature, *Wolffia* grows rapidly in the home aquarium.

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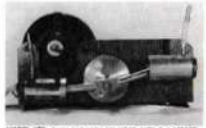
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ADVERSARIA is a column of controversy, dedicated to the uninhibited exchange of relevant opinion. Contributions to **ADVERSARIA** from readers is encouraged. "When a thing ceases to be a subject of controversy, it ceases to be a subject of interest". William Hazlitt.

From Eric Friese, College of Fisheries, Seattle, Washington:

"Yesterday I received the latest edition of *THE AQUARIUM* (Vol. I, No. 1). It took me about a day to cool-off after having read the article, *Big Brother Is Watching*. Even today it is still beyond me how such a piece of immature journalism could have appeared in a magazine which, I understand, plans to be taken seriously by responsible ichthyologists.

"It is not my intent to re-hash the multitude of unsubstantiated, irrelevant and often distorted generalities in said article, but I would like to express my serious doubts that such a piece of writing (?) could have, in all sincerity, passed the desk of your listed "Consulting Ichthyologists".

"I am particularly appalled by the apparent lack of knowledge of the very fundamentals of ecology. Ever since the introduction of the European carp into American waters, native American species have been increasingly suppressed by additional introduction of other alien species, mostly from aquarium hobbyists. Some of the best examples come from the extinct or nearly extinct endemic Cyprinodonts in the Southwest, which have been almost completely replaced by various spiny-rayed fishes from eastern Washing-

ton. In Seattle the rehabilitation of a native trout lake produces goldfish in large numbers. These are some examples of what happens to an ecological system once alien species are being introduced. Incidentally, if you check closely into your supported pheasant example, you will find that only regular re-stocking for hunting purposes maintains this species in most areas. (But this is beside the point!).

"I am fully aware that most laws are far from being perfect, but then again so is democracy. Nevertheless, I would like to go on record of favoring almost any kind of legislation that will keep non-native fishes out of native waters, even if this means keeping some of the tropical species completely out of the country. Despite the ridicule attempts in said article—which is poor journalism indeed—I suggest it might be wise for the staff of *THE AQUARIUM* to examine the work that is being done by most State and Federal agencies dealing with fish and fisheries. This might lead to the conclusion that there are also other fishes than the ones that come from tropical waters!

"I have occasionally frowned upon some of your "sharp-shooting" attempts, which not too frequently involve completely irrelevant points of discussion, but this time I am

truly disappointed that you have given your seal of approval to this article. In substance it deals in pure emotionalism without suggesting any real solutions. If this is going to be the policy of the magazine I most likely will not renew my subscription. It is not my intention to get involved in lengthy correspondence on the above subject matter. I merely stated my position, especially since one of these days I might very well become involved in the "utter futility of all this legislation!"

EDITOR'S REPLY: In fairness to our Consulting Editors it should be stated that they did not see the article in question before publication. As the name implies, they are consulted only when technical problems in ichthyology arise and ordinarily have nothing to do with editorial policy. On the other hand, it is ironic to note that the article itself was suggested by one of the country's most prominent ichthyologists who, like ourselves, is repelled by attempts of fisheries interests to ramrod through restrictive legislation in favor of one hobby at the expense of another.

Mr. Friese's remarks regarding the distribution of the European carp in American waters were rather judiciously selected as this event was a direct result of the efforts of the U.S. Commissioner of Fisheries in the 1870's, Spencer Baird. Indeed, the California Fish Commission was responsible for turning loose that very undesirable fish in California waters in the 1890's. But this, as Mr. Friese suggests, "... is beside the point."

Any reasonable aquarist is for conservation and would support laws making it a punishable offense to release non-native fishes into local waters. This certainly is our view on

the subject and it was made clear in our article when we referred to "... unthinking persons who wantonly release exotic fishes into native waters ...". When Mr. Friese and others, however, bombastically attempt to emasculate the aquarium hobby ("... I would like to go on record of favoring almost any kind of legislation ... even if it means keeping some of the tropical species completely out of the country.") just so that their friends who can afford to escape the ghettos can catch trout, then it is time to call a halt. We have been fisherman and aquarist alike for over twenty years, but never once were presumptuous enough to dictate which should have precedence over the other. AJK


CREDITS

PHOTOS:

P. 4-5, Braz Walker; P. 6-8, THE AQUARIUM; P. 10-13, William A. Tomey; P. 33-35, THE AQUARIUM; P. 39-45; THE AQUARIUM; P. 49-50, William A. Tomey; P. 73-75, THE AQUARIUM; P. 76, Wolfshaimer Aquaphoto; P. 77, Braz Walker; P. 78, THE AQUARIUM.

FISH:

Pseudotropheus auratus supplied by Goldenrod Aquarium, Long Island City, N.Y.; Aquarium Snails supplied by Grassy Forks Fisheries, Allendale, N. J.; *Sorobin lima* (P. 78) supplied by Dade County Fisheries, Bronx, N.Y.



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From page 26
adequately the care specimens collected for this well-managed aquarium receive. Salt-water species and fresh-water are discussed as well as the diseases that often plague them. He also points out that the variation in the personalities of fishes must be considered in how they are to be maintained and introduced to aquariums already inhabited by established specimens. Photographs used to illustrate this article are by the courtesy of Steinhart Aquarium and, oddly enough, by the Standard Oil Company. Jack Lohoff in his *Dutch Treat* gives us a rundown on a visit to the New York Aquarium located at Coney Island, which was the first stopover on his trip from San Francisco to Amsterdam. His subway trip to the New York exhibit may account a little for the somewhat negative report he offers on this facility and, we have to admit, his subway ride was far from satisfactory due to a malfunctioning door on the train in which he was transported. The highlight of his piece is his visit to the Artis Aquarium in Amsterdam. He liked what he saw there and feels the tropical section of freshwater and marine fish is worth a trip to Amsterdam to see. This is a well-written article and the author takes us on several sidetrips to the things he remembers of the wildlife in Holland which any nature lover will enjoy. This issue also give a salute to the American Cichlide Association, newly formed, which has patterned itself after the American Killifish Association. A membership

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can be had by sending six, large, self-addressed and stamped envelopes to The American Cichlid Association, 4011 Marron Street, San Diego, California 92115. This will bring six copies of the Newsletter published by the society wherein a membership roster is supplied and a means for exchanging fishes is made possible. All in all, this is a remarkably excellent aquarium publication, and one of which the publishing society can be most proud. Write to *Anchor*, S.F.A.S. Newsletter, San Francisco Aquarium Society, Steinhart Aquarium, Golden Gate Park, San Francisco, California 94118 for information.

Handy Hints for Aquarium Equipment by Gary Capper, appearing in the December issue of the *Wet Thumb* (published by the Cleveland Aquarium Society), demonstrates how much the creative ability and imagination of a 13-year-old boy can contribute to the fishkeeper's hobby. Gary tells us that circlets of airhose can make excellent feeding rings now that glass feeding rings are not easy to find in aquarium shops. He recommends drying out pieces of *Anacharis* and similar aquatic plants in the sun and serving it to fishes in tiny pieces as a supplement feeding to those fish who require vegetable matter in their diet. He also suggests saving colorful Christmas wrappings for use as backdrops for show tanks. These are only a few of the hints Gary has developed since he has been in the hobby. He is also an accomplished artist and we will be seeing some of his artwork in issues to come of *The Wet Thumb*. This issue also

carries a number of news items involving things aquatic. Among them is a report that an international effort is being made to save whales from extinction. The blue whale and the humpback whale are being protected in all waters and quotas are being placed on other species. Norwegian marine biologists favor the curtailing of all whaling for the next 10 years in an effort to save the disappearing giants of the sea. Editor Jim Martin bemoans his *Life and Hard Times with the Wise Guy Nextdoor*. This fellow not only executed a completed rec room with an \$1800 check while Jim was still nailing up the studs of the rec room he confided to his neighbor he was going to build in a weak moment, but was conned out of six large Congos when his neighbor decided his rec room needed a conversation piece. This after he commented that keeping fish was old-fashioned. Oh well, maybe this fellow deserves to get "hooked". And after all, if he weren't such a "wise guy", Jim wouldn't have had all this fun material for his article. *The Wet Thumb* is published by The Cleveland Aquarium Society and it reflects a lively, friendly group of aquarists (we had the pleasure of meeting them personally in November) in its well-produced pages. Write to *The Wet Thumb*, c/o Jim Martin, Editor, 36158 Hillcrest Drive, Eastlake, Ohio 44094 for information regarding the club and its publication.

In an effort to receive club announcements early enough to use in this column, please mail them and the bulletins to Helen Simkatis, P.O. Box 1979, Wheaton, Maryland.



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cultivation of fishes and in a short while, became the leading producer of German carp. In those days, The U.S. Fish Commissioner was interested in establishing German carp culture in this country. Accordingly, the Government offered, free of charge, 10 to 20 fingerlings to anyone willing to attempt their cultivation. In the year 1876 the number of applications only totaled 3 but by 1879, this number had risen to 324. A good many of these fish were sent to Cincinnati. In 1879, 37 individuals in the Cincinnati area received varying numbers of carp (not counting Mulertt who received 21 for his own use).

Mulertt apparently took his duties as Assistant Fish Commissioner seriously. In these early days, there was much myth surrounding fish culture and Mulertt, at his own expense, printed a brochure which answered 22 questions on the subject such as optimum water temperature, stream flow, depth of water, etc. One of his outstanding contributions in the area of aquarium fishes, however, was the establishment of the first true aquarium magazine in this country (and the world). This was a monthly magazine called "The Aquarium", first published in Cincinnati in the year 1878. Mulertt published two volumes of this magazine (which was in English), suspending publication sometime in 1881 or 1882 (the exact year is not known). He resumed publication in Brooklyn, New York, in the 1890's, but we will explore Mulertt's magazine in some detail in a later episode. We will comment, however, that many of the articles which appeared in "The Aquarium" were reprinted in both the English-language and German-language American press of the time. They enjoyed a wide readership and immeasurably helped to spread the word of the aquarium hobby.

By the end of the 1870's, Mulertt had also built a nursery in a then suburban part of Cincinnati, where he raised fish (mostly goldfish) and aquatic plants. This nursery was quite an extensive affair for the time, consisting of numerous concrete pools arranged in a semi-circle (see figure). This explodes, once again, another myth. In Joseph Kane's book, *Famous First Facts*, that author credits Eugene C. Shireman with starting the first successful goldfish hatchery in America (at Martinsville, Indiana) in 1899 (now known as Grassforks, Inc.). This is, of course, falacious as Mulertt preceded him by many years. Indeed, there were many successful goldfish hatcheries in the Cincinnati area, all started before Shireman's. The area was as ideal for goldfish cultivation as it was for German carp. Kane also erroneously credits Rear Admiral Daniel Ammen, U.S.N., with the introduction of the goldfish to America in 1878 when the Admiral presented a number of these fish, which had been brought over from Japan, to the United States Fish Commission (now the Bureau of Fisheries). However, as we have shown in the previous installment in this series, a fancy goldfish was exhibited at the "New

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Mulertt's display at the Cincinnati Centennial Exposition of 1888, described in the text. It was probably one of the most (if not the most) fabulous displays in the history of the aquarium hobby, devised by one man.

York Aquarium" as early as 1876! The Ammen fish were bred, by the way, and Mulertt was one of the few who received fish from the very first spawn (four young fish that later turned out, luckily, to be two pair). Thus, Mulertt was one of the first to be in a position to breed veiltail goldfish. We will discuss the Ammen importation later but as far as ordinary goldfish are concerned, they were imported many years prior to the Admiral's trip. Kane is far off base in his "facts". No one really knows for sure, who brought in the first ordinary goldfish. Certainly they were in this country at least as early as the 1850's.

In 1880, Mulertt imported two varieties of the paradise fish into the United States, from Germany. Although he was not the first to introduce this fish (to Adolphus Busch is reserved this honor), Mulertt was responsible for its widespread distribution and subsequent popularity. On the other hand, there are no disputants to the fact that he was the first to import *Sagittaria subulata*. This story is told best in Mulertt's own words:

"During the winter of 1878-79, while in business in Cincinnati, Ohio, we ordered from a correspondent, then traveling in the Amazon river region, an assorted lot of wild aquatic plants. In due time we received a little box full of various roots and rhizoms, some big, others small, and planted them in various tanks in our greenhouse. It is one of our peculiarities to throw nothing away as useless until it has had a fair trial. In this case we placed the moss

that had been used as packing and also the trimmings of the roots in a tank of water, and the mud that had dropped from the roots we placed in another vessel, thinking that some stray seeds might possibly be among this refuse that might develop into something useful. In due time we discovered several little sprigs of vegetable growth in the vessel that held the refuse. These were carefully removed to a separate tank where they would be under better control. Among these sprigs thus removed were two grass-like blades, not quite as wide as a straw; their starting points were two little corms, each not larger than an apple seed. To all appearances these were *Vallisneria spiralis*, and we expressed our surprise regarding the wide distribution of this famous water plant, which we were in the habit to obtain from the Northern lakes.

It was about the middle of March, these two little plants had completed their third leaf, when a lady, a faithful customer of ours, called at our store for a small *vallisneria* for her aquarium. The two above mentioned plants being the only ones we had in foliage at the time (our native *vallisneria* starts much later), we sold her the biggest of them for ten cents, making apologies at the same time regarding its inferiority to what we used to supply. About the end of April a carriage drove up in front of our store from which the same lady alighted. She came to ask the name of that little plant which we had sold her some time ago. We informed her that it was a *Vallisneria spiralis*. "No, no", said she, "I know *vallisneria* well enough, the plant which you gave me the last time I called here is not a *vallisneria*; it is much more beautiful and is now in bloom, proving by its flowers that it belongs to an entirely different order". We were unable to give its name from a verbal description of the flower, and were invited to ride down to her residence, in her company, and see it, she being anxious to know the correct names of her plants.

When we saw the little white flowers floating on the surface of the water in her aquarium, and the graceful shape to which the plant had developed, we were agreeably surprised, for this little plant certainly was a prize for the aquarium. We explained its origin. The lady then voluntarily offered to give it back to us in order to propagate it. It was very fortunate indeed that this little plant had come in such careful hands, where its characteristics had been noticed. We were as happy as if we had discovered a gold mine. We felt like "running" home. The street car seemed too slow for us so anxious were we to find out whether the other plant, its mate, was still in our possession. What then . . . if it had been sold to some careless, strange person for ten cents? Every person we met, as we neared our store, we observed closely, for he might have just carried off our prize."

Mulertt subsequently propagated the plant and disposed of several thousands of dollar's worth in a very short time. At the *Cincinnati Industrial Exposition* in 1879, he was awarded a complimentary medal for it. Mulertt supplied the plant to almost all continents and even in the 1890's, the annual sales of the plant exceeded several thousands of dollars. Without doubt, he was an aquatic plant expert par excellence. Besides developing several very popular strains of *Sagittaria subulata*, Mulertt also developed a special strain of *Ludwigia natans* which later came to be known as "*Ludwigia Mulertti*". As early as the 1890's, he successfully propagated (and sold) Madagascar laceleaf plants.

Through the popularity of Mulertt's magazine, he was asked to

participate in sundry Cincinnati Industrial Exposition displays. This he did and because these displays further popularized the aquarium hobby in the United States, they must be counted as additional outstanding contributions by Mulertt to the hobby. Children as well as adults became aware for the first time, of what the aquarium hobby had to offer.

In 1879 and again in 1882, Mulertt won medals for his work. However, this was the extent of the credit given him until, in 1883, Mulertt (and incidentally, this is the correct spelling of his name; it has been misspelled many times past in the aquarium literature) published the first English-language edition of his book, *The Goldfish and Its Culture*. There were six editions in all, two in German, four in English; the last appearing in 1910 (the first English-language edition was published in Cincinnati, the later such editions were published in Brooklyn, New York City). Until the arrival of Herman T. Wolf's book, *Goldfish Breeds and other Aquarium Fishes*, this text was the standard for the hobby and it ranks in the top three aquarium books ever published in America. With this book, his reputation was made and Mulertt became a recognized authority not only in the United States, but in Europe as well. One of the many honors he received was a medal and appointment as "Corresponding Member of the Imperial Russian Society for the Accli-

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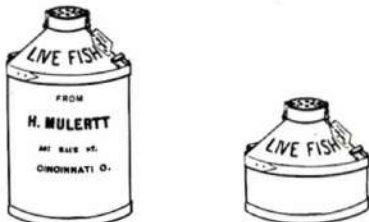
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matization of Animals and Plants".

Mulertt wrote, in 1883, that the yearly volume of goldfish sold in the United States was 2,000,000 at an estimated value of \$300,000 (about \$1,400,000 in terms of today's currency). According to Mulertt, Europe raised and sold more, but the quality of the American fishes was much better. But returning now to his book, two advertisements in the 1883 edition are of interest. The first was of J. W. Fiske, of whom we have already spoken with regard to our study of the 1870's. The second was of Jacob C. Cassel of Philadelphia, Pa. Cassel claimed that his variety in aquarium goods was the largest in the country. In any event, his firm was to remain in business for many years.

Mulertt shipped fish all over the country, even as far away as San Francisco! To this purpose he utilized the soldered cans generic to the coal oil trade (see diagram). Such cans were 15" to 18" in diameter, with a 5" opening at the top. The tops were perforated, open to the air, and the cans themselves were filled 4/5 with water. The containers were, of course, shipped via rail. In later years, the cans were shortened, thus giving rise to what ultimately became known as the "German shipping can". The point is that such cans were developed here in the United States, independent of such development in Germany.

To be continued.



The can on the left was the original shipping container used by Mulertt in the late 1870's and early 1880's. Twenty years later, Mulertt was using the cut-down version shown on the right. This is identical to the so-called "German shipping can", used extensively through the aquarium hobby until the advent of plastic shipping bags.

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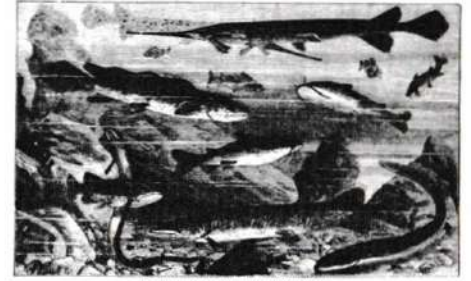
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The first aquarium magazine published in the world, the *New York Aquarium Journal*. Although it lasted for but a year, it was an excellent magazine, complete with illustrations (woodcuts), columns, and feature articles.

Our initial plans were to fly from Columbus, Ohio, to Miami, then on to Aruba, Netherlands Antilles, where we would spend a day or two. The next leg would be from Aruba to San Fernando in the Apure Province of Venezuela where we would spend a week looking for fishes. The final air flight would be from San Fernando to Leticia, Columbia, located right on the Amazon River. The return flight would be simpler: Leticia to Curacao, Netherlands Antilles, to Miami to Columbus.

While Jon was busy working on flight plans, aircraft maintenance, and securing the necessary permits from the various countries involved, Win and I contacted other aquarists whom we thought might be interested in making the trip. A ready acceptance was received from Dr. Richard L. Stone of New Orleans, La.—another old traveling companion, having accompanied us on a previous trip. Dick is Chief of Psychiatric Services at the Veteran's Hospital in New Orleans, an avid aquarist and all-round amateur naturalist. We were further fortunate indeed to have "sign up" with us, Vern Parish and Ed Corder, both of Indianapolis and active in that city's aquarium activities. Finally, Clarence ("Norm") Knepper, one of Ohio's best-known aquarists, brought the total up to six.

We were, however, still short of sufficient expedition members to make the trip economically feasible (the aircraft charter and operating costs would come to about \$4,500, for example, and this figure did not

include the copilot's expenses). Each of us, therefore, was obliged to scout up other candidates. Ed Corder enlisted Warren Dody, a railroad friend from Indianapolis; I secured two personal friends—John Chapman, an engineer, and Duane Wait, a mathematician—both from Cincinnati; Norm signed up two friends of his own from the Dayton area—Earl Elzorth and Marty Harm. Earl and Marty are archers (Earl owns an archery range) and their primary interest was in hunting wild game with bow and arrow. The expedition, therefore, developed an even more exciting nature! With the addition of Jon's son, Jon Jr., and our copilot, Bob Fitzsimmons (Bob even quit his job to come with us), our complement was now complete.

Problems developed, however. For one thing, we could not secure permission from Venezuela to enter and leave at San Fernando. It was Caracas or nothing. Since this would have meant flying 200 miles back to Caracas prior to flying back south to Leticia, we decided to forget about Venezuela except to fly over it. Secondly, "Papa Doc" Duvalier, dictator of Haiti, had warned about flying over his country. Detouring around Haiti would have added another 20% to our expenses. However, we learned that at the time, Duvalier's airforce consisted of only two planes; an old DC-3 and a World War II P-51 fighter. The former crashed a month before our takeoff, and the latter hadn't gotten off the

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ground in 7 years. So, we said "phooey" to Papa Doc and made our plans accordingly, reminding ourselves to fly especially high over Haiti.

During the weeks of preparation, we assembled our equipment and obtained our shots. Most opted for jungle hammocks but Win decided on a tent. John Chapman produced a machete as wicked-looking as any I've seen, and Duane Wait showed up in a white duck outfit, complete with white sneakers, apparently ready for the yachting season (the fellow who brought along an electric toothbrush will not be mentioned by name!). Norm, Earl and Marty had so many arrows sticking out from their baggage that it was a hazard to sit carelessly. The real fishman in the crowd was Vern who patiently attended to nets, plastic bags, and other gear.

We took turns throwing each other going away parties and complaining about our shots (Ed maintained that his were delivered via the blunt end of a broom handle!) but the day of departure finally arrived. Departure day is usually a mild form of mayhem. The loading of the aircraft must be done carefully to ensure proper weight distribution. Fuel must be pumped on board (the wingtip tanks last so as not to over-tax the wings) and last-minute additions to personal baggage must be made. All this must be done with people climbing in and out of the plane, and with wives, children and family dogs underfoot. At last, our good-



Route of the Amazonian expedition. The "kink" in the Miami-Aruba leg is due to the necessity of avoiding flight over Cuba. Leticia is situated on the Amazon River (not shown), on a dogleg of Columbia where Peru, Brazil and Columbia meet.

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byes were said!

The flight between Columbus and Miami was pleasant enough, a jaunt of some five hours. It afforded us the chance to experiment in how to distribute fourteen people comfortably in a plane built originally for four (someone suggested olive oil). Because we had arrived late in Miami, we elected to stop over the night, not attempting the flight to Aruba until the next day. A few decided to explore Miami's night life, and judging by the bags under the eyes I saw the next day, the plane wasn't the only thing fully loaded the previous evening. This I attributed to the prospects of a 1,200 mile flight over water in nothing but a 22-year old plane with but two engines!

The flight from Miami to Aruba was also a run of five hours. We flew over Haiti without incident, observing only how rugged and barren its mountains looked. The people there must have a hard life, indeed. The only incident between Haiti and Aruba occurred when someone jokingly asked Jon whether the plane could dive. In reply, Jon stalled the B-25 out and we dove about 1,000 feet in just a few seconds. Fellows who had just been sitting on the floor of the plane now were sitting in midair, staring face to face with their baggage. When the plane came out of the dive, down came everything—people plus baggage. The only real casualty was a cup of coffee which now was a part of the ceiling. We never did get the coffee stain out. The cigar I had been readying to light, looked as if it had just exploded. I never did forgive Jon for that cigar.

The approach to Aruba was rough and in jockeying for position, the plane was buffeted about, and so were we. After the first bounce or two (I told Jon I wouldn't forgive him for that cigar!), the landing was good and we quickly piled out after we taxied to our parking place. The Aruban officials were helpful, courteous people; they certainly knew the meaning of hospitality.

We rented two cars, I being elected driver of one of them. I backed out of the parking lot and swung around in front of the airport to pick up my passengers. Unfortunately, nothing happened when I stepped on the brakes. After I rolled to a stop against a cactus plant, the Aruban in charge of the agency expressed his apologies (he had just bled the brakes that morning) and turned over his own car to me, saying that he would get the brakes fixed and catch up with us to exchange cars later on. Since Aruba is only 17 miles long, true to his word the original car was back in our hands a few hours later, much to my trepidation.

Aside from the nonchalance with which Arubans view mechanical equipment, Aruba itself was fascinating. The island belongs to the Dutch and is situated about 15 miles off the coast of Venezuela. It is mostly sand, covered with cacti and a tree called the "diva-diva." The branches of the latter point in one direction only, for the wind blows from only one direction 11 months of the year (the 12th month it doesn't

Aruba belongs to the Dutch and their influence can be seen in this windmill, located just out of the capital, Oranjestad. This structure is used as a restaurant.



The island of Aruba is mostly sand with two types of vegetation: cacti and the Diva-diva tree. The latter always point in one direction as the wind blows from the same direction 11 months of the year (and doesn't blow at all during the 12th!).



Fish and produce are brought to Aruba in boats such as this one. Each morning the boats are unloaded and a market miraculously springs up right on the docks themselves!



73



The fish are tossed right on the docks where they will be cut up on the shopper's orders to suit the family pot that night.

blow at all!). Cactus is the main vegetation, however, because the annual rainfall in Aruba is a scant 16 inches.

The capital city of Aruba is Oranjestad ("Orange City"), where we stayed (up to five in a room). The stores were well-stocked with goods, however, and we had a field day buying Guatemalan tablecloths and other souvenirs for our wives who later claimed that these were but acts of conscience for leaving them home with the family dog, the kiddies, and all those fish tanks to take care of. We passed up a boar's head dinner (at \$5.50 per head) to dine at the Bali, a floating restaurant featuring a "Rijsttafel" or "Rice table," a complex 20-course Indonesian dinner that took us hours to eat. It was truly superb and I learned to go easy on the "sambal badjak" (a hot-hot red pepper!).

The group split up and I found myself with John, Duane and Win, driving the length of the island. One end of Aruba consists of a gigantic oil refinery, the largest I have ever seen. We wound up the evening by swimming in the moonlight in the Caribbean, a pleasant end to a pleasant day.

We were up early the next morning, photographing the docks and the market. Produce and fish are brought to Aruba by small boats and each morning, these are unloaded onto the docks which then serve as a sort of outdoor supermarket. About noontime, everything is reloaded aboard the boats, and the market disappears. After lunch, we were off on a glass-bottomed boat to skin-dive for the colorful coral fishes that abound in this part of the Caribbean.

To be continued.

74



Black lace angels spawning. The upper fish (female) deposits the eggs while the male (lower) fertilizes them.

WARNER

from page 33

another day or two. It is, therefore, advisable not to use gravel in the tank for hatching the eggs. After the fry (young fish) begin swimming, do not feed for twenty-four hours as they are absorbing their egg sac; this serves as food. They will accept no other food at this time. When they are free-swimming, feed freshly-hatched brine shrimp immediately; they do not need nor use infusoria. I leave the tank light on for the first three days of feeding and give them plenty of baby shrimp. Place a feeding ring in the tank and start feeding very fine dry food once a day, in the morning when they are hungriest. If you have microworms, feed these too.

The fry at this stage look like tetras or any other fish but angels.

75



Once deposited, some of the eggs usually turn white. These are usually either infertile or have been attacked by fungus. To prevent infection of others, remove the white eggs with an eyedropper or tweezers.

It will take about five weeks before they look like angels and when this starts, the larger fry should be separated from the smaller as there is a big difference in the rate of growth. Any fish losses should occur within a six week period; after that, one should not have any difficulty raising them to maturity.

The eggs that turn white within twenty-four hours are usually infertile eggs; if this occurs after twenty-four hours, they are victims of bacteria and fungi. It is very common to find infertile eggs in a pair's first spawning. If the eggs become fungused then I suggest, with the next batch of eggs, the use of a different anti-fungus agent.

Editor's Note: We find Mr. Warner's advice regarding the sexing of angel fish to be overly conservative. If you want to try two methods for sexing that work fairly well (but by no means are they certain!), we suggest the following:

(a) Observe the line of the lower body between the ventral fins and the beginning of the anal fin. In females, this line is more horizontal (see sketch).

(b) Observe the form of the ventral fins. In males these fins are fairly straight for most of their length, then curve backwards somewhat abruptly. The ventral fins of the female, on the other hand, start curving gently from their base (an exaggeration of this is shown in the sketch). Although this method works well even with very young fish, it fails of course when the ventrals are damaged. It also is useless in the case of veiltail angels because their ventral fins are commonly split.

You can tell sex in angels for sure while they lay their eggs since the fertilizing tube of the male is short and pointed, the tube of the female being long and blunt. **AJK. ●**



Although the tiger catfish is crepuscular ("twilight-loving") by nature, the insatiable appetite of the fish soon brings him around to more orthodox aquarium hours. Smaller specimens will eat frozen brine shrimp, but the futility of trying to sustain a bagre tigre on such nourishment is soon apparent. Other answers must be sought if he is ever to approach the size at which his pattern of color changes him into what I consider one of the most handsome of fishes. To do this, not only must he have adequate room (twenty-five gallons minimum) but also he must be stuffed with regularity since, in nature, fishes of this type often quickly reach size and maturity. To facilitate this, Nature has provided them with a growth period during which their capacities are larger (in proportion) than they will ever be again and there is a youthful appetite to accompany and see that the vacuum is filled. Commercial fish culturists and guppy breeders alike know that quick growth is essential if potential is to be realized. Here, however, we are dealing with the problem of space limitation, for the bagre tigre in mature reaches a length of more than a meter. Although a few public aquaria such as the James A. Record Aquarium in Fort Worth, Texas and the Steinhart Aquarium in San Francisco, California have raised tiger catfish to a length of about three feet, the aquaria involved are over a thousand gallons. In the home aquarium, taking advantage of the "growth period" is advisable in order to reach the necessary size for color to be at its best.

Pseudoplatystoma fasciatum is found from Colombia and Guyana through the Amazon, and its large size makes it of commercial importance as a trade item. In the month of January when millions of "Boca-Chicas" ascend the Magdalena River to spawn, these *Prochilodus* are followed by the bagre tigre. C. H. Eigenmann noted that at night during these periods, the silvery Boca-Chicas would often shower out of the water over the sand bars in an effort to escape the tiger fish and the gluttonous caiman (alligator). Predator that he is, even bagre tigre himself does not escape the jaws of this reptilian piscivore.

This is a highly prized display fish for public aquaria, but often because

of the tremendous color difference it is not recognized in smaller sizes for what it will later be.

Although the forked caudal lobes of young specimens are pointed, they round with age and size. The dorsal takes on color and the prominent spots and splotches migrate partially, those above midside becoming elongated and margined with an almost luminescent, lighter front edge. The lower spots appear beneath these bars. The upper side of the fish is ordinarily a dark copper-brown which pales at times of disturbance or unfavorable water conditions. The underside is light, almost white in color.

The tiger catfish likes it hot, around 80°, although 70° is not harmful. At lower temperatures, feeding becomes more of a problem. Live fishes such as native minnows are his preference but as he grows this reaches proportions only Nature can provide. Worms are not relished, but beef heart will be accepted as soon as a meal or two are missed, and eventually will be taken greedily. Beef heart is without doubt one of the finest live food substitutes and many fishes will accept it as the *only* alternative.

For the fancier of larger fishes, few could be more impressive or more satisfying. If kept with other large and swifter fishes, it may be necessary to hand feed the tiger fish, for in his home waters he prowls the rivers in twilight and darkness, lunging forward to engulf his prey when his barbels find them. In a lighted aquarium with others he may fail to sense the food until it is gone, for he seldom strikes at small pieces. It's worth the extra effort until he gets the hang of it. ●

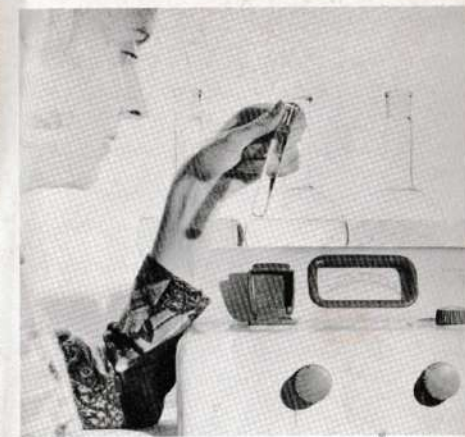


Photo by Fukuharu Watanabe, Photo: W. Zimmerman

Can aquarium water be cloudy, even if it looks clear?

Indeed it can!

As most fish lovers know, the right food and crystal clear water are vitally important to the well-being of fish.

That's why we continuously test raw materials and new food formulas with the help of electronic measuring devices, like the photometric densitometer shown here. This ultra-sensitive instrument helps us detect water that is so minutely cloudy the naked eye can't see it.

It is another way we work with the aid of science to bring you TetraMin, the fish food that won't cloud your aquarium water, but will give your fish a superb, nourishing diet... for new vigor, better health, improved color.



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