

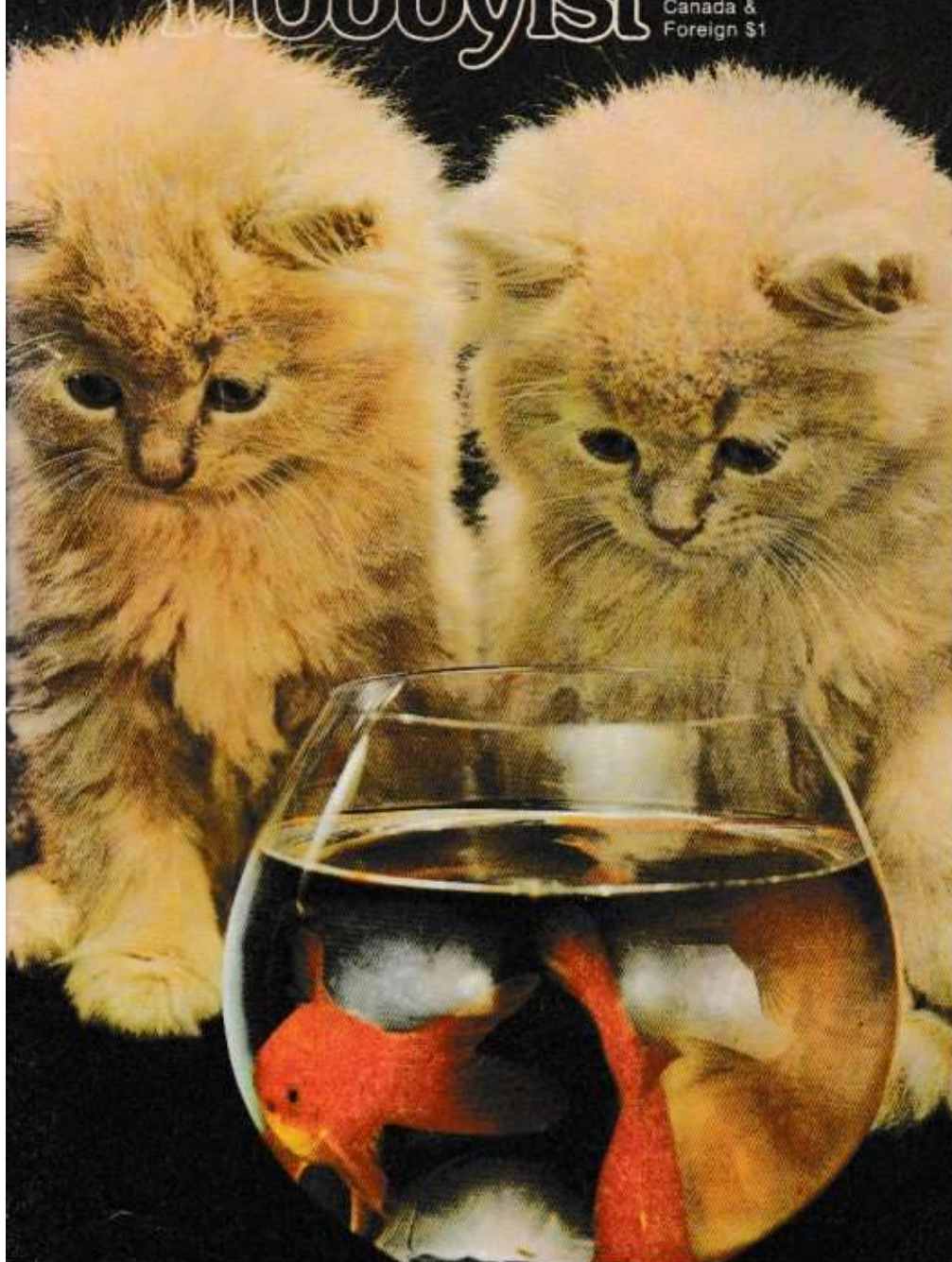
# Tropical Fish Hobbyist

75¢/45P

May, 1980

Canada &

Foreign \$1



## any way you view it, VORTEX performs

We know your fish are special to you and our products are special to us. We produce the finest filters in the world.



**A** The D-1 Diatom is the unmatched industry standard for pure mechanical filtering ability. Used by more hobbyists and professionals than any other.

**B** The XL Diatom is the newest entry boasting 3 times the filter area of the D-1 and aimed at the serious fish keeper with more than one tank to service.

**C** The Model D-4 Pro-400 filter used by professionals where quality and performance are second to expense. Designed for multitank continuous filtration under the toughest conditions.

**D** The Grease Washer cleans your aquarium gravel with a patented swirling action. The unique nesting chamber allows you to "stockpile" your gravel while you systematically clean the entire gravel bed.

**E** The P-29 "H" Valve is designed to allow all Diatom series filters to be moved from one aquarium to another without breaking the intake syphon or disturbing the "substrate" bed. Filter returns are accomplished with no chance of powder entering the aquarium.

**VORTEX** INNERSPACE PRODUCTS, INC.  
Manufacturing, Research and Development  
P. O. Box 168, Hwy. 90 West Ponce de Leon, Florida 32455

## Tropical Fish Hobbyist

ISSN 0041-3259  
Vol. XXVIII, May, 1980 (#261, No. 9)



Cover:  
Trouble for Goldfish.  
Photo by  
Color  
Library  
International

### CONTENTS

#### FEATURES

Special Feature: Breeding <i>Julidochromis marlieri</i> ... Jorgen and Pamela Hansen	4
Feeds and Feeding: A Simple Food Formula for Cultivating Fruitflies ... Dr. Matthew M. Yields	22
Know Your Invertebrates: Ghost Shrimp ... Thomas T. Watson	30
Amphibians: Spawning the Smooth Newt ... Boris Demian	47
Catfishes: The Sturgeon Catfish ... Brad Walker	61
Coldwater Fishes: Selecting Goldfish for the Outdoor Pond ... Marshall E. Ostrow	88

#### DEPARTMENTS

Notes on Killifishes: <i>Aphyosemion australe</i> ... Rudo Zubal	14
Supplements to Exotic Tropical Fishes: <i>Haplochromis venustus</i> , 17; <i>Lepomis macrochirus</i> , 83	
The Lineup	20
For Beginners: Water Hardness and the Hobbyist: Part II ... P. F. Capon	27
Notes on Discus: From Silks to <i>Symphysodon</i> ... Jack H. Wattlew	36
Rare and Well Done	38
Salts from the Seven Seas: The Rainbow Wrasse, <i>Thalassoma lucasonum</i> ... James Lee Charol	42
Mail Call	67
Tank Techniques	87

<p><b>TROPICAL FISH HOBBYIST Magazine</b>  <b>Dr. Herbert R. Axelrod</b>          President, Exec. Editor  <b>Marshall E. Ostrow</b>          Editor  <b>Dr. Leonard P. Scheiff</b>          Advisory Editor  <b>Lynda Scilliano</b>          Graphic Artist  <b>Mary Halstead</b>          Advertising Coord.  <b>Patricia A. DiPasquale</b>          Typewriting Coord.  <b>Loce Pressley</b>          Production Manager  <b>Debra Beck</b>          Bulk Sub. Dept.  <b>Linda Reeves</b>          Circulation Sub. Dept.</p>	<p><b>T.F.H. PUBLICATIONS, INC.</b>  <b>Dr. Herbert R. Axelrod</b>          President, Exec. Editor  <b>Neal Prange</b>          Managing Editor  <b>Dr. Warren E. Burgess</b>          Senior Editor  <b>Jerry G. Walls</b>          Senior Editor  <b>Glen S. Axelrod</b>          Senior Editor  <b>Laurence Burgess</b>          Biology Editor  <b>Dr. Matthew M. Yields</b>          Ornithology Editor  <b>Patricia Seminars</b>          Art Director</p>	<p>Rates: \$7.50 per copy in the U.S.; \$10.00 per copy in Canada or Foreign; \$7.50 for 12 issue subscriptions in the U.S.; add \$1.20 per year for foreign subscriptions. Index available in every 12th issue. In England and the western European area, Tropical Fish Hobbyist Magazine and T.F.H. books distributed exclusively through T.F.H. Publications (Europe), Ltd., 23 Nether Lane, Raigate, Surrey, England. In Australia and the South Pacific by Pet Imports Pty. Ltd., P.O. Box 140, Brookvale, N.S.W., Australia. In South Africa by Veld Aquatics, P.O. Box 5160, Randburg, 2126, South Africa. All subscriptions and inquiries should be sent directly to them.          Second class postage paid at Neptune, New Jersey. Published monthly by T.F.H. Publications, Inc., 211 W. Sylvan Ave., Neptune City, New Jersey 07753.          Exotic Tropical Fish Supplements          Pages 17-20, 83-84. These pages are prepared and indexed for easy removal and insertion into the lower-left section of Exotic Tropical Fishes, available in pet stores everywhere.          © 1980 by T.F.H. Publications, Inc.</p>
--	---	--

### Cichlids

## Breeding *Julidochromis Marlieri*

by Jorgen and Pamela Hansen  
Color photos by Jorgen Hansen

*Julidochromis marlieri*, described by Poll in 1956, is a monogamous cave-spawning cichlid from Lake Tanganyika in Africa. The mere mention of the generic name *Julidochromis* conveys the fact of the fish's beauty. The basic coloring is dark brown with three rows of yellowish white spots of varying sizes, the uppermost being the smallest. The fish's flanks are

moreover perpendicularly divided by slightly larger yellowish white spots with the result that the fish appears to have 6 dark brownish black perpendicular bands on a yellowish white background.

With the exception of the pectoral fins which are a weak yellow-brown, the fins are edged by a narrow brown band, within which runs an equally narrow white band,

The *J. marlieri* female looks after the eggs inside the cave.



The female *Julidochromis marlieri* swims with her belly pressed toward the cave roof.

The female turns with belly towards the cave roof and cleanses the eggs with her mouth.



while innermost lies a broad brown band. The rest of the fins are covered with light and dark markings. The most anterior ventral fin rays are elongated and almost reach the beginning of the anal fin; the caudal fin is rounded.

Tank-bred fish can attain a length of about 5 1/4 inches. Older males have a characteristic hump on the head which develops with age.

We began as usual by buying four specimens which we placed in a 20-gallon tank built up with round stones so as to create plenty of hiding places and with *Sagittaria* planted between the stones. Nothing very eventful occurred in the tank other than one of the fish being slain by the others, after which a state of equilibrium prevailed. We scanned the tank for signs of a spawning but without result.

Six months later we transferred the three *J. marlieri*, together with five small *J. ornatus*, to a 30-gallon tank, in which we arranged only a small system of caves close to the front glass in order to have a better view of what the fish were doing.

After a couple of months, it was apparent that the largest and the smallest of the *marlieri* had paired off, as they kept together in the caves and kept the remaining fish at a distance. An investigation revealed that eggs had been laid in the cave, but two days later these disappeared without trace. A month later the same course of events recurred. On the third spawning we removed the eggs for artificial incubation, but these fungused in the course of six days

in exactly the same manner as unfertilized eggs had fungused.

Because of an apparently sterile male, we purchased four more *J. marlieri* and placed them together with the others, after first having broken down the existing territories in the tank by rearranging the interior. For the next couple of days, we kept the tank under close observation and removed those fish which seemed to be badly hurt or which hovered close to the surface seemingly terrified.

Two fish eventually paired off, and these were transferred to a 15-gallon tank that was planted with *Sagittaria* and with a 1/2-inch-thick layer of hornwort (*Ceratophyllum demersum*) floating at the surface. There was a rock cave in the center of the tank. Although the pair got on well together, they didn't get around to spawning, so we separated them for a week and then reunited them. The following is the sequence of events that occurred.

1-10-78. Eggs spawned on the roof of the cave. Both parents bustled about near the eggs which were about 30 in number. The eggs were oval, 2 mm. wide and 3 mm. long, white at the one end and otherwise greenish.

1-12-78. The eggs hatched, and the greenish embryos were plucked from the roof of the cave by the parents, leaving the egg shells behind.

1-13-78. No fry were seen anywhere, but at least we now knew we had a male and female.

1-15-78. In a small crack far inside the cave, we discover a baby

# Chlorine Cure

## Aquatrol's Concentrated Treatment in a Bottle

Is there anything more vital to your prize fish than perfect health... Super-concentrated Chlorine Cure easily and instantly prepares a new aquarium environment for all fish. One drop per gallon is all it takes! This quality Aquatrol product is available in the best aquarium shops.

**Aquatrol, Inc.**  
237 H. N. Euclid St., Anaheim, CA 92801



When disturbed, the female turns to threaten the disturber.

When the threat fails to frighten the disturber away, the female swims toward a hiding place behind some stones.



When the eggs begin to hatch, the female is ready to pluck them from the stone.

The female turns on her side and plucks a baby fish from the stone.





All known *Julidochromis* species including *J. ornatus* spawn in concealed places. Photo by J. Elias.

fish hanging to the wall by a thin thread. Its eyes were clearly visible.

1-17-78. Although we now saw no fry, we began to put newly hatched brine shrimp into the tank.

1-22-78. We caught sight of a baby swimming with its belly toward the roof of the cave.

1-26-78. Six fry in all were perceptible. Only one was in the cave, while the others swam with their bellies toward the sides of the tank.

The fry had the same dark coloring as the parents.

2-01-78. The fry now measured 12 mm. and in color pattern resembled the adult fish.

2-05-78. Lots of eggs were being laid on the same site as before. The female spawned with her belly toward the cave roof and the eggs stuck to the roof. The male, which was the larger of the two, swam likewise and fertilized the eggs. After the spawning, it was mostly

100% AMERICAN-MADE AND  
**Unequaled-**  
ESPECIALLY FOR LARGE TANKS!

Supreme  
**DYNAMASTER**  
1- AND 2-CYLINDER  
**AIR PUMPS**



HERE'S  
THE  
SECRET!



UP  
TO **400** CUBIC INCH  
AIR PER MINUTE  
— 200 cu. in. per cylinder!

QUALITY-BUILT in every last detail, this is one pump you can depend on for faultless service, month after month — year after year! Available in 1 or 2-cylinder models, and the single cylinder model can easily be converted to two cylinders with a simple conversion kit. Other features include attractive, compact design; Hand-fitted O-Ring bearings throughout; Separate, double-acting check-valves; Lightweight, glass-reinforced frame that weighs 50% less than most others; Marproof felt base — can't scratch; \*OIL-IMPERVIOUS, top-quality drive belt for longest service life.

**NON-SLIP, POSITIVE  
GEARED-BELT DRIVE!**

Drive-pulley, drive-wheel and belt made with gear-teeth that eliminate slippage common with smooth-belt drives — assure positive, continuous air delivery!

OTHER DYNAMASTER PRECISION FEATURES:

- Permanently aligned cylinders, never need adjustment!
- Perfectly-balanced eccentric drive for quiet, smooth operation!
- THIRTY, TIME-PROVEN MOTCF — uses less energy than others of comparable output!

**EUGENE G. DANNER MFG., Inc.**  
160 Oval Drive • Central Islip, N.Y. 11722



The female turns around with the young in her mouth.

the female who took charge of the eggs. The previous brood swam around near the cave but were not permitted to approach the eggs.

2-07-78. As the wiggling tails became visible, the female turned belly upward and carefully plucked each baby from the roof and transferred them far in under the stone at the tank bottom, at which site she had beforehand removed most of the gravel. The chosen crack was so narrow that she could only force herself in with some difficulty.

2-08-78. All of the fry had been

transferred to their new home. The male was especially vigilant with regard to preventing the first brood from approaching the new fry.

2-16-78. Twenty free-swimming fry from the second brood were observed both within and outside the cave.

The 15-gallon tank was too small for this growing family, so we moved the adult pair to a 40-gallon tank after the next spawning. Fully grown *Julidochromis marlieri* have been known to produce up to 365 eggs in one spawning.

Please mention T.F.H. when writing to advertisers.

Welcome to Wardley's



From Australia to Sweden... Wardley serves the hobbyist worldwide.



People Power — our most important asset.



Our scientists continually monitor aquatic environments to create new and more effective products.



Whether it's Sweden or Spain... America or Australia, walk into a pet shop and chances are you'll see a Wardley product on the shelf AND in the language of that country.

Serving the needs of tropical fish hobbyists all over the world takes people, planning modern research and production facilities like some of the scenes above.

At WARDLEY we're putting our products all over the map because we want to be YOUR fish food company!!!



**wardley's**

WE'RE THE AMERICAN FISHFOOD COMPANY

One Aquarium Drive, Secaucus, New Jersey 07094, U.S.A.

Notes on Killifishes



1



2



3

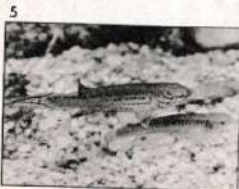


4

APHYOSEMION AUSTRALE

by Ruda Zukal  
Monochrome photos by the author

(1) Two male *Aphyosemion australe* in a rival fight. The male with his fins spread is the dominant fish. (2) The losing fish swims away with his fins folded, usually before much fin damage occurs. (3) The victorious male now turns his attention to a female. (4) The male approaches the female from above. (5) This is the typical position of the pair before spawning, with the male above and with his fins folded. (6) Together, the male and female swim to the chosen spawning site. (7) The male wraps his dorsal and anal fins around the female, the pair quivers and an egg is released and fertilized. (8) When the egg is laid the fish swim apart.



5



6

Whenever a hobbyist shows an interest in egg-laying tooth carps, this beautifully colored fish is sure to be his first choice. The reasons are easily seen. It is peaceful, hardy and brilliantly colored.

As far back as the year 1913 this *Aphyosemion* species, which attains a length of two-and-one-inches, was exported for the aquarium trade from its natural habitat in Gabon which is in western Africa. The male has a pike-shaped brownish red body with jaws and the body immediately behind them greenish to bluish in color. The body and fins are adorned with red dots and streaks. The dorsal and anal fins come to banner-like elongations that are tipped in white. The lyre-shaped tail fin has extended rays above and below that are edged in a reddish violet

color, and the middle portion of the tail fin is greenish blue with red dots. The female is a light brown color with a few small red dots on the fins and body and lacks the bright fin markings of the male.

For keeping *Aphyosemion australe*, or the lyretail as it is commonly known, a temperature of 70 to 72°F suffices. A small, heavily planted tank containing slightly acidic, clear, lightly salted water (1/2-teaspoon of salt per gallon) suits this fish well. The water should be practically free of infusoria, as these small microscopic organisms may attack the eggs. Planting may be augmented by floating plants. Although this species is peaceful, the fish do best if kept only with their own kind or with other peaceful species of the same genus. They require living

foods at first, but gradually they adapt to most standard aquarium fare.

For breeding, the temperature should be raised to about 75°F. No other changes from the last-named conditions need be made besides putting in some additional fine-leaved plants or a bundle of nylon fibers (a spawning mop). The fish spawn at irregular periods, with pauses lasting from a few days to a week in between. The sticky eggs are quite large and are easily visible. They can be removed from the plants with a glass pipette and then picked up with the pipette and put into a small, clean glass jar containing only about an inch of water. The water in the jar should be taken from the breeding tank, and the jar should be tightly covered to keep out airborne contaminants.



7



8



A male of the golden variety of *Aphyosemion australe*. This strain was first developed in 1953 by an aquarist named Hjerresen. Photo by H. Hansen, Aquarium Berlin.

The eggs are sensitive to light, so the jar should be kept in a fairly dark location. The white infertile eggs must be removed daily. If the eggs become crowded against one another, it is advisable to use a number of jars, each labeled with the date. Incubation time is 10 to 15 days. The water containing the hatched brood is poured slowly and carefully back into the breeding tank. The fry grow very rapidly on a diet of newly hatched brine shrimp nauplii and small *Daphnia*.

They are sexually mature in about ten weeks.

A golden strain of this beautiful fish has been developed, and that is the one that is now more commonly seen in the aquarium trade than the natural strain.

*Aphyosemion australe* is definitely one of the easiest egg-layers to breed as well as being one of the most beautiful fishes in the hobby. I highly recommend this fish for both beginning and advanced aquarists alike.

An adult male *Aphyosemion australe*. Photo by J.J. Scheel.



THE AQUA ENGINEERS MAIL ORDER  
LOW PRICE SALE

We will not be undersold!  
If someone else advertises our products at lower prices, mention the ad and give us their name please. Their names and addresses will be published in the Aqua Engineers' column. Special: major mail order aquarium supplies complete! Payment and shipping.

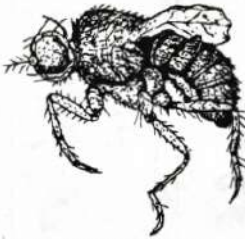
<p><b>110</b> <b>Plant-Plug</b> The Superior Plant Plug... Item #102 Regular Plug 45¢ Item #103 Giant Plug 1.00</p>	<p><b>PH TESTER</b> Fully automatic... Item #105 \$1.95</p>	<p><b>SILENT GIANT AIRPUMP</b> ... Item #108 \$1.95</p>
<p><b>DIATOM FILTER</b> ... Item #112 \$1.95</p>	<p><b>GRAVEL WASHER</b> ... Item #113 \$1.95</p>	<p><b>BRINE SHRIMP</b> ... Item #114 \$1.95</p>
<p><b>DYNAMASTER 2 CYLINDER AIRPUMP</b> ... Item #116 \$1.95</p>	<p><b>WATER HARDNESS TEST KIT</b> ... Item #115 \$1.95</p>	<p><b>DIET</b> ... Item #117 \$1.95</p>
<p><b>DIATOM POWDER</b> ... Item #118 \$1.95</p>	<p><b>WATER SOFT POWDER</b> ... Item #119 \$1.95</p>	<p><b>Live Foods</b> ... Item #120 \$1.95</p>
<p><b>DIATOM CHARCOAL</b> ... Item #121 \$1.95</p>	<p><b>DIATOM FILTER</b> ... Item #122 \$1.95</p>	<p><b>Thermometers</b> ... Item #123 \$1.95</p>
<p><b>DIATOM POWDER</b> ... Item #124 \$1.95</p>	<p><b>DIATOM FILTER</b> ... Item #125 \$1.95</p>	<p><b>HOW TO ORDER</b> ... Item #126 \$1.95</p>

ASK FOR A FREE CATALOG Aqua Engineers, Box 17, Okemuncie, Mich. 48861 One Order \$10.00 8077

**Foods and Feeding**

## A Simple Food Formula for Cultivating Fruitflies

by Dr. Matthew M. Vriends



The vestigial-winged fruitfly looks like a normal fruitfly in every respect but the wings. Its wings are reduced in size and mobility and they are crinkled-looking. Ill. by Lynda Siciliano.

Fruitflies (*Drosophila*) can be found in great numbers nearly everywhere, but their swarms are especially dense around fermenting fruit on warm summer days. Fruitflies are also very common in biology laboratories where they are cultivated in numerous strains for use in classroom instruction and in genetic research. They are also quite useful as a food for fishes that are adept at surface feeding, fishes such as livebearers, anabantoids, small characoids, killifishes and many others.

Aquarists find it easiest to work with the vestigial-winged strain in which the wings are small and incompletely developed, thus preventing the flies from taking flight. Starter cultures of vestigial-winged fruitflies can be purchased by mail from commercial live fishfood suppliers or they can be ordered from biological supply houses.

To culture fruitflies properly, a suitable food supply must be provided for them. There are a number of excellent food formulas known, but most of them require special ingredients that are difficult to come by unless one is employed in a biology laboratory. The following, however, is a fruitfly food formula for which all of the ingredients are fairly easy to obtain. Some of the ingredients can be purchased in a pet shop, some in a supermarket or produce store and only one ingredient, the preservative, must be ordered through a biological supply house or a pharmacy.

Before preparing the food, one must have suitable cultivation bottles that have been sterilized and are ready to use. The bottles should not be too large, for the weight of a large amount of fly food will cause

## Amazing New Product Reduces Tropical Fish Deaths



Why do fish die?

Experts tell us most fish deaths result from impure aquarium water.

And aquarium water is constantly being made impure. Decaying food, fish respiration, and urine produce ammonia, the number one killer of tropical fish.

Large concentrations of ammonia can be deadly, and even smaller amounts create fish stress and cause them to lose their ability to carry oxygen, thereby reducing their resistance to disease.

The usual aeration and filtration devices will not correct the ammonia problem, but now there's AMMO-CARB, the only product that not only removes all dissolved organic material, but eliminates poisonous ammonia as well!

### AMMO-CARB™ ...the carbon of the future—today

The most complete water filtering material ever marketed. Removes deadly ammonia, toxic organic substances, foul odors, and color, and adds clarity and sparkle to aquarium water.

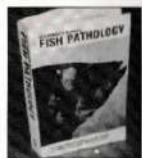
**AQUARIUM PHARMACEUTICALS INC.**  
POST OFFICE BOX 292, PERKINS, PENNSYLVANIA 15001



**PS-677 TEXTBOOK OF FISH DISEASES**, by Dr. Erwin Am-lacher. This is THE bible on the entire subject of tropical fish diseases. 312 pages with 196 black & white photographs. **\$12.95**



**PS-213 DISEASES OF FISHES, BOOK VI, FUNGAL DISEASES OF FISHES**, by Gordon A. Nash and Gilbert C. Hughes. A useful reference that covers most of the fungi that attack fishes. **\$12.95**



**PS-204 FISH PATHOLOGY**, by Dr. H. Reichenbach-Klinke. A useful comprehensive work that covers all facets of fish diseases including those caused by environmental pollution. **\$20.00**



**PS-210 HOW TO RECOGNIZE AND CURE AQUARIUM FISH DISEASES**, by Dr. Gottfried Schubert. A practical, colorful book for both beginners and advanced hobbyists. A non-technical approach to the subject. **\$3.95**



**PS-202 DISEASES OF FISHES, Book II, BACTERIAL DISEASES**, by Drs. Sni-asko, Bullock and Gontroy. Requires some biological background, but is essential for dealers and advanced breeders. **\$12.95**



**PS-673 PARASITOLOGY OF FISHES**, by Dogiel and others. An advanced comprehensive work, but not recommended for the beginner. A useful volume for every dealer, importer or student. **\$14.95**



**PS-209 FISH IMMUNOLOGY**, by Douglas Anderson of the U.S. Fish & Wildlife Fish Disease Lab. Discusses in simple language how to protect fishes against disease through immunization. **\$12.95**



**PS-205 DISEASES OF FISHES, Book I, COLOR ATLAS OF THE DISEASES OF FISHES**, by Dr. Eikan and Dr. Reichenbach-Klinke. Well illustrated with 32 pages of color photographs. A sophisticated book primarily for the advanced aquarist. **\$12.95**



**H-848 COLOR ATLAS OF THE DISEASES OF FISHES, AMPHIBIANS AND REPTILES**, by Drs. Eikan and Reichenbach-Klinke. A 256-page book completely illustrated with many color photographs. **\$30.00**

Available at your local petshop at these suggested prices. If ordering from the publisher, please add \$5.00 to cover

**For Beginners**

## Water Hardness and the Hobbyist: Part II

by P.F. Capon

Water hardness is merely a quantitative expression of the amounts of certain salts such as carbonates, sulfates and others dissolved in a given quantity of water. Temporary hardness, the hardness with which aquarists are most concerned, is a measure of the calcium and magnesium carbonate and bicarbonate salts. One of the reasons it is called temporary is that it can vary with the amount of carbon dioxide dissolved in the water; that is, a decrease of carbon dioxide drives dissolved carbonates out of water by causing them to precipitate. Heat also removes these salts, thus emphasizing the temporary nature of carbonate and, of course, bicarbonate hardness. The amount of carbonates and bicarbonates in a water have a direct effect on the physiological well being of living organisms.

Permanent hardness is a quantitative measure of sulfate salts such as calcium sulfate and magnesium sulfate dissolved in water. Neither decreased carbon dioxide nor high heat causes sulfates to precipitate out of water, thus hardness caused by sulfates is called permanent hardness.

Total hardness, another quantitative measure, is the sum of temporary and permanent hardness. It is a useful measure in determining the

amount of permanent hardness in a water. By the conventional test procedures available to most aquarists only temporary and total hardness can be measured. Since the sum of temporary and permanent hardness equals total hardness, permanent hardness is determined by subtracting the temporary hardness from the total hardness. Thus while the total hardness measure as an entity is of absolutely no value, it is essential for determining permanent hardness. The value in knowing the permanent hardness of a water comes into play when it is suspected that hard water is causing some problems in an aquarium and measurement of temporary hardness indicates that the amount of carbonates is not out of line. Measuring the total hardness, then, will provide an indication of whether or not hard water is the problem by revealing the amount of sulfates in the water.

For the aquarist, a convenient unit for measuring water hardness is the DH unit, which is also known as German degrees of hardness. One DH is the equivalent of one part calcium carbonate and magnesium carbonate dissolved in 100,000 parts water. In other words, a reading of one DH means that in 100,000 grams of the water from

which the test sample was drawn there would have been one gram of calcium and magnesium carbonates. Another way of looking at DH is that one DH is the equivalent of about 17 parts per million (ppm) of calcium and magnesium carbonate.

A DH of three and under is generally taken to mean that a water is soft. A DH of four to about 11 indicates a water of moderate hardness and a DH of 12 or over indicates a hard water.

Regulation of water hardness, especially the all important temporary hardness, can be accomplished in several ways. If one has fishes that require water that is harder than the available tap water, additional carbonates and bicarbonates must be dissolved in the water. This is usually only necessary if one is keeping fishes from the Great Lakes of the east African rift valley (Malawi, Tanganyika, etc.). The addition of calcium and magnesium salts, both carbonate and sulfate types, to the water usually does the job. Commercially packaged Malawi salts are available to help the aquarist increase his water hardness. Placing a chunk of hardened plaster of Paris in the filter helps increase permanent hardness. The use of gravels such as dolomite and crushed coral also help increase the hardness of water, though certainly more gradually than the direct addition of salts or plaster. Increased hardness is also required in maintaining marine aquaria. Commercial marine salt mixes take care of this initially, and the use of processed coral, crushed

coral or dolomite will help maintain the water's hardness.

Softening water for use with discus or many of the small characoids can be accomplished in several ways. There are special deionizing resins available that bind up the carbonates and bicarbonates in water passing over them. This should not be confused with the process that takes place in commercial home water softeners. These water softeners exchange calcium ions for sodium ions but do not remove the carbonates.

Peat moss is an excellent water softener for the aquarium. It slowly binds up the carbonate and bicarbonate ions as it acidifies the water. Fishes that require soft water usually also require water that is acidic, preferably made so as a result of an increase of dissolved organic acids such as tannic acid.

Finally, in order to determine the hardness of aquarium water, there are a number of inexpensive and simple-to-use water hardness test kits on the market. There is no point in going into detailed instructions here, because there are some differences between the kits of different manufacturers. For the new aquarist, the use of such a kit is desirable to help build confidence and an intuitive feel for the correctness of his aquarium maintenance procedures. For the more advanced aquarist who wishes to specialize in fishes having out of the ordinary water chemistry requirements, water hardness test kits are the only practical way to properly monitor modified water hardness values. —

## GOOD BOOKS, GOOD VALUES.

More books for aquarists in the highly successful KW SERIES. These 96-page hard-cover books are chock full of useful information on handling and keeping tropical fish, invertebrates and herps. Highly illustrated, authoritative, very colorful and very sensibly priced at only \$2.95 each.

FROM T.F.H.—the KW SERIES

Many other titles available and many more to come!  
\$2.95 Each • Hard-Cover



**KW002 BOAS AND OTHER NON-VENOMOUS SNAKES**, by Prof. Dr. Werner Frank. Covers biology and general care of these popular snakes. Colorful and easy to read.

**KW053 CORALS**, by Dr. Warren E. Burgess. Covers biology and distribution of corals in the world and discusses corals in the aquarium. Colorfully illustrated.

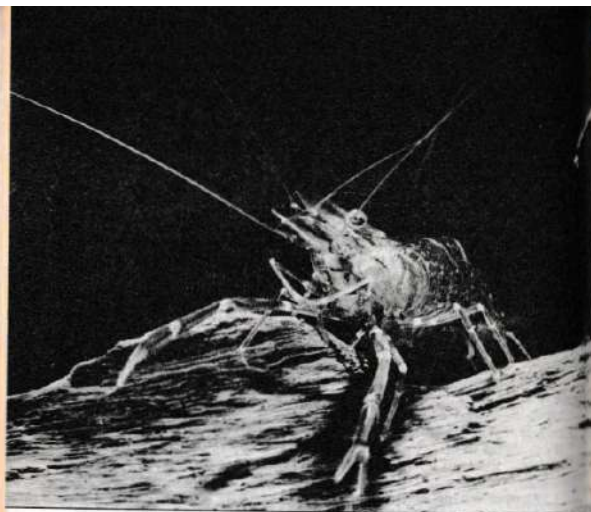
**KW-049 LIVEBEARERS**, by W. L. Whitten. The A to Z manual for keeping and breeding the most popular fishes ever known to the aquarium hobby. Highly colorful with clear concise language.

**KW420 TROPICAL FISH**, by Dr. Herbert R. Axelrod. A basic manual for the beginning enthusiast. Instructively illustrated and includes many brilliant color photos.

**KW428 TROPICAL FROGS**, by Helmut Zimmerman. A manual for keeping and breeding tree frogs and the colorful poison arrow frogs. Brilliantly illustrated with many color photos.

These and many more KW titles are available at pet shops. When ordering from publisher, please enclose 50 cents for each book for postage and handling.

**T.F.H. PUBLICATIONS, INC.**  
P.O. Box 427 • Neptune, N.J. 07753



Freshwater shrimp are found in streams and rivers of nearly every continent. This is a European species. Photo by J. Elias.

necessary for their health. This seems true of the ghost shrimp also, though they seldom eat it immediately. They allow it to decay for a day or two and then feed on it.

Ghost shrimp (*Palaemonetes* species) have been found almost everywhere in the United States and Canada; they are especially abundant in the southeastern part of the United States. In Georgia and Florida one does not have to hunt very far from home to find them in swamps, ditches and shallow lakes.

When I set out to study ghost shrimp, I set up a small tank especially for them. My study tank

was thickly planted with anacharis and corkscrew val. Unlike my crayfish, the shrimp in no way molested the plants. I placed six shrimp in the tank and let them settle down. They did so in a few minutes.

One facet of their behavior became apparent immediately. When released, they seemed to vanish without a trace. At first I was alarmed; one or two I could understand, but all six? I checked the bag, afraid they had been caught in the corners as the water rushed out—no shrimp. Puzzled, I searched the tank and soon found

them all hiding among the plants.

In a day or so they became bolder and did not dash away when I appeared. But whenever I did something to alarm them, they jumped and vanished into the plant thickets. So in one other respect they deserve the name ghost shrimp.

As for keeping them with fish, be very careful. The ghost shrimp does not possess the tough armor or weaponry of its cousin the crayfish. Animals such as these form the basic diet, particularly when young, for many fishes in the wild. Tank raised fishes retain their hunting instincts and regard most smaller animals as food. Never attempt to keep ghost shrimp with any fishes considerably larger than themselves.

From my experience and that of my customers, I have learned that ghost shrimp will do well with platies, guppies and small barbs, and small characoid fishes. Most fishes in that size range will leave an adult shrimp alone. Most scavengers simply ignore them. My scavenger collection consists of *Corydoras* species, porthole cats and some spotted weatherfish. None bother the shrimp I keep in that tank.

Of course there are many fishes with which ghost shrimp cannot be kept. Among these are large gouramis, angelfish, large barbs, and bettas. Large blue gouramis are very fond of shrimp cocktail, without the hot sauce, of course! I know of no cichlids that will pass up the ghost shrimp as an item of food.

When adding ghost shrimp to a tank, use the same common sense

that you would with new fish. If you think the fishes are too large for the shrimp, try another tank containing smaller fishes. When in doubt, don't put the shrimp in the tank.

For some reason my shrimp have not bred for me, although they do so quite freely in captivity. Ironically, the only place I have seen them breed is in the holding tank at our store. At least one of my customers has set up a special shrimp tank and raises a good number of shrimp.

Sex differences are not obvious until the eggs begin to ripen in the female. No one with whom I have spoken has actually seen the shrimp mate. The ovaries are in the female's thorax, which is the middle segment of the body. When eggs begin to enlarge a green mass is visible in the thorax. At a certain stage in their development the eggs are transferred via the oviduct to the underside of the female's abdomen. This process I have observed. The female curls up so as to bring the underside of her abdomen beneath the oviduct. The eggs are held by the swimmerets, appearing at first as tiny green specks. When the eggs reach the size of pinheads they hatch and the young remain attached to the swimmerets for a few days. As many as 60 young are produced at a time.

For the first week or so, the young are virtually invisible. However, they grow rapidly, drifting about in an inverted position and feeding at first on infusoria. They are soon able to take larger foods. My friend feeds his baby shrimp very finely ground flake food mixed with water to form a paste. Young

shrimp gather around lumps of this paste at feeding time, swimming head down and looking very little like shrimp.

As the young shrimp pass from the larval stage they assume a more horizontal position. As they grow, they shed their exoskeletons many times. Like crayfish, they often consume their old exoskeletons for the calcium content. Because of their transparency and small size, the empty shells are nearly impossible for the aquarist to find.



This Hawaiian freshwater shrimp was photographed by Henry Ullman. It is not as transparent as the ghost shrimp, but its size and feeding and breeding habits are about the same.

The parents don't seem to have any tendency toward cannibalism. I have seen full grown shrimp feeding side by side with young shrimp one fourth their size. No trouble came of it; they all foraged together, their combined motions forming a bizarre yet beautiful ballet.

One customer has found a way to put the ghost shrimp to work. This person raises a large number of livebearers, such as guppies,

platies and swordtails. For scavengers in his 'baby' tanks he has tried both snails and *Corydoras* species. The *Corydoras* he found efficient but not "terribly interesting." The snails soon outnumbered the fish one million to one—or was it one billion to one! So he tried ghost shrimp. It seems to have worked out well; they do a good job scavenging and seem to have no interest in the young livebearers.

Ghost shrimp make a fascinating study subject for the budding young

naturalist, as well as an interesting sideline for the most advanced aquarist. They are an excellent choice for people who wish to keep something different. With their ghostly appearance and their ability to vanish into any available cover, they well deserve the name "ghost shrimp."

By the way, should you begin to bear things go 'bump' in the middle of the night, forget it. That is one thing ghost shrimp don't do!

## The Better Alternative

Nutrafin Flake Foods contain the essential ingredients and nutritional values required by tropical fish. The quality of Nutrafin Flakes assure long and healthy life. Nutrafin Flakes are readily accepted by tropical fish. Nutrafin Flakes float longer and will not cloud water if used according to instructions. Nutrafin Flakes are packaged fresh in foil-sealed and reclosable containers that allow controlled feeding. Nutrafin Foods give you more.

Compare the value by size and price



The Better Alternative



This is *Symphysodon sequifasciata axelrodi*. It differs from *S. discus* in its stripe pattern. *S. discus* has, in addition to the eye bar and posterior bar, one heavy bar across the middle of the body rather than the numerous bars seen on this one. Photo by G. Marcuse.

### Notes on Discus

## From Silks to SYMPHYSODON

by Jack H. Wattlely

A recent business trip took me to Thailand to purchase silks and Thai cottons for our clothing store in Fort Lauderdale.

I flew via Frankfurt, West Germany, where I spent three very enjoyable days with my good friend, Dr. Eduard Schmidt-Focke, and his family. He showed me his discus room, as well as those of other

discus breeders in the Frankfurt area.

Generally, the Germans I saw are keeping and raising discus in about the same manner as we are in the U.S.A. The only noticeable difference I was able to see was the fact that their tanks were kept somewhat cleaner than ours, but they weren't having any better suc-

cess with their discus. At a later date I'll write more about my visits with Dr. Schmidt-Focke, an extremely kind and dedicated tropical fish enthusiast, who is perhaps one of the most knowledgeable fish breeders in the world.

On to Thailand via Lufthansa Airlines. I had several good discus contacts in my possession, thanks to Carl Zinn, a tropical fish importer-exporter in Miami who knows Bangkok like he knows the back of his hand, and to my long time friend, Virat, of White Crane Aquarium in Bangkok, who came to my aid quickly as soon as I phoned him from my hotel.

Most of the Bangkok discus breeders are of Chinese origin. They are not too selective in trying to maintain the different strains of discus pure. I saw heckels crossed with brown discus and half blues paired with browns—the result being a hodge-podge of color variations.

The so-called Oriental red discus had its birthplace in Bangkok. The breeders feed brown discus the bright orange eggs taken from live *Macrobrachium* shrimp, and after approximately two weeks the discus take on a fairly bright terracotta red color. Needless to say, the red coloring holds up only as long as the shrimp eggs are fed to the fish.

If one wants to go a step further, a medicated treatment of testosterone hormones will bring out the blue coloring in any discus; therefore, a diet of the orange shrimp eggs, plus the hormone treatment, will give the hobbyist a blue-faced red discus, compliments of Bang-

kok, Thailand. In my opinion these artificially colored discus are not worth the high price they command.

As has been reported in past T.F.H. articles, discus breeders in Bangkok feed their fish both live red tubifex worms and mosquito larvae. Large daily water changes are made, but no filters are in evidence, and the weak amount of air from the airstones seemed of no benefit.

After Bangkok, a quick trip to Malaysia (via Thai Airways) was made to purchase more fabrics—this time, cotton batiks. Discus are raised successfully in Malaysia; no doubt the most successful breeder is Wong Chong Moh. We two had several discus gab fests, and upon parting he asked me to try to obtain some true *Symphysodon discus* heckels. But shipping discus from Miami to Malaysia successfully would be most difficult, so I arranged for my friend Heiko Bleher in West Germany to ship some of his heckels from Frankfurt direct to Singapore, where Wong Chong Moh received them in good condition.

Discus breeding in Malaysia is done more or less as in Thailand, except that by government regulation no mosquito larvae are available.

Reflecting on the principle difference between breeding in Thailand and here in the U.S.A., I would have to say that we certainly try to breed for quality of color, whereas the Thai breed mainly for volume, not concerning themselves with the purity of different strains.



# RARE and WELL DONE

## Hawaiian Shellers

At long last, Dr. E. Alison Kay's *Hawaiian Marine Shells* is finally available. Although Hawaii probably has more active divers and shellers than any other state except Florida, it has long needed a truly comprehensive book allowing ready identification of its molluscan treasures. This 654-page volume briefly describes and illustrates all Hawaiian molluscs. A quick count shows about 48 new species described here, including a new olive. As many of the species and most of the genera occur elsewhere in the western Pacific, the work is usable far beyond the shores of Hawaii and is sure to become a truly standard reference for conchologists and malacologists. Dr. Kay and the Bishop Museum are to be roundly congratulated for the patience and persistence resulting in this excellent volume. Available for about \$30 from your favorite shell dealer or from the Bernice P. Bishop Museum Press, Honolulu, Hawaii.



A living *Tritonidomus roblardi* with siphon out. Photo by Scott Johnson.

## Cortez Creatures

Alex Kerstitch, whose many excellent photos of marine life have appeared in *T.F.H. Magazine* and in many *T.F.H.* books, has coshored with D.A. Thomson and L. T. Findley the recently published *Reef Fishes of the Sea of Cortez*. The book, published by John Wiley & Sons, Inc., 1979, contains 302 pages of vital information on habitats, communities, families and species found in the Gulf of California (formerly known as the Sea of Cortez) and sells for \$34.50.



*Coraliferellus micropus*. Photo by Alex Kerstitch.

## Two New Atlantic Species

Two new *Anthias* species, *A. woodii* and *A. menziesi*, were recently described by W.D. Anderson, Jr. and P.C. Heemstra (Copeia 1980 (1), pp. 72-87). Both species are deepwater fishes, the first ranging off So. Carolina southward to Florida and the Dry Tortugas and the latter ranging from northeastern Brazil southward to Uruguay. These fishes closely resemble their more colorful Indo-Pacific cousins in body and fin shape, including the extremely lunate caudal fin.



An Indo-Pacific *Anthias*. Photo by Dr. Herbert R. Axelrod.

## No Longer Unknown

Ivan Sazina, a biologist at the Universidad Estadual de Campinas in Sao Paulo, Brazil, has recently documented many facts about the feeding and breeding of two species of a little-known family of characids, the parodontids (Copeia, 1980, 1, pp. 167-169). These bottom-dwelling characoids have strong pectoral and pelvic fins and an underslung mouth. They are found in swift streams and may be the ecological analogs of our own native darters.



*Parodon panglossi*. Photo by Dr. Herbert R. Axelrod.

## Salts from the Seven Seas

# The Rainbow Wrasse THALASSOMA LUCASANUM

by James Lee Church

This past summer I had the happy opportunity to participate in a six-week course in marine ecology. It was a field course offered through the University of Arizona and taught by Donald A. Thomson, Ph.D. The area studied was the Gulf of California. The course took in varying marine environments from Puerto Penasco on the northern coast down to Cabo San Lucas at the tip of Baja.

One of the interesting fish species I had the chance to observe during this time was a little beauty called the rainbow wrasse, *Thalassoma lucasanum*. These fish are common from the central portion of the Gulf of California south to Panama. They are usually found in rocky areas offering holes in which they hide from danger.

This wrasse is brightly colored, with a yellow body set off by two

*Thalassoma lucasanum* is commonly known as the rainbow wrasse. It is one of many different kinds of cleaner wrasses. Photo by Aaron Norman.



*Thalassoma bifasciatum* is another wrasse in which there are two kinds of males. The secondary male is known as the bluehead wrasse (center). The secondary male is surrounded by an assortment of females and primary males, all of which look alike. Photo by Dr. Patrick L. Colin.

red stripes. The first of these is on the dorsal surface of the fish and extends the length of the fish and into the dorsal fin. The second stripe passes through the eye and the top of the caudal peduncle, terminating in the upper portion of the caudal fin. Both females and primary males are colored in this way and show little if any sexual dimorphism.

One of the things that makes this fish so interesting, however, is the ability of the females to undergo a sex change, developing into a male capable of reproduction. Not only does she change sex, but coloration and marking as well. In fact, for years these sex-changed males were thought to be in a separate

species! The females and primary males are less than six inches in length, while these secondary males may reach eight to ten inches.

As the change from female to male progresses, the fish turns an overall blue-tinted-purple except for a bright yellow saddle behind the head which extends through the body, including the base of the pectoral and ventral fins.

The primary males do not hold territory. They school with the females and cruise along the bottom in search of food. Sometimes they act as cleaners for larger varieties of fish.

Females and primary males are group spawners during this phase.

Spawings usually take place at or shortly after high tide so that the fertilized eggs will be carried out to open water to develop. It appears that many of the females in the group reach spawning readiness simultaneously. Spawning occurs when the school begins to swim in a mass over an area. The females begin releasing their eggs, and the males dart among them spreading sperm into the water. Such group spawnings increase the number of possible fertilization combinations, thus encouraging more variability in the offspring, which is a plus factor for species survival.

Secondary males, on the other hand, occupy specific territories which they defend against each other, primary males and any other fishes which they perceive as competitors. The existence of these secondary males indicates a plentiful supply of food in the area since size seems to be one of the factors controlling sex reversal.

These males spawn by displaying before any female entering their area. If the female is ready to spawn, she is often herded into the

center of the male's territory where spawning takes place. Here again the eggs and sperm are released into the water and allowed to be carried away. When the female has been depleted of ripe eggs she is usually chased out of the area and the male seeks a new mate.

By undergoing this sex reversal, these fish have practically doubled their choice of mates. After group spawning with the males in the area for the first part of their life, they are now able to mix their genes with the female population as well.

To the best of my knowledge, it has yet to be determined if all the females are capable of making this change of gender. Detailed chromosome studies would probably be needed to answer this question. It may be of interest to point out that these are not the only fish to adopt this or similar life styles. It is thought that some species of large groupers begin life as females only to undergo a sex change at some point.

*Thalassoma lucasanum* would probably make an excellent fish for

#### A MAJOR BREAKTHROUGH IN THE SALT WATER HOBBY RILA NITRITE-NITROGEN TEST KIT

- A SIMPLE, ACCURATE TEST TO DETERMINE NITRITE LEVELS OF AQUARIUM WATER.
- TESTS ARE EASILY, RAPIDLY & ECONOMICALLY PERFORMED.
- REGULAR TESTING WILL ALERT THE HOBBYIST TO ANY CHANGE IN NITRITE LEVELS & THIS AID IN PREVENTING TOXIC CONDITIONS FROM OCCURRING.
- REAGENTS CARRY THE MANUFACTURER'S LIFETIME GUARANTEE FOR STABILITY & ACCURACY.
- COMPLETE PLASTIC PACKAGING FOR DURABILITY & EASE OF USE.
- AN ESSENTIAL ITEM FOR EVERY SALT WATER HOBBYIST.

FREE BROCHURE! "BASIC CHEMISTRY OF THE SALT WATER AQUARIUM." Ask your dealer today or write for complete Product Information Bulletin and FREE Brochure. Please include \$1.

RILA PRODUCTS P.O. Box 114-TN Teaneck, N. J. 07666



M-513 GARDEN POOLS, by Paul Stetson. For hobbyists who want to expand their hobby to the outdoors. 46 black and white photos and 22 color photos. \$2.00



H-947 KOI OF THE WORLD, by Dr. Herbert R. Axelrod. The bible for identification of scale and color patterns. 22 black and white photos and 327 color photos. \$30.99



H-929 ENCYCLOPEDIA OF WATER PLANTS, by Jiri Stodola. A virtual catalog of aquarium plants with ecological information on each species, their care and propagation. \$6.95



H-909 GOLDFISH AND KOI IN YOUR HOME, by Dr. Herbert R. Axelrod and William Vorderwinkler. Complete data on care, feeding and diseases. 91 black and white photos and 125 color photos. \$9.95



H-919 GOLDFISH POOLS, WATER LILIES AND TROPICAL FISHES, by Dr. G.I. Thomas, Jr. Covers planning and building pools, care and propagation of water lilies and pond fishes. \$12.95



H-944 THE ENCYCLOPEDIA OF THE WATER LILY, by Charles O. Masters. Everything you want to know about water lilies including ecology and cultivation. 54 color photos. \$30.00



PS-659 KOI, by Glen Y. Takeshita. Covers the basics and the fine points of care, breeding and rearing. Many color photos showing varieties. \$2.95

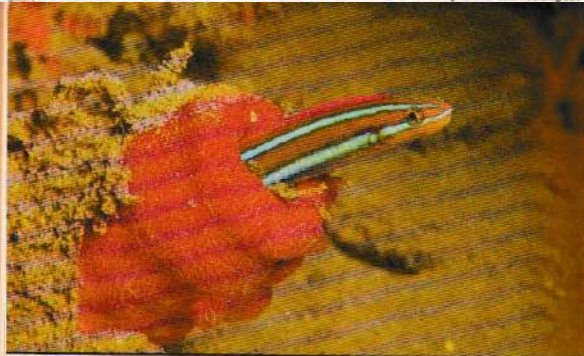


M-504 STARTING RIGHT WITH GOLDFISH, by Robert Gannon. The basics of care, breeding and rearing the young. Good book for beginners. \$1.79



PS-662 AQUARIUM PLANTS, by Gerhard Brunner. Descriptions of plants and complete instructions on cultivation. Covers relationships between fish and plants. \$6.95

Available at your local pet shop at these suggested prices. If ordering from the publisher, please add \$ 5.00 for postage and handling (\$1.00 for outside the U.S.A.). T.F.H. Books, P.O. Box 477, Neptune, N.J. 07753.



The sabretooth blenny is a predatory fish that mimics the rainbow wrasse in both appearance and behavior, but it attacks the fish it appears to be cleaning. Photo by A. Power.

the saltwater aquarium. The females and the primary males are not aggressive toward other species, they are not easily frightened and they spend much of their time swimming in the open. They seem to feed on small invertebrates which they pick up from the rocks and whatever organisms they find on the fish they clean. I would expect any such pollock feeder to adapt well to the usual aquarium fare.

Keep their water temperature around 75°F and provide good aeration. If given a large tank to themselves this might be one of the marines that could be coaxed into spawning, though the chance of raising the offspring seems pretty slim.

A word of warning to prospective purchasers of this fish. They have a mimic which is often found with them. The mimic, *Plagiotremus*

*rhinorhynchus*, is commonly known as the sabretooth blenny, and in spite of its size of about four inches, it certainly lives up to its name. Although it has almost the same color pattern as the rainbow wrasse, it can be distinguished by body shape and by the typical blenny head shape. If you get one of these in your tank, you may be in for trouble. In the wild these fish often join a group of wrasses involved in cleaning some large fish. They make their way to some area of soft tissue of the large fish, and then, CHOMP! They bite off a mouthful and dodge away. Although they are small fish, they are not timid. And I can tell you from first-hand experience that they are not above sampling a mouthful of passing diver if given the opportunity. Any unsuspecting fish in your aquarium would probably not be passed up either.

## Amphibians

# Spawning the Smooth Newt

by Sorin Damian

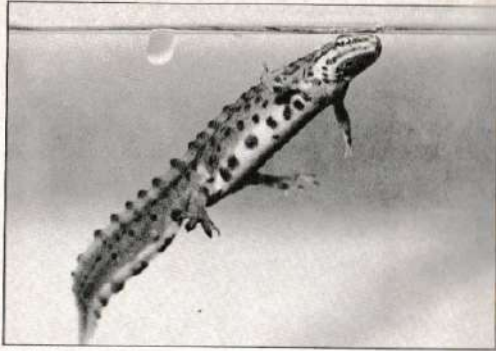
The common newt, *Triturus vulgaris*, is a tailed amphibian that lives alternately on land and in water, its biotope being the same as that of *Triturus cristatus*. *Triturus vulgaris* attains a maximum length of four to four-and-one-half inches, thus it is one of the smallest newts. During the reproductive period *T. vulgaris* is colored quite attractively. The back is brown with dark round dots which are larger on the male than they are on the female.

Sexual differences are very clear during the breeding season. The male develops a wavy dorsal crest

that runs from just behind the head almost to the end of the tail. The laterally flattened tail has on the lower side an orange band and above that a blue one. The belly has rounded black dots and an orange color. Finally, during the breeding season, the cloacal area of the male becomes greatly swollen. The female lacks the dorsal crest and does not develop a swollen cloaca. Any time other than during the spring breeding season the sexes are much more difficult to determine, for the brilliant colors of the male revert to a duller pattern similar to

The female smooth newt does not develop a dorsal crest during the breeding season. Photo by the author.





A male *Triturus vulgaris*, clearly showing the wavy dorsal crest. Photo by G. Marcuse.



**Segrest Farms**

P.O. Box 1027 • BRADENTON, FLORIDA 33506

**IF YOU EXPECT A  
SINCERE EFFORT TO  
DELIVER THE BEST FISH  
AVAILABLE, YOU'RE  
LOOKING FOR US.**

Dealers only, write on your letterhead.  
**813-722-1756**

FRESHWATER • SALTWATER • EXOTIC PLANTS

48

Tropical Fish Hobbyist

# The Tetra Aquarium Digest International

Full color with articles of interest to every hobbyist!



You may subscribe to A.D.I. for one or two years:

1 year (4 issues) \$6.00     2 years (8 issues) \$10.50

And, you may also obtain back issues of A.D.I.

\$ .50 each	#1 _____	#2 _____	#3 _____	\$1.00 each	#12 _____	#13 _____	#14 _____
	#4 _____	#5 _____	#6 _____		#15 _____	#16 _____	#17 _____
	#7 _____	#8 _____	#9 _____		#18 _____	#19 _____	#20 _____
	#10 _____	#11 _____		\$1.50 each	#21 _____	#22 _____	#23 _____

Special A.D.I. Binders (New 1 1/2" Size) \$7.99 each

To order: (1) Subscribers: Check "1 year" or "2 years" above. (2) Back issues: Indicate quantity by the issue numbers listed above. (3) A.D.I. Binders: Indicate quantity in space above. (4) Fill in your name and address.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

(5) Send your check or money order, made out to Tetra Press, to: Tetra Press, c/o Tetra Sales (U.S.A.), 201 Tabor Road, Morris Plains, N.J. 07950. Please enclose \$ .50 for handling, if your order is less than \$5.00 for back issues. Offer available in continental U.S. only. Prices effective 3/1/80



A young *Triturus vulgaris* with three pairs of gill branchia around the head. At this advanced larval stage the forelegs are well developed and the newt will soon begin to metamorphose into an adult by gradually absorbing the gill branchia. Photo by the author.

that of the female, the dorsal crest disappears and the swollen cloaca recedes. The only real clues as to which newt is which sex is, as mentioned above, the larger black dots on the male, but this, too, may sometimes be obscure.

This newt species is also known in Europe as the common newt, and it is indeed the most common newt in Central Europe. It lives in biotopes such as grasslands and forests, and it is found at elevations as high as 3,000 feet above sea level. It doesn't wander far away from water, because in the early spring it must come back to water to reproduce. Spring, therefore, is the optimum time for catching the common or smooth newt.

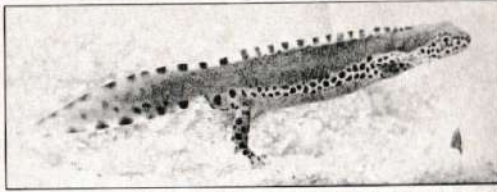
The smooth newt can be collected in small forest swamps having clear water or in temporary waters that remain after the melting of snow or after a heavy rainfall. From summer through late autumn they can be found on humid ground under rocks and fallen trees. On the ground they are nocturnally active. In water they tend to be a bit more diurnal.

In the aquarium the smooth newt is a very greedy eater, devouring *Daphnia*, *Bosmina*, *Cyclops*, tubifex worms, chironomid larvae, aquatic insect larvae, tadpoles and even their own young.

On dry land their movement is difficult, giving the impression that they are not strong enough to move. However, in the water they move about freely, because there they can control their buoyancy. Swimming is effected by a lateral undulation of the tail.

In the aquarium the smooth newt

51



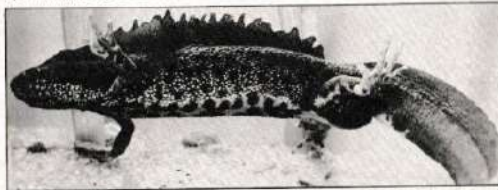
The dorsal crest on *Triturus alpestris* is not ragged along the edge as it is in *T. vulgaris* and *T. cristatus*. Photo by G. Marcuse.

lives amicably with fishes that are just a bit too large for it to swallow. These newts are so adaptable that they are indifferent to the hardness and pH of the water, as long as these don't attain extreme values. It thrives at water temperatures from 45 to 85°F. Recommended plants to keep in its aquarium are *Vallisneria*, *Potamogeton* and *Ceratopteris*. These same plants can be used in the breeding tank because they have narrow leaves that can be folded by the female with her posterior legs in the act of egg deposition. The intensity of light and the substrate composition

in the aquarium are of no consequence.

Breeding takes place in early spring, which is why it is best to catch them in February or March when the temperature is under 45°F. Immediately after catching them the sexes must be separated, and they should be fed mostly with live food. Shortly after putting them into the breeding tank they begin the mating rituals. The male sits on the bottom of the tank at a right angle to the female and in front of her, making waving movements with his curved tail. This apparently stimulates the female into

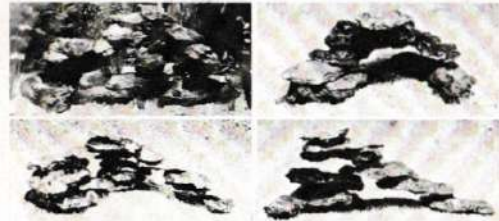
The crested newt, *Triturus cristatus*, has the largest dorsal crest of all of the *Triturus* species. Photo by G. Marcuse.



## Create your own natural wonders with Lok-Rocks™



### Snap-Together Decorative "Rocks"



It's fantastic. An instant adventure playground for tropical fish and small animals. With Lok-Rocks, hobbyists can instantly create a fantasy world of coves, caves, craggy peaks, bridges, ledges, and enchanted grottos. Rugged realistic Lok-Rocks, more versatile and more manageable than real rocks, snap together instantly and firmly to form any number of imaginative formations.

Lok-Rocks are easy-to-handle, super sturdy and super durable. They don't chip. They stay in place and they're fun to arrange and rearrange. Lok-Rocks are a great value and great fun.

Penn-Flax Plastics, Inc., 720 Stewart Avenue,  
Garden City, New York 11530



A developing *T. vulgaris* embryo curled up in its egg. Photo by the author.



A one-month-old larva with the rear legs almost completely developed. Photo by the author.

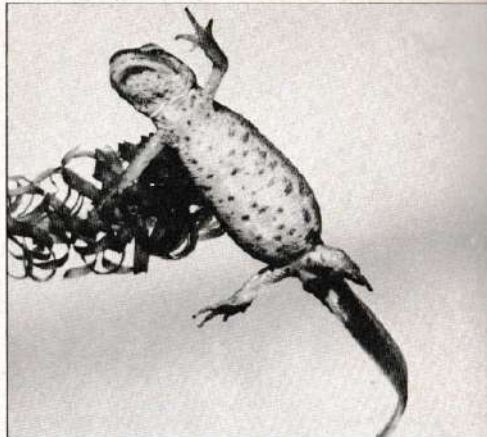
An unsexed young adult smooth newt just after completing its metamorphosis. Photo by the author.



Newly hatched larval newts hang on leaves or the glass sides of the aquarium for a few days before beginning to feed. Photo by the author.

After losing their gills, young adult newts spend most of their time resting on the top of floating plant leaves. Photo by the author.





This female smooth newt is nearly ready to spawn as indicated by the abdomen swollen with ripe eggs. Photo by L.E. Perkins.

following him to the breeding site. The male deposits sperm from his enlarged cloaca onto the bottom substrate. The female then picks up the sperm in her cloaca. From this moment the male has finished his role in the spawning and should be removed from the aquarium.

After a few days the female folds a leaf with the help of her hind legs. Inside the cup of the folded leaf she deposits one egg at a time. The total number of eggs deposited can be as high as 100, but many of them get eaten by the hungry female. The unfertilized eggs are white, while the fertilized eggs are transparent.

After five to six days, developing embryos can be seen curled up inside the eggs. After another few days the eggs hatch. The larvae have three pairs of gill branchia around the head and are approximately 3/8ths of an inch long. At this stage they cling to the aquarium walls. After a few more days they become free-swimming, and then they begin to feed on the nauplii of *Daphnia* and *Cyclops* and later on microworms, grindal worms and chopped tubifex worms. The larvae have a long dorsal growth and a pointed tail.

In nature, metamorphosis of the larvae into adults is usually com-

**New! POWER PADS! New!**



- **Superior Filtration** — removes tiny particles.
- **Economical** — lasts up to 6 times longer than other filtering materials.
- **Perfect Snug Fit Every Time** — bulk pads may be cut to fit.

- **Use in Saltwater Aquariums** — to seed new tanks with bacterial population built up in **Dirt•Magnet® Power Pad**.
- **Breaks Waste and Toxic Ammonia** — by bacterial and protozoan action.
- **Time-Tested** — works on same principle as world famous **Dirt•Magnet®**.
- **Use in Freshwater Aquariums** — with Jungle Charcoal or Ammonia Sorb for water clear as mountain air.

Available in a full range of sizes, pre-cut to fit most popular filters. Also available in bulk sizes to fit almost any filter.

Ask for it by name  
**DIRT MAGNET® POWER PADS**  
by Jungle

the  
**VERY**  
best



Available at all leading Distributors,  
Dealers, Aquarium and Pet Shops  
Throughout the Free World.

LABORATORIES CORPORATION

P.O. Box 2018 • Sanford, FL 32771 • (305) 322-8313



*Triturus alpestris* (male) showing its breeding colors, dorsal crest and swollen cloaca. Photo by S. Frank.

This is the marbled newt, *Triturus marmoratus*. It is closely related to *T. vulgaris* but is not as widely distributed, being found only in France, Spain and Portugal. *Triturus vulgaris* is found all over central Europe. Photo by J.K. Langhammer.



A ventral view of the crested newt, *T. cristatus*. This species secretes a mild poison from the skin when it is under stress.

pleted by late July or early August. The adults then climb out of the water for the first time. However, because the temperature of the water in my aquarium was warmer than it usually is in nature (the tank temperature was about 72°F), my newts completed their metamorphosis and attempted to leave the water in May rather than July or August. By the middle of May 96% of my newts were fully transformed adults. Fourteen individuals retained their gill branchia for a while longer, making me believe that these were permanent neotenus forms. However, by the end of June these newts had also lost their gill branchia.

After spawning, males gradually lose their dorsal crest and then, once again, attempt to leave the water. By lowering the water level and tightly covering the aquarium, these newts can sometimes be kept in water indefinitely. There they will shed their skin periodically. If they still attempt to leave the water, which they may or may not do, it is better to put them into a terrarium containing humid soil and pieces of tree bark. During the winter their hibernation can take place either in cool aquarium water or in a cool, moist terrarium. During this period they should not be fed.

European newts are occasionally exported to the U.S.A. and sold in pet shops. Because they are simple to keep and breed, I recommend that all aquarists with an interest in herpetology seek them out. They will add a pleasing new aspect to your aquarium hobby interests.

# THAT FISH PLACE

237 Centerville Rd., Lancaster, PA 17603 Ichthyologist present at all times to answer your questions... just one of our many services  
Tel.: 1-717-299-5891  
OVER 600 TANKS OF SALT & TROPICAL FISH

**WORLD'S LARGEST QUALITY DISCOUNT AQUARIUM**  
**WHY PAY RETAIL?**

We have in stock at all times: Aqua Stock Hawaiian Marine Products, Jungle, Kordon, Eheim, Metaframe, Nektos, Penn-Plax, Silent Giant, Supreme, Tetra Min, Vortex, Warley's, T.F.H. Books, Mardel, Merician, Aquology, Perfecto, San Francisco Bay Brand and San Francisco Seamester.

## All Brand New Merchandise!

Here are just some of our everyday low prices:

<b>METAFRAME</b> Heater 8" 25, 75, 100 Watts \$3.75 ea. Dynaflow 150 Filter, \$11.95 Dynaflow 150 Deluxe, \$19.95	<b>AQUOLOGY</b> Power Plus 600, \$53.95 Power One, \$17.99 Power Master, \$32.95 Pro Model 606, \$45.95 Power Head 200, \$15.95 Power Head 400, \$19.25	<b>WHISPER PUMPS</b> 100, \$4.95, 200, \$5.25, 300, \$3.95, 400, \$7.19, 500, \$8.95, 600, \$11.50, 700, \$14.95, 800, \$20.95, 1000, \$26.95
<b>SILENT GIANT PUMP:</b> Price now \$16.90	<b>TETRA MIN</b> 2 Oz. Staple Food, \$2.99 2 Oz. Large Flake, \$3.19 6 Oz. Large Flake, \$8.25 6 Oz. Staple Food, \$6.95 32 Oz. Staple Food, \$31.99 5 lb. Special Mix Large Flake, \$26.95 7 1/2 lb. Special Mix Small Flake, \$43.95 7 1/2 lb. Plantneters, \$39.95 2 lb. Cichlid Food, \$23.95	<b>HAWAIIAN MARINE</b> 4-watt Sterilizer, \$49.95 8-watt Sterilizer, \$59.95 5 Gal. Mix, \$2.09, 10 gal. Mix, \$3.89; 25 gal. Mix, \$9.99; 100 Gal. Mix \$29.99; 150 Gal. Mix, \$39.95; 300 Gal. Mix, \$59.95
<b>JUNGLE LABS</b> 20 Oz. Fungus Stop, \$6.75 20 Oz. L'Algaecide, \$6.75 MollyBright 9 Oz., \$1.99 Plant Saver 3 Oz., \$1.99 Start Right 20 oz., \$4.25 Senior Diet Magnet, \$3.95 Junior Diet Magnet, \$2.95	<b>NEKTOS</b> Ultra Violet Sterilizer, \$40.00 Undergravel Filter, 10 gal., \$9.25; 1500 Nl gal., \$11.95 30 Long gal., \$15.65; 90 gal., \$13.29; 30 gal., \$13.29; 4055 gal., \$19.95; 75 gal., \$23.95; 100 gal., \$26.09; 120 gal., \$30.59	<b>KORDOMEHEIM</b> Mod Four (K-1400), \$78.95 Eheim, 20 l.b., \$79.99; 2021, \$106.99; 21214044R, \$159.95; 2022 4747, \$149.95; 2026 (408), \$209.95
<b>HAGEN Submerisable Heaters:</b> 8" 25, 50, 75 Watt, \$11.25 10" 75, 100 Watt, \$11.95 12" 100, 150 Watt, \$12.50 15" 150, 200 Watt, \$12.50	<b>SAN FRANCISCO BAY BRAND FOODS</b> 8 Oz. Staple Food, \$3.90 80 Gram Freeze Dried Brine Shrimp, \$8.75 4lb. Oz. Brine Shrimp Flakes, \$5.95 15 Oz. Brine Shrimp Eggs, \$29.95	<b>INSTANT OCEAN</b> 90 Gallon Salt Mix (Super Special), \$7.50 Large Hydrometer/Thermometer, \$5.95
<b>MARDEL LABS</b> Maracyn 8 tabs, \$1.75; 100 tabs, \$17.95 Maracyn II 8 tabs, \$1.85 100 tabs, \$19.95 Maracide: 1/4 Oz., \$1.19 Maracyn: 1 Oz., \$1.59 Tank Saver: 6 tabs, \$1.29	<b>PENN PLAX</b> XP980 Appurto, \$11.95 506 Ft. Airline Tubing, \$16.50 Aqua Nursery, \$5.39	<b>TRAP-A-LINE</b> 6", \$2.76; 12", \$3.49
<b>WARDLEY</b> 2 lb. Special Mix, \$25.95 64 gram Freeze Dried Cubifex, \$3.89 10 Oz. Shrimp Pellets, \$2.95	<b>WE ACCEPT BANK AMERICARD AND MASTERCHARGE</b> When sending order, enclose your card number, expiration date, name on card and your address. Do not send your card.	<b>VORTEX</b> Diston Filter, \$34.95 Diston Pro-400, \$69.95 Extra Large Diston, \$59.95

**WE ACCEPT BANK AMERICARD AND MASTERCHARGE**  
When sending order, enclose your card number, expiration date, name on card and your address. Do not send your card.

**PLEASE ALLOW TWO WEEKS TO PROCESS ORDERS PAID FOR BY PERSONAL CHECK.** Orders paid for by money orders and certified checks will be processed immediately. All orders are shipped through United Parcel Service, Postage Collect; no COD's on merchandise. Sorry—no COD's to Canada.

**PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.** Store hours: Monday to Thursday: 12:00 Noon to 7:00 P.M.; Friday: 12:00 Noon to 9:00 P.M.; Saturday: 10:00 A.M. to 9:00 P.M.; Sunday: 1:00 P.M. to 5:00 P.M.

Please send \$1.25 for our Complete Supply Catalog.

## Catfishes

# The Sturgeon Catfish

by Braz Walker

South America, birthplace of the fishes known as catfishes or Siluriformes, reflects the diversity to which the group has progressed, with a range of shapes, sizes and forms to almost defy the imagination. Not surprisingly, many of them have found their way into the aquarium, especially small, inoffensive and often handsome species belonging to the genus *Corydoras*, which to many aquarists comprise the mental imagery conjured up when the word "catfish" is mentioned. Aside from other attributes, they earn their keep by relentlessly rooting out scraps of food the other fishes might have missed. While these quaint and useful members of the family Callichthyidae seem to approach the epitome of aquarium desirability, there are other roles to fill in today's aquarium hobby. One of these roles in the modern aquarium is that of the large, predatory showpiece.

Some of the most beautiful catfishes in the world belong to the family Pimelodidae. Ranging from handsome little *Microglanis* species only a couple of inches long to monsters reputed to be man-eaters, Pimelodidae engross many models and styles, including several with almost unbelievably flattened heads, powerful tubular-shaped bodies and strong, forked tails for propulsion. These are among the sleekest and most efficient predators of the Amazon

river, and one of the most highly prized by those with the necessary facilities is the sturgeon catfish *Platystomatichthys sturio* (Kner, 1857).

Of all the shovel-nosed catfishes, the sturgeon catfish seems to have carried the flattened head and elongated snout trend to the limits of feasibility, almost, it seems, to the point of ridiculousness. Its entire evolutionary trend seems to have been toward the lengthening of existing features, including not only incredibly long barbels, but also elongated tail filaments which extend from the upper and lower lobes of the deeply forked caudal fin, stretching over half the length of the body. Even the dorsal spine is long and slender.

The generic name *Platystomatichthys* means "flat-mouthed fish" and could hardly be more appropriate. The head is rather narrow and is very depressed toward the front, with the snout projecting far beyond the lower jaw. The entire under surface of the snout is covered with teeth. The eyes are located superiorly or toward the upper surface of the head, and somehow there is a brightness or alertness about them that is unusual. Another fish that seems to project this same sensation, a fish that is difficult to describe, is the tiger catfish, *Pseudoplatystoma fasciatum*.

The species name *sturio* is

responsible for the popular name of the sturgeon catfish, since *sturio* is low Latin for "the sturgeon." The reference here is obviously to the sturgeon-like look of the fish.

The general color of the sturgeon catfish is a rather light brown, which can vary with lighting conditions, shading to silvery below. Several large black spots adorn the sides, and one is usually present at the base of the upper caudal lobe. The adipose or "fat fin," which is typically found on most catfishes, is somewhat longer than the base of the anal fin.

The maxillary or upper barbels, which are unbelievably long, especially in young fish only two or three inches in length (which sometimes have barbels over twice

this measure), are amazing in their dexterity. Since barbels are organs of taste and smell which are used in the location and identification of food and other objects, their usefulness would be limited without the ability to direct them to a given orientation. Because of the extreme length of the major pair in the case of the sturgeon catfish, it could conceivably present difficulties in extending them toward a given location if they were flimsy and overly flexible. This could be compared with attempting to poke a piece of cord toward an object eight or ten feet away. To facilitate accurate movement and placement of these investigatory appendages, more than half of the length of the barbels has become wiry and

The flattened snout of *Platystomatichthys sturio* is much more pointed than that of most other shovel-nosed catfishes. The unique shape of its snout very closely resembles that of a sturgeon, which is why the fish has come to be known as the sturgeon catfish. Photo by Dr. Herbert R. Axelrod.



The tiger catfish, *Pseudoplatystoma fasciatum*, is one of a number of pimelodid catfishes having an extremely flattened snout but the snout of this species as well as that of many other shovel-nosed or shovel-mouth catfishes is more or less squared off, whereas that of the sturgeon catfish is flat but almost pointed. Photo by K. Paysan.

Front view of a pimelodid catfish showing the typical elongated upper barbels.



ossified (bony). If I might be allowed another comparison, it would be like trying to cast a fly, first using only the fly and fly line, and then adding a flyrod to give the system some "backbone."

Small sturgeon catfish are sometimes rather emaciated when received by dealers, and because of their oddity and the infrequency of their availability, it is not often long before they are sold. Aside from readily apparent undernourishment, when first purchased they are relatively light-shy and do not respond well to immediate placement into an aquarium of active fishes, especially one containing frisky species that could simply not resist nipping at such long, animated and intriguingly worm-like appendages as the maxillary barbels of a young sturgeon catfish. Much better is a reasonably well-established smaller aquarium, rather dimly illuminated and equipped with root or two or a few rocks beneath which the fish can retire. Feeding should be at least in semi-darkness, and live food is preferable until the fish gains a bit of weight and enthusiasm. For small sturgeon catfish, baby guppies, tubifex or small earthworms are among the best foods to get them started on, although other small live foods, frozen brine shrimp and finely ground beef heart are also very good. It is, however, of primary importance not to leave uneaten food in the aquarium unless it is alive as in the case with guppies. It is beneficial to provide a bit of insurance against food accumulation in the form of retiring, inoffensive and relatively

non-competitive fishes such as a few coolie loaches or a couple of *Corydoras*. Once feeding is well established, brine shrimp, beef heart and other such animal fare should be acceptable without problems and the fish can be placed in a more normal aquarium situation.

Another thing to watch for with small, newly acquired sturgeon catfish is ich or other diseases that can develop because of weakness due to the stresses of capture and transport. Often, these stresses are more telling on the young of relatively large species such as this, since the very early stages when they are so often captured would ordinarily be periods of rapid growth and very high food intake. For the first few days, at least, a reasonably stable temperature in the upper seventies is needed to maintain strength and keep the possibility of disease at a minimum. There is at least one new water conditioner and probably several others that can tremendously reduce the shock and susceptibility to disease which fishes are subjected to at times of stress due to shipment, moving, etc.

Once well acclimated, *Platystomatichthys sturio* is easily maintained and will live for years in any aquarium where other shovel-nosed members of the clan would be suitable. Beef heart, chopped fish, earthworms and such are ideal for large specimens, which can easily reach a foot or two in length if well fed and provided with plenty of room. Sturgeon catfish, like other flatheaded pimelodids, also make excellent

## EXOTIC TROPICAL FISHES

H-907L—\$20

by Dr. Herbert R. Axelrod, Dr. Cliff W. Emswiler, Dr. Duncan Sclater, William Vorderwinkler, Neal Pronek, and Dr. Warren Burgess.

- **EASY TO USE**—the fish section is arranged in alphabetical order, so you don't have to know which family a fish belongs to in order to find it. Completely indexed, too, with both common and scientific names listed.
- **COMPREHENSIVE**—covers all significant areas of hobbyist interest: setting up, feeding, breeding, diseases, plants, fish behavior.
- **NEVER OUT OF DATE**—because it's a looseleaf volume, the basic looseleaf volume of *Exotic Tropical Fishes* is always ready to receive handy supplement pages containing information about new fishes and plants as they're discovered or developed or brought onto the aquarium market.



- **HIGHLY ILLUSTRATED**—contains almost 1000 photographs.
- **MAGNIFICENTLY COLORFUL**—contains over 700 full-color photos.
- **EASY TO READ**—a practical, easy-to-learn-from style is maintained throughout, with a minimum of scientific jargon used.

This immense book is the bedrock reference volume of the aquarium hobby. It contains four separate sections dealing with the major areas of aquarium interest: maintenance and management of aquaria (119 pages); plants and planting (86 pages); commercial breeding (45 pages); and the fish catalog/description section (640 pages) wherein individual species are shown—in color in almost every case—and discussed mainly from the standpoint of their interest to hobbyists: their scientific and common names, where they come from, what they eat, what kind of water they need, whether they're peaceful or aggressive, how they breed, how to recognize sexes, etc. The book is completely indexed, with both common and scientific names listed so that readers can find information about a fish without even knowing its scientific name. And of course the photos are useful for identification so that you don't have to know anything about a fish to find it in the book.

Apart from its tremendous usefulness as an all-in-one-book reference library to aquarium fishes and plants and their propagation, the Looseleaf Edition of *Exotic*

*Tropical Fishes* has an extra great built-in value and convenience to readers because of its capacity to be added to. Since it's a looseleaf book, readers can keep up to date by simply adding to their basic volume, because supplement books are issued regularly—each supplement book contains a minimum of 32 pages, most in full color, and pages are hole-punched and numbered for easy insertion into the basic volume.

The basic volume, of course, contains no supplement pages, but supplement pages are available at no extra cost to readers of *Tropical Fish Hobbyist* magazine, since *Tropical Fish Hobbyist* regularly carries supplements to *Exotic Tropical Fishes* as a bonus value to readers. Supplement pages also are available in handy supplement books issued regularly; these supplement books are available at pet shops everywhere at \$1.29 each. Supplement books and extra binders also can be purchased as money-saving supplement packages.

Available at pet shops everywhere. When ordering direct from the publisher, please add \$1.00 to cover the cost of postage and handling.

**T.F.H. Publications, Inc. (T.F.H.)**

P.O. Box 427 • Neptune, N.J. 07753



This sturgeon species is sometimes known as the sterlet. Compare its snout shape to that of the sturgeon catfish to see why the sturgeon catfish is so named. Photo by J. Kassanyi.

single-fish displays for a forty- or fifty-gallon aquarium. Under such conditions they need not be fed every day, since obesity is probably more detrimental than letting the fish fast occasionally. This is true of a number of large fishes that are kept singly.

For the collector of larger catfishes, or simply for the aquarist

who finds wonder in the diversity of nature's products, the sturgeon catfish, *Platystomatichthys sturio*, is a prize. Its range is throughout the Amazon basin, and perhaps we can look forward to increased availability of this unique siluriform whose barbels or whiskers put the rest of the catfishes in the "peach fuzz" class.

## Mail Call



by Marshall E. Ostrow

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

### No Thanks, Good Neighbor

**Q.** My neighbor has a goldfish pond in his yard which he keeps stocked all year round. Last spring his goldfish spawned and he offered me some of the babies. At the time I was not into fishkeeping and I had no accommodations for them. Thanks to this neighbor, I am now hooked on fishkeeping and already have two 20-gallon aquaria and an assortment of tropical fishes. My neighbor expects his goldfish to spawn again this spring and wants to give me some of the offspring. Is it safe to keep goldfish from a pond in an aquarium with store-bought tropical fishes?

**Jerry Goldstein**  
Moline, Illinois



In the temperate climatic belt goldfish spawnings usually occur around early to mid May. These newly hatched goldfish fry are only a few hours old. Photo by L.E. Perkins.

**A.** It is probably safe, but it certainly is not advisable. Goldfish, *Carassius auratus*, are coldwater fish, and they don't really fare well in water that is heated. On the contrary most tropical fishes don't fare well in water that is comfortably cool for goldfish.

### PLEASE

When writing to MAIL CALL, please do not combine your questions about the hobby with correspondence about subscription renewals, book orders, etc.

Matters related to subscriptions and other such topics are not handled by MAIL CALL, and combining them with MAIL CALL questions can only result in delay.



The name giant gourami implies that this is a very large fish. Actually mature breeders seldom exceed four inches in length, but the name expresses its size relative to the dwarf gourami, a two-inch fish. Photo by H. Hansen, Aquarium Berlin.

#### Chubby Gourami

**Q.** My breeder male giant gourami *Colisa fasciata*, recently died of dropsy. I have been told that dropsy is an incurable disease, so I didn't waste any time or money on chemicals. I would like to know if dropsy can be cured in fishes so that I will know what to do if it occurs in one of my other fishes.

**Pete Busch**  
Kenosha, Wisconsin

**A.** Dropsy is not really a disease per se; rather, it is a symptom of several different diseases, most of which are internal bacterial infections. The dropsical condition (swollen abdomen) is caused by an accumulation of fluid in the visceral cavity. If the fluid is clear the disease is probably not contagious. If it is a yellowish creamy color, the disease may be contagious. Unfortunately, only a post mortem examination can determine which type it is. If it is the latter, preventive antibiotic therapy is recommended for other fishes exposed to the diseased fish. Most dropsical conditions are not curable and some are not even preventable.

#### Youngstown Show

The Youngstown Area Tropical Fish Society's Whale of a Show, VI is being held June 20-22, 1980 at the Southern Park Mall, Rts. 7 and 224, Boardman, Ohio. For more information contact Show Chairman Dennis Price, 187 Brockway Ave., Youngstown, OH 44509 or call (216) 793-3759.

**Kenneth Colley**  
Ivor, Virginia

**A.** Your aquarium sounds perfect except for the temperature. Continuous exposure to temperatures in the high 80's or into 90's will shorten the lives of most



Prolonged, excessively warm water temperatures will shorten the lifespan of African cichlids such as this *pseudotropheus zebra*. Photo by G. Marcuse.

fishes considerably. This is also probably why they haven't yet bred. Slowly drop the temperature to about 78°F. and your cichlids will probably spawn within a week or two, if you have at least one of each sex.

#### Columbus Show

The Buckeye Aquarium Society 5th Annual All Species Show and Auction will be held on June 20, 21 and 22, at the Northland Mall, Columbus, Ohio. For more information contact George Kroupa, Show Chairman, 436 East Beck Street, Columbus, Ohio 43206.

### AFRICAN CICHLIDS — Our Specialty

Over 5,000 gallons of fresh water fish...4,000 gallons of HEALTHY AFRICAN CICHLIDS, from 1" to full grown adults...One of the largest selections of AFRICAN CICHLIDS in the country...We have more varieties of AFRICAN CICHLIDS on display in our store at any one time than any other retail or wholesale establishment. We use oxygen and double bag each fish to insure safe transportation for our many customers who travel a long distance to our store...Drop in, COMPARE PRICES...You will be glad you did. STORE PICKUP ONLY • NO SHIPPING

Hours: M-F 10am to 9pm Sat 10am to 5pm Sun 10am to 5pm

TANGANYIKAN FISHES NOW IN STOCK

*L. affenarius*, *L. brichardi*, *L. elongatus*, *L. savoyi*, *L. modestus*, *L. tetraodon*, *T. caenioides*, *Limnochromis macrolepis*, *Mastacembelus moorii*, *Speothodus marlieri*, *T. vittatus*, *O. nasutus*, *T. moorii*, *J. marlieri*, *J. regani*, *E. cyanostictus*.

Freehold Mall  
Route 8  
Freehold, N.J. 07728  
(201) 431-3210

pet gallery

OPEN 7  
DAYS

#### Fish Sauna

**Q.** I have a 30-gallon aquarium containing five 4½-inch-long red zebra cichlids and one black shark. I feed them frozen brine shrimp, beef heart and flake foods twice a day. The water was aged for five months before I purchased the fishes. It is hard and contains two teaspoons of ocean salt mix per gallon. The water has a pH of 8.5 and a temperature of 90 to 92°F. Every month I make a 25% water change. On the bottom of the tank I have 23 large rocks and some gravel. The tank is filtered with a strong power filter. Can you tell me if I have met all of the requirements of my fishes? I know the cichlids are mouth-brooders, so how do I get them to spawn?

### Instructional AQUARIST SUPPLY MANUAL



This authoritative reference for Aquarists of all levels has over 150 information laden pages featuring live food culture techniques, power filtration, medications, biological purification, ozonation, lighting and temperature control, trash and saltwater support systems. Profusely illustrated, loaded with technical data and problem solving charts. Durable waterproof vinyl binder with space to keep your manual up-to-date. Order yours today! Send \$3.00 postpaid (U.S.A.) Dealer Inquiries invited.

#### MASTER BREEDER PRODUCTS

416 Glenaby Road  
Tonawanda, N.Y. 14150

Daleco



Little is known of the spawning habits of the Chinese algae eater, although it is known that larger specimens are very territorial and defend their territory vigorously. Photo by M. Chvojka.

#### Rarely Spaweed

**Q.** To your knowledge has anyone ever successfully spawned the Chinese algae eater? If so, how was it done?

**Helen Mento**  
South Orange, New Jersey

**A.** The Chinese algae eater, *Gyrinocheilus aymonieri*, actually comes from Thailand, making it difficult to explain why it is called the Chinese algae eater. No information is available in any aquarium literature that we've ever seen on the breeding habits of this fish. We do know that this fish grows to a length of over 10 inches in nature. Since they are rarely if ever seen at that size in aquaria, it is understandable that they have not been bred in captivity, for probably no one has ever had a sexually mature pair. They may have some peculiar environmental requirements that are difficult to meet in the aquarium. If any readers know of anyone who has spawned this species, please let us know.

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

#### Unusual Swordtail

**Q.** I recently purchased six swordtail characins. They seem to be very hardy and peaceful in my community tank. I noticed some long paddle-like appendages on the pectoral fins of the fish I suspect are males. What are these appendages, what is their function and are they found only on males?

**Fred Blanchard**  
Seattle, Washington

**A.** You are indeed fortunate to be able to buy this unusual aquarium fish in your area, for it is rarely imported. It is hardy, peaceful, thrives in almost any reasonable aquarium environment and is not difficult to breed. It is hard to understand why this fish, scientifically known as *Corynopoma riisei*, has never become more popular.



The swordtail characin derives its common name from the extended rays of the lower portion of the male's caudal fin (upper fish). Photo by R. Zukal.

The paddle-like extensions are not on the pectoral fins but are attached to the gill plates (opercula). Their function is not really known, although it has been observed that they are spread out laterally when the fish is courting. The appendages are found on males only.

### Sanders BRINE SHRIMP EGGS

Now everyone can afford nature's finest fish food. If your local pet shop does not carry them yet, try our introductory offer:

Also available in 3 lb. 1 oz. (1.4 kg.) vacuum packed cans

3½ oz. (100 grams) vacuum packed in cans. \$5.00 each. Postpaid in U.S. or Canada. Send check or money order. (Also available in 2 lb. 14 oz. cans.)

70% minimum hatch guaranteed. Money back if not satisfied.

Sanders Brine Shrimp Co.  
1255 W. 4600 So.  
Ogden, Utah 84403

### AFRICAN CICHLIDS



"Marmalade Cat *Fuellstoppi*," a rare OB mottled male, is offered on our current list with 100 other species (breeder pairs and fry). Any interested hobbyist or dealer can get a free copy of our price list and an illustrated brochure on keeping and breeding African cichlids. For an immediate reply send us a business size (9" by 4") envelope; otherwise, allow 3 weeks. Call or write.

1979 NEVIN AND TOM BAILEY  
5151-I Santa Fe St., Dept. T  
San Diego CA 92109 714-270-1182

**LOUIS WASSERMAN**  
**INTERNATIONAL CHAMPION GUPPIES**

3 Times WORLD GUPPY CHAMPION — 3 times GUPPY MAN of the Year  
30 World Wide Color Class Championships, 29 Best of Shows  
625 1st Place International Trophies, 1950 Awards

TRUE-BREEDING STRAINS

\$35.00	trio Red, Blue, Green, Multi, or Gold Red Deltas
\$35.00	trio Red, Blue, Yellow, or Purple Snakekins
\$40.00	trio ½ Black Pastels, ½ Black Blues or ½ Black Gold Reds
\$45.00	trio ½ Black Reds or Black Orchids
\$55.00	trio Black Deltas

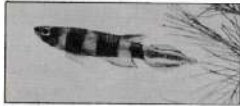
Peekskill Paste Foods — Liver, Fish or Spinach  
1 oz. \$1.19 — 2 oz. \$1.69 prepaid

GUPPY FANS: Get your autographed copy of *How to Raise Show Guppies*, by Lou Wasserman. \$4.95 plus \$5.00 for postage and handling. Guaranteed Live Delivery — Airmail — Special Delivery add \$4.95 for postage and handling.

Send check or money order to:

**LOUIS WASSERMAN**  
4650 S.W. 70th Terrace • Davie, Florida 33314  
Phone: (305) 792-2111 — By appointment only, no weekends.





The striking color pattern of the clown killie, *Epiplatys annulatus*, makes this fish unique among killifishes, for no other species has a color pattern resembling this one—not even congeners. Photo by E. Roloff.

#### Rare Clowns

**Q.** I have seen photos of the clown killie, *Epiplatys annulatus*, in the aquarium literature, and I am fascinated by this little fish. The only problem is, nobody sells them. Where does this fish come from and how can I obtain some?

**Robert Longstreet  
Springfield, Illinois**

**A.** The clown killie is one of the smallest of all killifishes known to the aquarium hobby, seldom exceeding 1½ inches in length. This fish is found in low-lying swampy areas near the tropical west coast of Africa, from Sierra Leone southward through Liberia.

Like most aquarium hobby killifishes, it is difficult to come by. The best way to find these or any other rarely seen killifishes is through a member of one of the killifish clubs such as the American Killifish Association or the British Killifish Association. The address of the AKA usually appears at the end of this column.

#### Marine Driftwood

**Q.** With reference to page 81 of your January, 1978 edition regarding the use of driftwood in an aquarium, would this treatment be okay for use in a saltwater tank? I have been told here that no wood should be included in a saltwater aquarium, as it turns the water acid. I have treated two pieces of driftwood, one from Phuket Island and the other from Baros Island (both islands being in the Maldives), in the manner your article recommended. However, I am still hesitant about placing them in my 55-gallon marine tank. Would you recommend it?

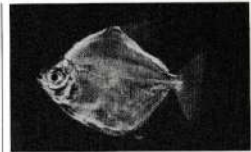
**Ian B. Walters  
Hong Kong**

**A.** We have no specific evidence to suggest that properly cleaned driftwood could be especially harmful to a marine aquarium. In theory, if cleaned properly, there should be nothing left in the wood to decompose and foul the water or to turn the water acid. However, in practice the story is often quite different than it is in theory, and because of the sensitive ecological balance in a typical marine aquarium, especially one as small as 55 gallons, we, ourselves, would shy away from using driftwood in a marine aquarium.

#### Vanishing Greens

**Q.** I have a community aquarium in which live plants mysteriously vanish. I find no traces of decomposing plant pieces, so I suspect that some of my fishes are the culprits. The tank contains two angelfish, three red swordtails and three small silver dollars. Which fish would be guilty of plant eating? How can I stop the guilty ones from eating my plants?

**Lynne Swanson  
Billings, Montana**



Silver dollars are avid plant eaters, and they should not be kept in aquaria containing expensive plants. Photo by H. Schultz.

**A.** There is little doubt that the silver dollars are the culprits, for they are known plant-eaters. The most obvious way to stop the plant eating is to replace your live plants with plastic replicas. If you don't like this idea, then try keeping only heavy-leaved plants such as Vallisneria, Sagittaria, etc. You might further retard the silver dollars' passion for your expensive plants by offering them some spinach or other soft greens that are less expensive than your aquarium plants. No matter which solution you choose, this species' need for greens must be met if the fish are to grow properly and remain healthy.

**Are you looking for Quality Discus?**  
Our hatchery offers beautiful, true-breeding tank-raised discus at reasonable prices with prompt delivery. Our discus are raised in hard alkaline water so they will adapt to any water conditions. We ship internationally rear (adult) fish are shipped in double insulated boxes to insure protection. We ship to extremely cold areas in special containers if needed. Fish arrive live and healthy. Guaranteed live delivery.

**DISCUS HAVEN**  
HOME OF THE ALBINO DISCUS

**TURQUOISE DISCUS**

**DISCUS HAVEN**  
13782 Llagas Ave.  
San Marin, CA 95046  
(408) 683-2474

Prices below are on Fifty Cent Size Discus

Columbian Blue	\$7.50
Powder Blue	\$7.50
Royal Blue	\$10.00
Ocellat Blue	\$10.00
Peruvian Green	\$13.00
Turquoise	\$13.00
Albino's Sibling	\$18.00

Mated pairs sometimes available. Fish will be shipped express mail or air mail special delivery, so please include \$8.00 for postage with your order. You will be notified of shipping date. Minimum order \$50.00.

Orders from outside USA shipped Air Freight Collect so include the name of your nearest international airport. Minimum order \$50.00, plus \$3.50 for base charges.

Send Cashier's Check or Money Order

Please call us if you need additional information

**SWEETWATER AQUARIUM SUPPLY COMPANY**  
362 Boylston St., Brookline, MA 02146  
(617) 232-0087

We feature the complete TFH book selection

The 1980 Sweetwater Aquarium & Pet Supply Catalogue  
All major aquarium equipment and parts; Ehren and parts; Beginners section; information for everyone.  
Pet supplies & DOGS.  
Catalogue in U.S. & Canada, \$3.00. Worldwide, \$5.00.

**FREE** with your catalogue over **\$15.00** worth of coupons. Includes a \$1.00 off certificate, a free gift coupon & discount coupons.



When a male and female dwarf gourami (*Colisa lalia*) prove to be incompatible, it is best to provide the male with a new mate. Photo by R. Zukal.

#### Try a Different Female

**Q.** I am having trouble breeding my dwarf gouramis. My tank has a five gallon capacity. The water temperature is 80°F, and the pH is 7.4. The

male builds a bubble nest under a piece of floating waxpaper and puts pieces of torn plants in the nest. He chases the female all over the tank, but she won't breed with him. Can you offer any advice?

**Bob Campbell  
Cincinnati, Ohio**

#### South Jersey Show

The South Jersey Tropical Fish Association is holding its Annual Spring Tropical Fish Show on May 17-19, 1980 at the Echelon Mall Community Hall, Voorhees Twp., NJ, located off Rt. 30. For more information contact Jim Boyd at 215-457-1370.

Please mention T.F.H. when writing to advertisers.

### For Healthier Fresh Water And Marine Fish, Aquatic Plants, And Invertebrates

- APPEVITE contains fifteen essential vitamins and feeding stimulants to fortify your tropicals basic diet
- APPEVITE'S taste attractants encourage new and finicky animals to eat
- APPEVITE'S total formulation makes possible the maintenance of healthy and actively feeding sea anemones
- APPEVITE acts as an organic fertilizer for all aquatic plants



**A.** Perhaps the female is not old enough to spawn or perhaps she simply isn't ripe. Try feeding her rather heavily on meaty foods and live foods for about a week. When her abdominal bulge remains for more than a few hours after a meal she is ripe. Perhaps you just have an unexplainable incompatible pair. If, after conditioning the female for a week or so in a container placed adjacent to the male's (where she can see him without making contact), she still refuses to spawn, we suggest you try another female.

#### I Like Pike

**Q.** I recently saw some livebearers in a pet shop that were called pike minnows. They are mean-looking fish, and while they are attractive because of the slender body shape, I am reluctant to put them with any of my other fishes. Are they as mean as they look?

**George Fischman  
Las Vegas, Nevada**



*Belonesox belizanus* is one of the largest of the livebearing tooth carps and is unquestionably one of the most predatory. Photo by R. Zukal.

**A.** Meaner! This "minnow" is not a minnow at all. It is a member of the family Poeciliidae, which are commonly known as the livebearing tooth carps. This fish, *Belonesox belizanus*, certainly lives up to its name! It is a vicious predator that lies in wait for fishes sometimes even larger than itself to swim by. At the right moment it attacks with the ferocity of any real pike! This is a problem fish that generally refuses anything but live food and requires brackish water in order to flourish. Unless you can give them the special care and accommodations they need, which includes a large, heavily planted aquarium, you had better pass them up.

Gold Sailfin Mollies \$3.95/pr. Extra Large "Large Male Show" Betas \$1.53

Plus postage and handling with order

**TROPICAL FISH & SUPPLIES**

BUY DIRECT FROM OUR FLORIDA FISH FARM AT GREAT SAVINGS. DELIVERED TO YOUR HOME VIA U.S. AIRMAIL. SATISFACTION GUARANTEED OR YOUR MONEY BACK. SEND \$1.00 FOR AQUATIC SUPPLIES CATALOG AND WORLD WIDE SELECTION OF FISH TO: POSTAL PETS, INC., DEPT. TFH, 500 BRANCHTON CHURCH RD., THONOTOSASSA, FL. 33562



## SHEER MADNESS

FREE GIFT WITH EVERY ORDER

<b>SILENT GIANT AIR PUMP</b>  Item # 100-100-100 Item # 100-100-100	<b>HAGEN AQUA CLEAR 150 G.P.H. POWER FILTER</b>  Item # 100-100-100 Item # 100-100-100	<b>SUNGARD P.M.E. POWER FILTER</b>  Item # 100-100-100 Item # 100-100-100	<b>AQUALOGY POWER 1 motor driven pump filter</b>  Item # 100-100-100 Item # 100-100-100																								
<b>Marineland Maxiflow POWER FILTERS</b> Model 100: 120 gph Item # Y. \$14.95 Model 200: 240 gph Item # Y. \$24.95	<b>DYNAFLO 150 POWER FILTER</b>  Item # 100-100-100 Item # 100-100-100	<b>SUNGARD DYNAMASTER 2 CYLINDER AIR PUMP</b>  Up to 400 Cu. Feet per minute Item # 100-100-100	<b>AQUARIUM PHARMACEUTICALS SALT WATER MASTER TEST KIT</b>  Item # 100-100-100																								
<b>AMMONIA SORBERS</b> A convenient and fast means to remove ammonia from an aquarium continuously. Item # 100-100-100	<b>Jungle</b> <b>FREEZE DRY</b> Item # 100-100-100	<b>NEW! SUPERIOR</b> Item # 100-100-100	<b>WHISPER AIR PUMPS</b> <table border="1"> <tr><th>Item</th><th>Price</th><th>Item</th><th>Price</th></tr> <tr><td>W17-100</td><td>4.99</td><td>W17-1000</td><td>11.99</td></tr> <tr><td>W17-200</td><td>4.99</td><td>W17-1500</td><td>14.99</td></tr> <tr><td>W17-300</td><td>5.99</td><td>W17-2000</td><td>19.99</td></tr> <tr><td>W17-400</td><td>6.99</td><td>W17-2500</td><td>24.99</td></tr> <tr><td>W17-500</td><td>7.99</td><td></td><td></td></tr> </table>	Item	Price	Item	Price	W17-100	4.99	W17-1000	11.99	W17-200	4.99	W17-1500	14.99	W17-300	5.99	W17-2000	19.99	W17-400	6.99	W17-2500	24.99	W17-500	7.99		
Item	Price	Item	Price																								
W17-100	4.99	W17-1000	11.99																								
W17-200	4.99	W17-1500	14.99																								
W17-300	5.99	W17-2000	19.99																								
W17-400	6.99	W17-2500	24.99																								
W17-500	7.99																										
<b>POWER PLUS 600 AQUARIUM PUMP AND FILTER</b>  Item # 100-100-100	<b>MERIDIAN AUTOMATIC WATER CHANGER</b>  Item # 100-100-100	<b>POWER GRAVEL CONVERSION UNITS</b>  Item # 100-100-100	<b>EBO-JAEGER Submersible Heaters</b> <table border="1"> <tr><th>Item</th><th>Price</th></tr> <tr><td>EH-200 Watt 15'</td><td>\$12.95</td></tr> <tr><td>EH-100 Watt 15'</td><td>12.75</td></tr> <tr><td>EH-150 Watt 15'</td><td>11.95</td></tr> <tr><td>EH-200 Watt 12'</td><td>11.75</td></tr> <tr><td>EH-250 Watt 12'</td><td>9.95</td></tr> <tr><td>EH-300 Watt 12'</td><td>9.49</td></tr> </table>	Item	Price	EH-200 Watt 15'	\$12.95	EH-100 Watt 15'	12.75	EH-150 Watt 15'	11.95	EH-200 Watt 12'	11.75	EH-250 Watt 12'	9.95	EH-300 Watt 12'	9.49										
Item	Price																										
EH-200 Watt 15'	\$12.95																										
EH-100 Watt 15'	12.75																										
EH-150 Watt 15'	11.95																										
EH-200 Watt 12'	11.75																										
EH-250 Watt 12'	9.95																										
EH-300 Watt 12'	9.49																										

**TO ORDER AND RECEIVE OUR FREE CATALOG:** Just fill in the coupon below and return with the quantity of each catalog. Add \$3.00 for all orders under \$10.00 and \$7.50 for orders over \$10.00. System. Continental U.S. add \$2.00; orders over \$10.00 add \$1.00. This will cover shipping and handling charges. New York, State Residents add applicable sales tax.

**FOR EXPRESS SERVICE:** Please enclose certified check or money order as payment. Orders may take two weeks to ship.

**NEW - USA 4-WAY CHARGE:** Just enclose card number, expiration date, bank number or digits, name of card bank with this order. Please include your card (\$10 minimum order).

**ALL ORDERS ARE SHIPPED TO SHIPPED WITHOUT NOTICE.** Sales prices valid through this month only if other prices listed.

**NEW AUTOMATIC TELEPHONE ORDER SERVICE:** for charge card customers - call 1-800-981-5471.

**AQUATIC SUPPLY HOUSE** P.O. Box 8 • Braintree Manor, NY 10510

## TANK TECHNIQUES

**Problem:** How to test a rock for lime content before placing it in the aquarium and possibly poisoning the fish.

**Solution:** Place it in a glass bowl and fill bowl with vinegar, making sure entire rock is submerged. The acid in the vinegar will react with lime in the rock, and the rock will fizz as carbon dioxide is released. Allow the rock to remain in the solution for a few hours so that the solution for a few hours so that vinegar will soak in as far as possible. If there are no bubbles, the rock is probably safe to use after thoroughly rinsing out the vinegar. If the rock fizzes, don't use it.

S.C., Portland, Maine

**Problem:** How to waterproof power cord splices located close to aquarium splashing or water vapor.

**Solution:** Before making the splice, insert two-inch pieces of airline

tubing over the leads and down past the exposed wire. Complete the splices, and then slide the tubing over the bare wire so that it overlaps the insulation by at least ¼-inch on either side of the splices. Seal the tubing to the insulation with silicone rubber aquarium cement.

F.D., Brainard, Minnesota

**Problem:** How to determine if your airpump is operating efficiently.

**Solution:** When you buy the pump, determine how long it takes to displace with air from the pump the water in a jar that has been filled and inverted in a bucket of water. Insert the airline under the edge of the jar, start the pump and note the time it takes until the jar fills with air. Also note the depth of the water in the bucket. To check the pump's efficiency, repeat the test when desired, using the same equipment, and compare the test time to the original test time.

G.J.R., Des Moines, Iowa

Have any time-saving, trouble-saving, money-saving, fish-saving ideas that you would like to share with other hobbyists? We will pay \$5.00 for each idea accepted for publication in this column. Submitted ideas must be typewritten, double-spaced and no more than 100 words in length to be accepted. Accompanying illustrations preferred where applicable, but not required if explanation is simple.

T.F.H. Publications, Inc. will have all commercial English language publishing rights on ideas accepted and will pay the author upon acceptance of the submission. Unaccepted ideas will not be acknowledged or returned unless accompanied by a stamped, self-addressed envelope.

Submit ideas to: TANK TECHNIQUES, c/o Editor, TROPICAL FISH HOBBYIST, P.O. Box 427, Neptune, NJ 07753.

May, 1980

87

## Coldwater Fishes



**Opposite page:** The fantail goldfish is one of the few exotic strains that will survive well in a pond for the summer, but this sensitive fish must be brought indoors for the winter so its environment can be controlled. **Above:** It is risky keeping a redcap oranda in an outdoor pool, for good specimens like this are expensive, and they are one of the more delicate strains.

## Selecting Goldfish For the Outdoor Pond

by Marshall E. Ostrow

By the time this article is published spring will have arrived, and many aquarists thoughts will be turning to garden ponds for keeping fishes and raising live food. This is the time of year when goldfish sales begin to skyrocket, for they have come to be the favorite pond fish of most aquarists.

In selecting goldfish for the pond it would seem that this is a difficult

task because of the great number of varieties available. Actually the opposite is true. While there are certainly many varieties, some of them being very fancy, with long fins, odd-shaped bodies and eyes and frilly head growths, only a few of them, and the less fancy ones at that, are really suitable for the outdoor pond. The lionheads, orandas, fantails, veiltails, telescope-eyes,

May, 1980

89



Nelson Miller's  
**RETAIL PET SUPPLY MANUAL**  
 shows you how owning  
 your own pet shop  
 can be

**CHALLENGING  
 REWARDING  
 And  
 PROFITABLE!**

This hard-bound **MANUAL** explains standard business procedures and special problems unique to the pet industry.

Covering all aspects of pet products retailing, the **MANUAL** deals with topics ranging from handling personnel to setting up an aquarium to locating displays to maximizing profit.

**ORDER YOURS TODAY!**

Please send me \_\_\_\_\_ copy(ies) of the new **RETAIL PET SUPPLY MANUAL** at \$24.95\* per copy. Enclosed is my check for \$\_\_\_\_\_ to cover the cost of the **MANUAL** and the shipping and handling expense.

Name \_\_\_\_\_  
 Firm Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Clip and mail this order blank, along with your payment, to: Book Department, *Pets/Supplies/Marketing Magazine*, One East First Street, Duluth, Minn. 55802.

\*Please add \$1.50 per order and, if ordering multiple copies, also add 25c per additional copy, to cover postage and handling expense.



Most people keep only common goldfish in their pond and not the fancy varieties, because the commons are much harder fish. Photo by L.E. Perkins.

water-bubble-eyes, peariscales and so forth are generally much too delicate to withstand the sharply fluctuating environment of a small garden pond.

It is indeed true that some of these fancy strains have been raised successfully in outdoor ponds, but usually this occurs in climates in which the temperature rarely drops below 50°F and in which the changes are gradual. Raising fancy strains outdoors is not uncommon in southern areas of the United States, but when climatic disasters such as the frosts of the 1977 and 1978 winters occur, deaths among fancy goldfish strains are often almost as frequent as they

are among tropical fishes being kept outdoors. Losing 10 or 20 \$1.00 swordtails to the weather is one thing, but losing 10 or 20 \$5.00 to \$10.00 lionhead or oranda goldfish to the weather is a goldfish of a different color! All goldfish, be they plain or fancy strains, must go through a winter cooling period if they are to thrive well and spawn in the spring. However, the more exotic strains require very careful special handling, for they are indeed quite delicate compared, for instance, to the common goldfish. The seasonal changes must be brought about in a much more controlled manner for the exotic strains, and the temperatures can-



This is the London shubunkin. The tail fin is shaped like that of a common goldfish, and like the common, this is an excellent pond fish.

This young comet has lost most of its golden coloration, but the color is likely to return as the fish matures. Specimens such as this are hardy pond fish.

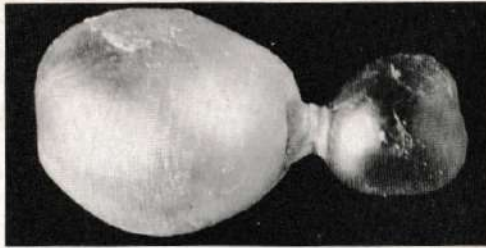


If fancy goldfish such as this fine fantail specimen are going to be kept in ponds for the summer, they should not be kept together with streamlined goldfish such as commons, comets or shubunkins, for they will not be able to compete with them very efficiently for food. Photo courtesy Wardley Products Co.

not drop as far for them as they can for their plainer cousins.

There are other reasons for not putting fancy goldfish in outdoor ponds. While most of them are indeed more susceptible to diseases of one sort or another in cold winter water, many of them are also highly susceptible in warmer water. In short, usually the fancier and more complex the external features of a goldfish are, the more complex are its internal physiological features, thus the more sensitive the fish is to environmental changes and extremes. For instance, compare the swim bladder of a comet goldfish to that of the egg-shaped strains such as a veil-

tail or an oranda. In the comet the swim bladder consists of a pair of tubular shaped sacs that are horizontally oriented, and one is located anterior to the other. In the veiltail goldfish both sacs are almost globular in shape, but the anterior sac is so small that for the purpose of providing controlled buoyancy it is practically non-functional. The posterior sac is greatly enlarged and distorted and is often displaced into an oblique or vertical position. This modified swim bladder causes the fish to swim mostly in a head-down or tail-up oblique position with very little control over its buoyancy. In order to swim, feed or breed this fish



Swim bladder of a veiltail goldfish. Note the size disparity between the lobes. This type of swim bladder is found on most of the goldfish whose body is egg-shaped. Photo by L.E. Perkins.

must expend much more energy than that expended by a plainer goldfish having a "normal" swim bladder. The results are weaker, less competitive fish that will be among the first to go belly-up under conditions of environmental stress. Such a fish cannot escape from enemies very quickly, either, and in an outdoor pond there certainly is no shortage of enemies! This is but one example of the many internal physiological changes that have occurred in goldfish as the result of development of more complex external features. It is quite obvious how such changes reduce a fish's ability to cope with its environment.

Speaking of enemies, there is another reason to keep fancy goldfish out of outdoor ponds. Generally they do not grow as large as common goldfish or even comets or shubunkins. This results in their being more susceptible to predation by birds, snakes and the neighbor's cat. The smaller size of orandas,

lionheads and so forth is probably at least partially a direct function of the fishes' genetic constitution. However, it's not that simple, for the overt expression of the genes of any organism is to a very great extent controlled by external environmental factors such as temperature, water chemistry and other competing fishes. Therefore the exotic goldfish's smaller size is due in part to a smaller food intake resulting from their lack of competitive ability. There may also be all sorts of digestive and metabolic malfunctions tied in with some of the cultivated gross external mutations in goldfish. This is not an uncommon occurrence with some other mutations in fishes such as albinism, which is no doubt one of the reasons why albino fishes are often smaller than their normally colored brethren, and weaker too. The point is simply this. Fancy goldfish strains are rarely seen at a size over four or five inches in body length, whereas common goldfish

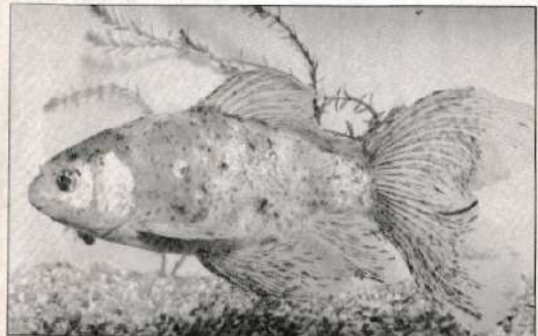
and even some of the comets and shubunkins are frequently seen in the large economy size at 10 inches or larger. It's certainly a lot easier for the neighbor's cat to snatch a four-inch slow-moving fish than a 10-inch fast-moving behemoth, and I've seen some common goldfish that might even be capable of snatching the cat!

Some fancy goldfish such as the celestials and the water-bubble-eyes seem to be engineered, so to speak for display in outdoor ponds, for their most prominent feature is their unalterable heavenward gaze. The goldfish keeper can view this interesting eye anomaly from above much better than from the side, as he would if the fish were kept in an aquarium. I have seen celestials of a six- to eight-inch length, but not very often. Lacking

a dorsal fin and having a displaced and distorted swim bladder, these fish cannot move very quickly. Therefore, if they are to be kept outdoors, special precautions must be taken—neighbor's cat, exit, stage left! The pond must be covered and perhaps even tightly fenced in so as to keep predators out. Of course, if this is not convenient, the goldfish keeper can plan to spend the summer poolside, shotgun in hand! However, that could lead to some neighborhood disharmony.

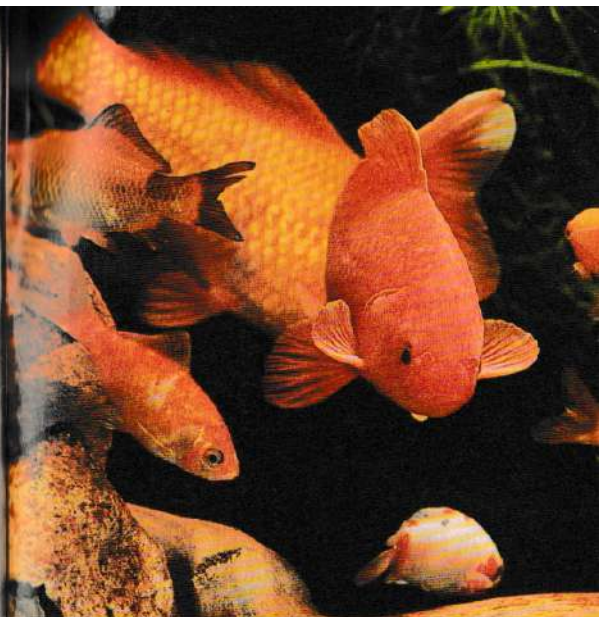
What it all boils down to in selecting goldfish for a garden pond is this. Select only fish that are good eaters and good swimmers. Most likely they will grow a bit larger than the others and will generally be healthier, hardier fish. The only goldfish that fit this category well

A Bristol shubunkin. Note the wide tail fin. The anal and pelvic fins are often enlarged in this strain too. Photo by L.E. Perkins.



In this excellent common goldfish specimen notice the nearly perfect fin and body shape and the interesting color pattern in the tail. The color pattern may change as the fish continues to mature. Photo courtesy of Wardley Products Co.

A well formed young comet goldfish. The long, pointed tail lobes are a desirable trait in this strain. Photo courtesy of Wardley Products Co.



Goldfish of assorted sizes can live together peacefully in an outdoor pool or in an aquarium.

are the common goldfish and some of the comets and the shubunkins. This, however, does not mean that the pondkeeper must restrict himself to only "plain Jane" fish, for these strains are available in a number of color varieties, many of which, in my opinion, rival some of the best of the highly colorful Japanese koi, but these fish are in-

deed far less expensive than even poor quality koi.

Common goldfish need no description here, for they can be seen in any discount department store or pet shop. In shops specializing in fishes, they are usually sold as feeders for hungry cichlids, lionfish and piranhas. A thorough search among them often turns up a few

specimens worthy of some special attention and perhaps even some affection—these generally make fine specimens for the garden pond, if show competition is not the pond-keeper's goal. These are the basic *Carassius auratus* from which most of today's exotic goldfish strains are derived. A good specimen is a uniform bright orange or red color with smooth body lines, no missing scales, undamaged fins and clear eyes.

A fish swimming about in a 50-gallon tank or tub, fin to fin with 200 other similar fish, admittedly complicates the task of selecting fish for the pond. However, if none of the "feeder" goldfish meet the criteria for being good pond fish, the same shop or other shops may stock quality common goldfish for pond use. Actually these pond fish are much better to start with if they are available, but if they are not, feeders may at least be a beginning.

Pet shops also stock somewhat fancier pond fish such as comets and shubunkins. Color variations in comets are about the same as they are in the commons, but the resemblance stops there. The comet body is much more streamlined than the common body, and the fins are much larger. The caudal fin is deeply forked and is often longer than the body itself. Comets usually don't grow as large as commons, but because of their streamlined shape they can deftly dodge enemies from the dry world outside their pond just about as well as any 10-inch common.

Shubunkins are usually mottled in color, having intermingled small

patches and flecks of black, gold, red, pink and reflective blue. Under the fleck marks they may have a calico pattern consisting of large patches of red, gold, silver and black.

There are two shubunkin strains; the London shubunkin and the Bristol shubunkin. The colors in both are about the same, but they differ in fin conformation. The London shubunkin looks like a mottled version of the common goldfish; it has short almost stubby-looking fins. The Bristol shubunkin looks like the London shubunkin as far as color is concerned, but like the comet, its fins are large and full. As in the comet, the caudal fin is deeply forked, but the lobes of the fin (unlike those of the comet which are long and pointed or slightly rounded) are well rounded. By judging standards the height of the caudal fin is the important feature in the Bristol shubunkin, whereas in the comet length is emphasized. Good specimens (by show standards) of the Bristol shubunkin are hard to come by and when found are generally not good pond fish because of the enlarged finnage.

All in all, for the pond it is best to stay with goldfish that are rather simply built and save the fancier strains for indoor aquaria that are large and well filtered. There is an economic factor that makes this philosophy even more important. Fancier strains are much more expensive than commons, comets and shubunkins, and their loss to the neighbor's cat is a hard pill to swallow without becoming the neighborhood "troublemaker." Shoo kitty!!

## MOST THOUGHT AFTER MAGAZINE

TROPICAL FISH HOBBYIST magazine has been... and still is... the largest-selling aquarium magazine in the world. A subscription is your KEY to all the newest, most desirable of aquarium fishes. Its issues contain information that is not found in any aquarium book. As a matter of fact, that's our editorial policy: **TO PROVIDE NEWS ABOUT AQUARIUM FISHES THAT IS NOT FOUND IN BOOKS.**

**SUBSCRIBE NOW TO THE WORLD'S LARGEST-SELLING AQUARIUM MAGAZINE. Send your check, cash or money order to:**

**TROPICAL FISH HOBBYIST MAGAZINE  
P.O. BOX 27, NEPTUNE, N.J. 07763**

Sample copy, \$1;  12 issues, 1 year, \$7.50;  24 issues, 2 years, \$13;  36 issues, 3 years, \$20.00

YOUR NAME \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Foreign: Add \$1.20 per year's subscription. Allow 4-6 weeks for processing.



Subscribers receive every issue of TROPICAL FISH HOBBYIST without fail.

Subscribers are kept informed about every important development in the aquarium hobby... the new fish, the new people, the new products, the new techniques... every month.

They also know that they'll always be up-to-date with their free supplements to EXOTIC TROPICAL FISHES.

Subscribe NOW to TROPICAL FISH HOBBYIST, the biggest (more pages, more pictures, more information, more readers), most colorful (a minimum of 32 color pages in each issue), most interesting aquarium magazine in the world.

specimens worthy of some special attention and perhaps even some affection—these generally make fine specimens for the garden pond, if show competition is not the pond-keeper's goal. These are the basic *Carassius auratus* from which most of today's exotic goldfish strains are derived. A good specimen is a uniform bright orange or red color with smooth body lines, no missing scales, undamaged fins and clear eyes.

A fish swimming about in a 50-gallon tank or tub, fin to fin with 200 other similar fish, admittedly complicates the task of selecting fish for the pond. However, if none of the "feeder" goldfish meet the criteria for being good pond fish, the same shop or other shops may stock quality common goldfish for pond use. Actually these pond fish are much better to start with if they are available, but if they are not, feeders may at least be a beginning.

Pet shops also stock somewhat fancier pond fish such as comets and shubunkins. Color variations in comets are about the same as they are in the commons, but the resemblance stops there. The comet body is much more streamlined than the common body, and the fins are much larger. The caudal fin is deeply forked and is often longer than the body itself. Comets usually don't grow as large as commons, but because of their streamlined shape they can deftly dodge enemies from the dry world outside their pond just about as well as any 10-inch common.

Shubunkins are usually mottled in color, having intermingled small

patches and flecks of black, gold, red, pink and reflective blue. Under the fleck marks they may have a calico pattern consisting of large patches of red, gold, silver and black.

There are two shubunkin strains; the London shubunkin and the Bristol shubunkin. The colors in both are about the same, but they differ in fin conformation. The London shubunkin looks like a mottled version of the common goldfish; it has short almost stubby-looking fins. The Bristol shubunkin looks like the London shubunkin as far as color is concerned, but like the comet, its fins are large and full. As in the comet, the caudal fin is deeply forked, but the lobes of the fin (unlike those of the comet which are long and pointed or slightly rounded) are well rounded. By judging standards the height of the caudal fin is the important feature in the Bristol shubunkin, whereas in the comet length is emphasized. Good specimens (by show standards) of the Bristol shubunkin are hard to come by and when found are generally not good pond fish because of the enlarged finnage.

All in all, for the pond it is best to stay with goldfish that are rather simply built and save the fancier strains for indoor aquaria that are large and well filtered. There is an economic factor that makes this philosophy even more important. Fancier strains are much more expensive than commons, comets and shubunkins, and their loss to the neighbor's cat is a hard pill to swallow without becoming the neighborhood "troublemaker." Shoo kitty!!

## MOST THOUGHT AFTER MAGAZINE

TROPICAL FISH HOBBYIST magazine has been... and still is... the largest-selling aquarium magazine in the world. A subscription is your KEY to all the newest, most desirable of aquarium fishes. Its issues contain information that is not found in any aquarium book. As a matter of fact, that's our editorial policy: **TO PROVIDE NEWS ABOUT AQUARIUM FISHES THAT IS NOT FOUND IN BOOKS.**

**SUBSCRIBE NOW TO THE WORLD'S LARGEST-SELLING AQUARIUM MAGAZINE. Send your check, cash or money order to:**

**TROPICAL FISH HOBBYIST MAGAZINE  
P.O. BOX 27, NEPTUNE, N.J. 07763**

Sample copy, \$1;  12 issues, 1 year, \$7.50;  24 issues, 2 years, \$13;  36 issues, 3 years, \$20.00

YOUR NAME \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Foreign: Add \$1.20 per year's subscription. Allow 4-6 weeks for processing.



Subscribers receive every issue of TROPICAL FISH HOBBYIST without fail.

Subscribers are kept informed about every important development in the aquarium hobby... the new fish, the new people, the new products, the new techniques... every month.

They also know that they'll always be up-to-date with their free supplements to EXOTIC TROPICAL FISHES.

Subscribe NOW to TROPICAL FISH HOBBYIST, the biggest (more pages, more pictures, more information, more readers), most colorful (a minimum of 32 color pages in each issue), most interesting aquarium magazine in the world.