

June, 1969

# tropical fish hobbyist

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**New Research  
on the Behavior  
of Fishes**



# tropical fish hobbyist

Vol. XVII, June, 1969 (#160, No. 10)

## CONTENTS

The Care and Breeding of <i>Pelmatochromis annectens</i>	4
Bettaphile	12
New Research on the Behavior of Fishes	19
<i>Botia modesta</i>	33
<i>Apocheilichthys lineatus</i>	37
Start Smart	46
Guppy Corner	57
Salts From The Seven Seas	60
<i>Ageneiosus madeirensis</i>	67
Mail Call	69
Your Fishes' Health	81
If You're Going to Florida	84
Photography Contest Winners	98

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## cover

Bettas are beautiful and easy to spawn and come in many different colors and combinations of colors and are readily available and can get along in cramped quarters and have a number of other qualities that have made them favorites among hobbyists for a long time . . . they happen also to be very handy for scientists engaged in biomedical research, and our happy little anabantid is currently the subject of some interesting studies relating to memory and learning processes in man. Read about the efforts of LSD and bourbon on bettas in Dr. David Ingle's article beginning on page 19. Cover photo by Dr. Herbert R. Axelrod.

## exotic tropical fishes supplements

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June, 1969

## editorial

Come on now, admit it. Once in a while you let sneak into your head the idea that maybe it would be nice to make a few drachmas out of tropical fish. I mean that you confess to yourself that you're more interested in selling a spawn of *kribensis* than you are in sitting back and ruminating on the wonders of nature as represented by the procreative activities of cichlids. So you feel dirty and degraded because you know that your unbounded venality has prevented you from grasping the TRUE MEANING, the REAL SIGNIFICANCE, the BASIC RELEVANCE of the aquarium hobby, right? You do feel that way, don't you? Well, if you do, okay . . . and if you don't, okay; there's plenty of room in the hobby for both the visionary and the practical. Anyway, this was just a digression . . . what we're really going to discuss today is economics, to which discussion I am prompted by receipt (in one form or another) of numerous queries all dealing with one topic: how much money is such and such a fish worth?

In some cases the questioner wants to know how much a fish is worth because he's bred it and intends to sell it. In other cases the questioner wants to know how much a fish is worth because someone is offering it for sale and the questioner wants to know whether the price is "fair." Now some might think that such a question is very difficult to answer. They might believe that you have to make all kinds of arcane determinations relating to supply and demand and the cost of air freight from Leticia, Colombia and the mortality factor for the fish in dealers' tanks, and what is the value of the foods fed to the fish to get it into its present shape, etc. But you don't have to do anything like that at all, and the answer is quite simple. The fish our questioners have in mind, and any other fish that has ever lived or ever will live, is worth exactly one thing: it's worth what the seller can get for it. Not a cent more or a cent less.

*Neal Pronck*



## The Care and Breeding of *Pelmatochromis annectens*

BY DR. HERBERT R. AXELROD  
Photos by Rudolf Zukal

The Five-Spot African Cichlid, *Pelmatochromis annectens*, has been known to science since 1813 when Boulenger catalogued it. Live specimens were probably imported to Germany in the early 1900's, since this fish is quite common along the west African coast from Liberia to the Congo. The author caught several specimens in almost pure salt water along with *Mondactylus sebae* near Douala in the Cameroons. The largest specimen I have ever seen is slightly over 4 inches, but I never saw any this large in their natural range.

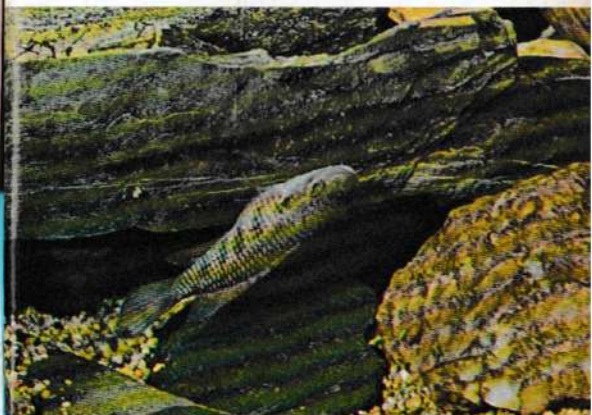
The rather elongate body, large mouth and fleshy lips give this cichlid the appearance of a predaceous fish, but just the converse is true. Except during breeding time, the fish is peaceful, subdued and shy. It might even be nocturnal, as its large eye could capture enough moonlight for it to graze at night. Certainly in the aquarium it hides at the slightest provocation and probably has lost most of its popularity because of this. It prefers dimly lit locations.

I keep my fish in slightly salty water. Usually I add a gallon of sea water to every five gallons of aquarium water, but the same effect is achieved by

June, 1969

The female *Pelmatochromis annectens* in pre-spawning colors. Notice how light she is.

The courtship of *Pelmatochromis annectens* is very beautiful. The fish are always in close contact, with the female searching for a spawning site. Here the female is showing the male she chooses this site.



putting in a few tablespoonfuls of sea salt (Kosher salt will do) for every 5 gallons. In order for the fish to be comfortable and acclimated, it is absolutely necessary that their aquarium be furnished with several inverted flowerpots, or, better yet, with caves made of flat stones. Unquestionably the fish will select one of these sites in which to spawn, if they were properly fed and brought into prime condition. The water temperature should always be above 70° F., and a 5° rise in temperature will usually start the spawning procedure if all else is in readiness.



should be destroyed anyway. You can haunt your local shop for dying fishes and use whatever you scrounge for food. Food for the Sargassum fish should be moving, so living fishes are best.

Other fishes found in the floating weed will be small jackfishes (family Carangidae), which will be silvery, silvery-yellow, blotched, or silvery black. They breathe very rapidly, and you can use this sign for an off-the-cuff "identification." Jackfishes are hard to keep and should be discarded, or kept separately for Sargassum fish food.

Now to some of the unusual things you may catch in the floating weed. One fish is very tiny and looks like a little black berry. I don't know what it is, but it may be a baby trunkfish. These do well in aquaria for a while. Slightly larger, and easily identifiable, is the baby spiny boxfish. These puffers make nice marine aquarium fish. You will pick up an occasional pipefish, which are also easily kept, but should be fed live baby brine shrimp. A rare find (I have only one) is the tripletail. This fish grows, in nature, to a few feet in length, but there is no such worry in the aquarium; you'll be lucky to keep it alive a month. They are fussy eaters, flat, and resemble Scats to a remarkable degree, even to a hint of reddish about the head. In the floating weed you'll also find some sergeant majors on occasion, usually together, and these should be given special care as they are very desirable fish and not often found in the weed. Occasionally

you'll pick up a spadefish (they look like freshwater angelfish), but these should not be kept, as they are not hardy in the tanks of the beginner. Young snappers will also sometimes be found.

You will also see weed that is not floating, but seems to collect in masses on the sand in the water. Scoop into this material. It is usually blackish in color, and here you will get most of your pipefish, spadefish, and snappers. The two most common snappers are the dog snapper (with brown bands on the sides and a blue streak below the eye on the gill cover), and spot snapper (silvery, with yellowish fins, some red margins on the spiny dorsal, and an ocellus on the rear flank). The dog snappers are vicious. You can keep the small spot snappers, and even *very small* dog snappers, but don't keep dog snappers larger than  $\frac{1}{4}$  of an inch. Try to keep only those snappers (of all species) which are smaller than anything else in the tank. And keep very few.

An occasional find in the bottom weed is the young of the lookdown. The lookdown resembles a threadfin, but can easily be distinguished if you have a photo or drawing of either. The young lookdown doesn't keep very well, but it's nice to have it for the few days it does live. A fantastic beauty!

There are many other things which you might find in the seaweed, but this should cover most of them. The watchword is trial and error, together with plenty of room.

92



*Blennius cristatus*, one of the Florida blennies, is a lot less colorful than some other fishes in its genus, but shares the interesting habits of the other blennies. Photo by H. Hansen.

Bring along several Styrofoam<sup>®</sup> boxes and many plastic bags and rubber bands. A cylinder of oxygen is great to have, but not absolutely necessary. Nonetheless, its use will give you great peace of mind and also enable the bringing back of things that might not survive the trip otherwise.

Another place to use your net is along pilings or breakwaters or the encrusted beach dividers between private and public beaches. Use the net two ways. Along the sand for the length of the structure will yield snappers and some sergeant majors. Scooping against the wall, in a scraping motion, will yield very nice little blennies. These resemble gobies and make nice aquarium

fishes. You may also pick up a sea urchin or two. You can try to keep one or two small ones, but don't try to overdo the invertebrates in your tank. They are harder to keep than the fishes. A couple of crabs are nice to have, but these should be walking, rather than swimming, crabs. Look at the last pair of "legs." If they are flattened at the tips like tiny oars, don't take them. If they are pointed like the rest of the legs, then they are okay to try. The best, of course, are the hermit crabs. These live in shells of molluscs and are found scurrying along the bottom, usually in shallow waters. The shells that they carry often are not very pretty. Throw in some pretty shells from a shell shop (after care-

93

ful washing), and sooner or later the crab will switch homes. Keep plenty of shells in the aquarium to accommodate the crab as it grows.

Now what about the aquarium itself when you get home? The best aquarium is the all-glass tank put together with a neutral silicon compound. Use very little light, and it should be cool white fluorescent. You don't want to grow algae! The filtration system should be basically a deep undergravel filter. Three inches of standard natural gravel, mixed with small broken shells from the beach, is ideal. You can also add an outside filter, but the undergravel filter is essential to ease of maintenance. Synthetic salts are cheap enough to warrant their use. You must have a hydrometer. If your shop doesn't have any, ask your surgical supply house for a urinometer; they're the same thing. The water should have a specific gravity of 1.025. A little handbook on the marine aquarium is a must. I also believe that about  $\frac{1}{4}$  of the water should be natural sea water, so plan on taking some back with you.

How do you get your fish home?

**NOTE:** Anyone who wants to try his hand at collecting fish, whether they're freshwater or marine species and whether the fish are for his own use or for resale, is best advised to check with the conservation officials having jurisdiction over the area in which he intends to operate. Although there are normally very few restrictions relating to the capture of non-gamefish salt water species, this may not always be the case. Again, even when collecting in areas without restrictions of any kind, NEVER TAKE ANY MORE THAN YOU CAN USE.

96

We've already indicated plastic bags, Styrofoam<sup>®</sup> boxes, and oxygen (optional). Carry a 1-gallon size Styrofoam<sup>®</sup> ice box in the car, and fill it with ice from the motel. If you don't have one of these boxes, your motel manager will give you one for a buck; they keep one in every room. On the trip home, periodically put some ice around the plastic bags of fishes. Don't worry about chilling them; they'll be fine. Your only worry is the heat causing death by lowering the oxygen saturation of the water. The fish should be double-bagged, with plenty of air (or oxygen). If your car is not air-conditioned, the ice is an absolute necessity. When you stop to eat, park in the shade and keep the windows open if at all possible; this is not always possible if you have clothes on hangers. Thus, try to store everything of value in the trunk and keep the fish in the back seat. If you stop overnight at a motel, bring the fish inside.

If you're flying, why then (you old son-of-a-gun) you could have afforded those coral fishes in the shop all along! Good fishing!



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97



The colorful male fertilizing the first eggs laid.



The female lays a row of about 8 eggs (partially visible near her vent) on the undersurface of the cave.

The female waiting for the male to fertilize her eggs before she lays more.



## Bettafile

Frederick J. Kerr

### Conditioning

**Q.** In a letter to your column a Mr. Schultz complained that his bettas weren't breeding. He stated that he has used different males and different females on several occasions. I feel that he has overlooked the cause of his problem. I also had trouble breeding my bettas until I took the time and care to condition my fish. After I had done so, I rarely had a case in which the pair of fish failed to breed.

**Joseph A. Barry,**  
Little Creek, Virginia

**A.** There is no doubt that many betta-philas, especially beginners, do not condition their fish adequately. This would include moderate feedings three or four times daily, a temperature of about 80 degrees, and a 10 to 25% change of water weekly. Unfortunately, even excellent conditioning is no guarantee that bettas will spawn.

### Peach Betta

**Q.** Could you please help me discover the type of betta I have? Its body and

fins are a light peach color and small iridescent blue spots can be seen on the body. I have never heard or seen anything concerning this type of betta.

**Ronald Gettles, Wellston, Ohio**  
**A.** Names for color varieties of the betta are always a problem, because there is no recognized standard for naming them. Many of the names proposed by breeders are a good deal more commercial than descriptive. I have seen a fish called the peach Cambodia, but it had red fins. Perhaps yours could reasonably be referred to simply as a peach betta.

### Betta Filtration

**Q.** Is there any way to keep bettas in a betta tank and keep the tank clean by normal filtration? I have a 5-gallon betta tank, but the partitions do not permit outside filtration. Even with the use of a subsand filter a feathery slime keeps building up even if the tank is vacuumed often.

**Bob Birkhauser,**  
Madison, Wisconsin

**A.** Keeping betta tanks clean is a real problem. I have found that a subsand filter is the best solution, even if it is not completely satisfactory. Very careful feeding is important to see that no food is overlooked and to be sure the bettas are not stuffing themselves. Frequent vacuuming which removes a portion of the water is also important. Another factor which will help prevent the growth of slime is the presence of growing plants. Hornwort and water sprite are both excellent for this purpose.

### Dropsy

**Q.** I have been spawning bettas for over a year, but just recently I have lost some of my bettas to disease. The fish developed a swelling and a protrusion of the scales. They were fed about ten different types of foods including raw chicken and beef liver. What can I do to cure or prevent this disease?

**Michael R. Harding,**  
Pittsburgh, Pennsylvania



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**Tropical Fish Hobbyist**

**A.** Your bettas obviously have dropsy. The symptoms are caused by a malfunctioning of the kidneys, usually as the result of a bacterial infection. I know of no cure. The best preventive is to destroy infected fish and discard or disinfect any jars or nets they may have come into contact with.

**Black Cambodia**

**Q.** I have a Cambodia male with black fins. Do these have a specific name?

**Asa T. Ige,**  
Kahului, Hawaii

**A.** Naming the Cambodia bettas is becoming more and more standardized. The term "Cambodia" is coming to indicate the pale body and an adjective is usually used before this term to indicate the fin color. This strain which has been

called simply Cambodia in the past is more and more called the red Cambodia. Your fish would then be a black Cambodia. This is a very rare variety.

**First Food**

**Q. 1.** What is the best way to prepare infusoria?

**2.** How can you tell if the culture is rich in infusoria?  
**3.** How long do betta fry need infusoria?

**Medric Magann,**  
Billings, Montana

**A. 1.** Crush one lettuce leaf in a two-quart jar filled with aquarium water. The culture will become cloudy in a short time. Do not feed the culture until the water clears and clouds of dust-like particles can be seen drifting through the water.

**2.** Remember not to feed the culture to the fry until it becomes clear. The dust-like particles are the infusoria. If the culture clears and the clouds are not present, the culture has failed.

**3.** There are a number of successful breeders who do not use infusoria at all. They start their fry on newly hatched brine shrimp. This should be offered in any case one day after the fry become free swimming.

**Nervous Breakdown**

**Q.** Will the constant tension of a male betta seeing a rival all the time injure the fish in any way such as causing a nervous breakdown?

**Kevin Barber,**  
Orlando, Florida

**A.** It is always a mistake to attribute human characteristics to fishes, especially psychological characteristics. Compared to man, the betta has a very simple nervous system. As a result: the presence of another male is not likely to cause frustration to the point of psychological disorder. The advantage of this is that the fish spends its fins a great deal, keeping them strong and attractive.

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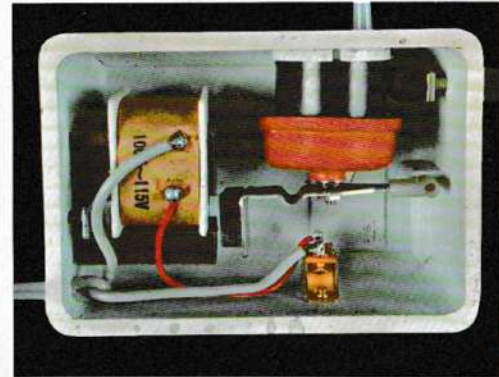
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FANCY GUPPIES FOR THE ADVANCED HOBBYIST by Drs. C. W. Emmens and Herbert R. Axelrod, published by T.F.H. Publications, Jersey City, N.J. Price \$1.50.

This new addition to the many books that have been written on guppies, hybrid guppies and fancy guppies surpasses previous works mainly because of the careful presentation . . . in detail . . . of the requirements essential to a complete understanding of the many factors involved.

There has been a progressive growth of interest in guppies ever since the first fancy guppies came on the scene years ago, and today specialized aquarium societies and groups have been established. Heightened interest has resulted in the production of many new color patterns of both the body and finnage, and it is apparent that the limit has not yet been reached.





The step-by-step approach this book uses to detail such important factors as aquarium size, water conditions, temperature requirements and feeding are given in a concise manner that permits easy understanding that if implemented in a practical way will undoubtedly give some measure of assurance for success. The careful explanation of the principles of guppy breeding, genetic selection and color testing of females are all excellently presented in a language that any aquarist will be able to fully understand.

This book should inspire and influence many aquarists to breed

guppies, and provided that they have the patience, space and time to undertake this type of breeding the ultimate results are sure to be very rewarding. It is significant that the development of more vivid color patterns, whether single-toned or multi-colored, has not yet reached its peak: the fancy guppies of tomorrow will surpass even the beautiful types that are available today.

One of the greatest strengths of *Fancy Guppies for the Advanced Hobbyist* is that the book's wealth of beautiful (many in color) photographs of guppies is exactly the sort of stimulus hobbyists can count on to continue the work of producing better fish.

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# New Research on the Behavior of Fishes

by Dr. David Ingle  
Boston City Hospital

Since ancient times, men have been impressed by the ways of fishes. The Bible regards the fish as a symbol of fertility, while the Chinese complimented the golden carp as an embodiment of vigor and endurance. Today a growing band of biologists and psychologists are still intrigued with fishes—with their fine sensory capacities, their quick learning abilities, and even with the intricacies of their emotional lives. Studies of the tiny fish brain—a simpler model of our own—and its susceptibility to drug action have opened a new chapter in biomedical research. This review charts some of the high points in this "new wave" of fish research.

Naturalists observing the striking color patterns of many fishes have wondered whether fishes themselves perceive colors. Recent studies provide a clearly affirmative answer. The goldfish, at least, possesses three kinds of visual cells in the retina, each with its own pigment sensitive to a particular part of the spectrum. With three retinal pigments, the goldfish

seems likely to have trichromatic color vision: the ability to match any color with an appropriate mixture of three other colors.

Recently, Muntz and Mackintosh of Sussex, England, have argued that goldfish must have trichromatic vision since they can distinguish a variety of colors regardless of variations in their brightness. Further indication of trichromaticity was obtained from the sophisticated experiments of Yager, now at Brown University. Goldfish were trained to strike an illuminated target for food reward only when it contained a noticeable component of colored light. Yager measured the amount of monochromatic light that had to be added to one target to make it distinguishable from a pure-white adjacent target and found goldfish to be color-sensitive at all points throughout the spectrum. Moreover, Jacobson of The Johns Hopkins University has recorded electrical responses from single nerve fibers that send color information into the goldfish brain. These units are each specialized for sensitivity to red, green or blue lights. Since goldfish color vision is more similar to our own than that of many mammalian species, further fish studies will be of interest to students of color-blindness in man, and even to electrical engineers who are trying to devise a better design for color TV.

Although many fish have excellent vision, other sensory domains are uniquely specialized. For example, the famous German biologist Karl von Frisch showed that many fish are extremely sensitive to a fear-inducing odor (*schreckstoff* in German) released into the water from bits of torn skin. Other biologists have noted that each species is most sensitive to the *schreckstoff* from their own kind and that the substance from one fish can produce an alarm response even when diluted to  $1/10^{11}$  this concentration. With apologies to the perfume industry, I suggest that the study of smell should utilize species for which evolution has designed a supersensitive nose, rather than by whiffing odors at such anomic creatures as man!

At least one fish neurophysiologist, von Baumgarten at the University of Michigan, has probed the mechanism of olfaction with microelectrodes (as Jacobson has done in the visual system). Apparently, each olfactory fiber gives responses to many odors, although each cell may have its unique traits when several odors are compared. The trains of electrical impulses that inform the brain about smells will prove a complex code to decipher. Nonetheless, von Baumgarten has taken a second important step in this direction in showing that goldfish whose severed olfactory nerves have regenerated into the brain can remember discriminations between odors that had been learned months earlier, prior to surgery. We infer that cut fibers from the olfactory bulbs can find their way back into the right part of the forebrain and re-establish their former connections with other parts of the smell system. Among vertebrates, this ability to regenerate connections within the central nervous system seems to be limited to fishes and amphibians. Studies of the regeneration process might provide insights



Dr. Ingle adjusts a stereotaxic manipulator by which tiny wires can be permanently inserted into a fish's brain. Through such insulated wires electrical events can be recorded in even the free-swimming fish. The experimenter can also induce emotional changes in the fish by passing signal currents through the wires into the brain. Photo by the author.

useful to the clinical neurologist who lacks a method of promoting such healing within the brains of his own patients.

The rapid learning abilities of fishes (so under-rated by most psychologists) make possible studies on emotional mechanisms as well. By training a fish to press a lever, one can determine what kind of "rewards" matter to a fish. For example, Rozin at the University of Pennsylvania showed that goldfish really do care about the temperature of their aquarium: they could learn to press the lever to obtain squirts of cold water whenever they felt overheated. Although fish may not easily learn things that run contrary to instinct, allowing them to express their powerful drives can itself serve as a reward for new learning. The Dutch ethologist Sevenster, at the University of Leiden, has trained male sticklebacks to swim through a small ring in order to view a ripe female, for whom they delight in performing a courtship display. Since love and anger are somewhat incompatible attitudes for the stickleback, these males did not so readily take to biting a rod as a requirement to see the female. Yet they eagerly attacked the rod in order to see and threaten a rival male.



Since fishes may display emotions so suggestive of our own—fear, aggression, sexual attraction and parental care—it was probably inevitable that scientists attempt to disrupt their mental health with the same drugs that create confusion and misery for man—notably alcohol and LSD. The Siamese fighting fish proves a good choice for such studies, since his ever-ready tendency to attack a rival or display to his own mirror-image can be measured simply by counting the frequency of gill-openings during an aggressive encounter. This behavior is reduced, or even abolished, by remarkably low levels of LSD. One wonders whether these fighters have attained a peaceful harmony with their world, or whether perhaps they are simply intimidated by the “monstrous” appearance of their own reflection. In any case, pharmacologists have seriously suggested that *Betta splendens* might serve a useful medical purpose in testing the urine of drug-users or even that of psychotic patients, whose disease may be precipitated by the misbehavior of a chemical substance within the system.

In our laboratory at the Boston City Hospital, the popular term “drunk as a fish” has taken on a new meaning. Drs. Anthony Raynes and Ralph Ryback, the world's first fish psychiatrists, have measured effects of alcohol on behavior of both fighting fish and the common goldfish. *Betta splendens* actually becomes over-aggressive after a few hours' immersion in a moderate concentration of alcohol. Yet an hour after removal from the intoxicant, he seems to show a “hang-over,” as seen by his depressed level of fighting.

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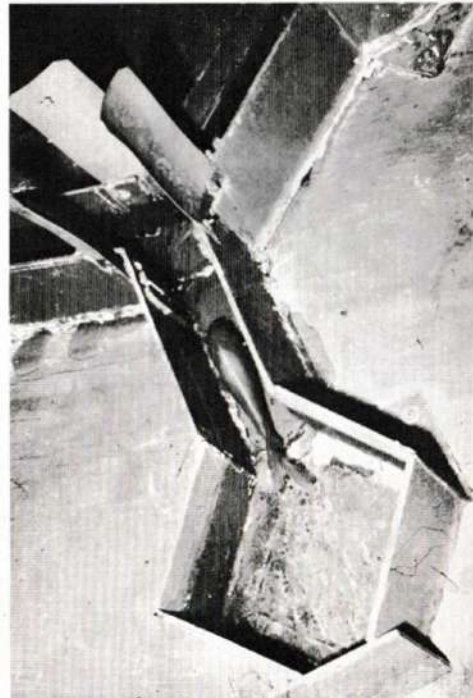
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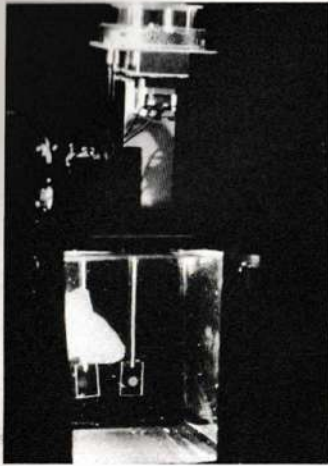
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22



A continuous Y-maze designed by Dr. Ingle for studies of learning and memory in goldfish. The fish learn to turn consistently in one direction, right or left, after swimming from one arm to the center of the maze. After only ten or fifteen trials most fish learn to turn the right way in order to avoid a glass barrier inserted in the wrong arm. Photo by the author.

23



A color-discrimination apparatus designed by Dr. Dean Yager of Brown University that automatically teaches goldfish to choose the correct colored target. In order to obtain food rewards, a hungry fish continues to punch the right target even when the colors are dimmed or made very pale. Photo by Dr. Dean Yager.

Interestingly, a treatment with bourbon (at the same alcohol level) depresses the subject betta, probably due to the presence of minute concentrations of impurities called “congeners.”

Using goldfish, we find that maze-learning ability can be somewhat increased by moderate alcohol treatment, although depressed by heavy intoxication. Yet fish that learn the problem, whether quickly or slowly, remember what they have learned and perform with few errors after one or three days, provided that they are *re-intoxicated*. But, when they confront the maze in a sober state of mind, they appear to have forgotten whatever they had learned while under the influence of alcohol. We suspect—contrary to some psychiatrists—that the human alcoholic as well does not forget his “lost weekend” simply because it is painful to remember, but because the memory locked in his brain is accessible only during the alco-

24



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holic state. When a near-toxic level of alcohol follows maze learning, fish as well as man seems to suffer a total memory "blackout," as if the drugged brain were simply unable to form a permanent memory of the just-completed experience. Our research in this direction follows the lead of Aggranoff at the University of Michigan, who has used various drugs to interfere with memory storage in goldfish.

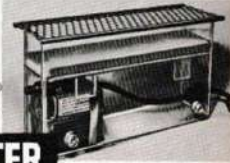
In conclusion, we note that fishes are coming to serve a practical role for science and medicine, as well as providing beauty and fascination for tropical fish hobbyists. These experiments are adding more and more to the deep appreciation that biologists and medical workers have for the intricate functions of the brain. The idea that studies of brain physiology and chemistry will produce new drugs that stimulate memory and stabilize emotions has become a part of the new folklore of science, and I suspect that research on fish behavior will help to stimulate us toward these goals.

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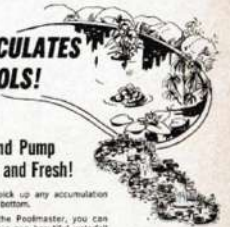


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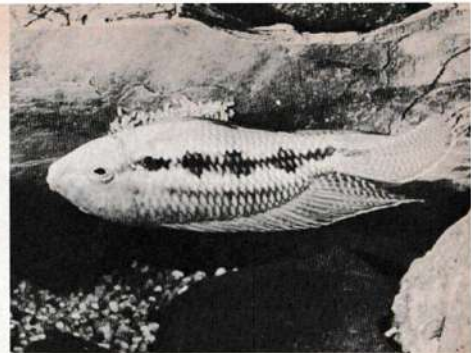
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***P. annectens***

*Continued from Page 11*

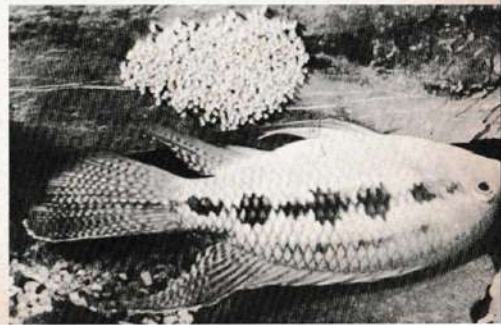
The eggs are typical of most cichlids that lay hanging eggs. They are oval shaped, much like a chicken's egg, but much smaller, of course. They are cloudy when first laid, with a slightly yellow cast. Within a few moments of being laid they seem to swell and development starts at the pole of the egg farthest from the end of the egg which is attached to the spawning site.

The female signals the male to fertilize the eggs by swimming a few inches away from the eggs, then she folds her tail fin and quivers and shakes in position. This sign advises the male to begin fertilizing the eggs already laid.



A closeup of the male fertilizing the eggs. He actually presses his body against them, indicating that the eggs are very tough indeed.

The male slowly floats away from the eggs, still upside down. Both fish continuously quiver as they either lay the eggs or fertilize them.







Towards the end of the spawning, both fish crowd each other on the spawning site. Sometimes while the female laying the eggs, the male attempts to fertilize them.



After spawning is completed, the female takes a position in front of the eggs, fanning them with her pectoral fins and tail, while she guards the entrance.

Spawning lasts several hours and the male quickly loses interest in the eggs. Many breeders recommend removing the male immediately after spawning; I have had bad experiences where the male attacked the female while she was attending the eggs, but I enjoy watching the pair with the young, though most of the time they are eaten unless the male is removed. The eggs hatch in two or three days depending upon the water temperature and the female tends to the eggs in a most peculiar way. Not only does she fan the eggs with her fins in the usual cichlid manner, but she sprays them with water from her mouth. You can actually perceive her taking mouthfuls of water and spitting it out onto the eggs. So powerful is

the force of this expectoration that the eggs wave back and forth reacting to the strong force of the current generated by the flow from the female's mouth. Periodically, the female mouths the eggs and the unfertilized eggs assumedly burst from the relatively rough treatment given them by this scouring. The young are slow growing. They take newly hatched brine shrimp as soon as they are free-swimming and have absorbed their yolk sacs. They grow and thrive on freeze dried Fry Treet, loose pack freeze dried tubifex worms and loose pack brine shrimp.

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Well-fed *Aplocheilus lineatus*. Photo by H. Hansen.

## Aplocheilus lineatus

BY TERRENCE D. SOLE

*Aplocheilus lineatus* is a colorful and interesting killifish that has been an aquarium species for a long time.

Usually called just plain "lineatus," this Asiatic killie is very well kept in captivity. A shallow tank is suitable, as the fish is a top swimmer and seldom goes more than a few inches below the surface. The tank should have a large area and be thickly planted. There should be both shady and well lighted areas. *A. lineatus* really enjoys a tank that is half in shade and half in direct sunlight; the fish will merrily chase one another through the sunny arch and back into the shadows. The water conditions are not especially critical, but the best water is slightly acid and relatively soft.



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Aquarium-bred *A. lineatus* males vary considerably in coloration from individual to individual, depending on age and conditions under which they were raised, natural populations of the species also show considerable differences. Females vary less markedly than do the males. Photo by H. Hansen.

The temperature should be about 75° to 78°, but the species takes a drop in temperature very well. A tank housing *A. lineatus* should be tightly covered at all times; like many other killifishes, they jump.

Feeding this fish is not difficult if the food is kept at the top of the tank. They prefer food at the surface but will go down if it is necessary. They readily eat flake foods and other dried foods, white worms, daphnia, mosquito larvae, and enjoy freeze-dried tubifex worms very much. They will also eat any young fish small enough to be swallowed, so bear this in mind when choosing tankmates.

Spawning *A. lineatus* is a relatively easy procedure. The parents should be conditioned on live foods or frozen foods for about two weeks before the anticipated breeding. There won't be any special outward signs that they are ready except that they will be plump, colorful, and active. The pair should then be placed in a tank by themselves; the tank can be of any size,



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The male presses against the female during spawning maneuver near a growth of plants; although fine-leaved plants can be used to receive the eggs, most breeders who want to produce fish in quantity use nylon spawning mops in breeding *A. lineatus*. Photo by Horst Abel.

but a small one seems to hurry the process by cutting down the area of chase. The best spawning medium is a nylon spawning mop, and the longer the mop, the better.

The male should first get the urge to breed and start chasing the female around until he can force her into the mop. To do this the male may get quite nasty, and on occasion I have had the male kill the female. One way to avoid damage to the female is to use more than one female to each male. The male and female go into or very near the mop side by side and deposit the eggs. The spawning goes on for about 10 days, and the eggs should be removed every day. The eggs are not delicate. They can be removed from the mop with the finger but should be removed with forceps or tweezers, taking a few strands of wool with each egg so that they're not touched. The eggs should then be placed in damp peat moss and into a dark jar





Well suited by shape and temperament to existence as a predator, *A. lineatus* is a very capable hunter and will seek out and swallow fishes smaller than itself, but it is not usually quarrelsome with any fish that it doesn't regard as food. Photo by S. Frank.

where they are stored away from the light at a temperature of about 75°F for about two weeks. It is not strictly necessary for the eggs to be placed into peat moss, and many successful breeders neglect this process entirely, letting the eggs hatch in water. Some breeders don't even remove the eggs from the spawning tank, preferring to remove the parents instead while leaving the egg-laden mop in the tank.

The eggs, which should not touch one another, should be checked every few days and the white fungused ones removed. At about two weeks the eyes of the fry should be showing and they should then be placed in a small tank containing water from the breeding tank. When the young hatch they should be fed large infusoria for the first day or two. After that they should receive micro-worms and baby brine shrimp. They should be fed foods according to size and separated in size, as some grow faster than others, and the larger may eat the smaller. The young grow rapidly on a good diet of live and frozen foods.

This is a good fish for someone who has not bred killies and wants something a little different or challenging.

*A. lineatus* is not seen as often as it should be, but if you can get a pair or two, by all means do so, as this is an interesting species to work with.

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BY WILFRED L. WHITERN, F.Z.S.

There are many aquarists who, during the summer months, acquire a venturesome spirit and enjoy searching for quiet spots in which may be found small pools containing quantities of live foods for their tropical fishes. Unfortunately these spots are not readily available, especially in areas of dense population, and require diligent effort to locate, often requiring a journey of several miles.

Although hobbyists today have available to them a large variety of safe, nutritious foods in the form of dried, frozen and freeze-dried substances, many keepers of tropicals like to offer their fishes occasional or even regular feedings of live foods anyway. For the most part this is a good idea, provided that the users of live foods take care to prevent the introduction of fish enemies and the causes of epidemic diseases along with the live food.

(Enemies of fishes that are likely to be introduced into a tank along with live food will be covered in a future column.) Now, even though most hobbyists who do use live foods usually buy their foods at a tropical fish shop, some hobbyists like to collect their own, and START SMART this month is devoted to exactly that topic.

Collected live foods can be divided into three major groups: crustaceans, worms and insect larvae.

### CRUSTACEANS

**Water Fleas (*Daphnia*, etc.)**—Various small crustaceans of the genus *Daphnia* are not too difficult to locate, as they inhabit most stagnant woodland pools. Congregating in large masses, they are easily detected because when they are present in sufficient number they tend to color the water with the same color as their bodies,

which vary from red to tannish brown to cream . . . and sometimes even green.

As a live food they have a very high nutriment value, but they should be fed sparingly every other day to avoid complications to the dietary system of the fishes.

### Fairy Shrimp (*Eubranchipus* sp.)

—This variety of live food is probably the first that can be collected, being available in most small lakes or ponds as soon as the ice begins to break up in the early spring.

Much larger than the daphnids, fairy shrimp swim on their backs, near the surface, exposing their

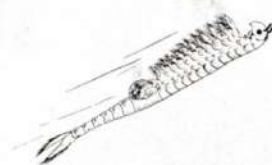
feather-like appendages that are attached to the forward portion of their bodies. These appendages vary in color, having either a bronze, green, blue or red tinge.

These feather-like appendages are equipped to achieve a combination of functional purposes—they are gill feet that act as a breathing apparatus and a propellant for swimming; the gill feet even incorporate a chewing base which helps them to manipulate their food.

The remainder of the body is slender, with a few hair-like appendages at the posterior extremity. Fairy shrimp can be maintained for several weeks when placed into a separate aquarium containing water that is sustained at a water temperature of between 45 and 60 degrees Fahrenheit to maintain them.

**Cyclops (*Cyclops* sp.)**—These are small aquatic animals, found abundantly in most small stagnant pools that have masses of aquatic vegetation; they have a greenish tinge or may be entirely colorless. They derive their name from the mytholo-

*Eubranchipus vernalis*



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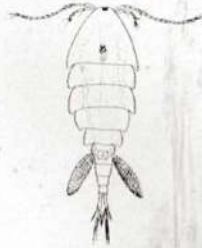
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gical Greek giant Cyclops, having only one eye located in the center of the forehead.



Cyclops

These are a very excellent live food for young fry and will live longer in an aquarium than most other live foods, the possible reason being that they swim much faster and are not as easy to be caught by the fishes.

**Fresh-Water Shrimp (*Gammarus* sp.)**—These are crustaceans often referred to, in the same manner as daphnids, as water fleas, although the disparity in size belies this synonym. Actually because of this larger size they are suitable only for the larger species of tropical fish; some of the cichlids love them.

Invariably they are indigenous within areas close to the bank in which there is an abundance of aquatic vegetation and roots of trees or bushes that have extended

into the water. They thrive on the vegetable detritus which usually abounds in these areas and where the water is more liable to be shallow.

This is one species of live food that can be maintained, bred and sustained, during the summer months, in a shallow, well shaded garden pool that contains dense aquatic vegetation.

Being very slow growing, gammarids under six months old are ideal for food for the smaller species of tropical fishes.

**WORMS**

**Tubifex Worms (family Tubificidae)**—These worms are a very popular live food, and may be located in any areas close to water that is polluted, particularly if that pollution is caused by direct sewage infiltration.

They absorb oxygen through the tail and because of this they burrow into the mud but leave their tails sticking out, but these are quickly retracted upon the slightest noise or sound of footsteps. They are reddish in color, which makes them very easy to find, as their red tails sticking above ground give the area a reddish tinge.

Considered to have a high nutrient value, they are excellent as a live food supplement, but their value has been questioned because of problems that may arise when fish are fed these worms. There is a logical answer to these problems that only requires a close examination of a few sample worms. If held



Tubifex

an area surrounding a local filtration plant, but I have always followed this procedure and have never experienced any kind of problem with fish that have been fed with this food.

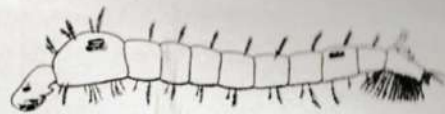
To extract the worms from the mud is very simple; all that is required is a one gallon glass jar half filled with water, in the neck of the jar place a wire bird's nest. Take a tin that has the same diameter as the nest and place in one end a porcelain electric socket and using a 100 watt bulb place immediately over the nest after it has been filled with the mud containing the worms. In less than a few minutes, the worms will come through the wire mesh of the nest and drop into the water. They will mass into a tight ball and may be kept for several days if kept in cool water that is changed each day.

**INSECT LARVAE**

**Glass Worms (*Chaoborus* larvae)**—These are one of the first of the live foods available, obtainable as soon as the ice on river, lake or pond begins to break up; they usually swim close to the surface. Being transparent they are very difficult to locate except that their



According to reports from Peking, Red Chinese authorities have condemned goldfish breeding (along with playing chess and cards and a few other activities) as an example of a "bourgeois custom" that has a tendency to distract young people from their proper revolutionary fervor.



Chaoborus

black eyes quickly divulge their presence. Early evening is the most opportune time in which to collect them. One favorable aspect is that they may be maintained for several days in a separate aquarium provided the water temperature is not above 55 degrees; they may be kept in a crowded condition without any ill-effects. Fed sparingly to the fish they are invaluable as a food because of their high nutrient value.

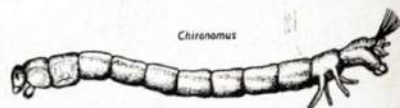
**Bloodworms (*Chironomus* larvae)**

—These larvae are very abundant through the summer months. Although the majority of the larvae prefer to burrow into the bottom mud, there are always a sufficient number that loiter and wriggle at

the surface of the water. They can be collected very easily with a fine-meshed net and are a very acceptable and palatable food for the fish.

**Mosquito Larvae (*Culex* sp.)**

—Found in great abundance during the late spring and early summer in practically every non-moving body of water that has not been specifically treated for their eradication. They are not too difficult to locate or distinguish, as they have the habit of always being found wriggling head-down near the surface, a position required because of the location of their breathing apparatus. Mosquito larvae should be fed immediately and not more than the fish can eat, otherwise you are likely to have some unwanted mosquitoes flying around your home.



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by paul hahnel

## GUPPY corner

Small male

Q. I have an aquarium of common guppies and am doing very nicely with them except for one male. This fish is about 7 1/2 months old and is only about 2" long. With the exception of one spot just behind the gill plate and one on the caudal peduncle he does not show any color. He has not shown any sex changes at this point as his anal fin is still rounded. What is wrong with this fish, and what do you advise me to do?

Allen Stevenson,  
Chevy Chase, Maryland

A. The fish you describe is obviously a runt. These are of no use to anyone interested in breeding fine guppies. The only thing to do is to cull it.

How many guppies?

Q. I recently purchased a 25-gallon tank and would like to know how many

fish it would be possible to keep in it comfortably. How often should the water be changed?

Edith Verleigh,  
La Jolla, California

A. A 25-gallon tank could take 40 guppies provided adequate aeration and

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57

### Tropical Fish Hobbyist

filtration exists. You should change (or replace) 3-4 gallons of water per week. The new water should be the same temperature as that of the water in the tank when you add it and should have been allowed to age for several days. Avoid metal containers for storing or aging water.

#### Discoloration

Q. One of my good male guppies died recently. Before he died he became very sluggish and his fins became very dark. I have now noticed that some of my other fish are exhibiting the same symptoms. What is the nature of this disease, and how can I save my other fish from becoming victims to it.

Stanley Racowicz,  
Tenafly, New Jersey

A. It is common for fish to become discolored prior to death. Unfortunately it is often too late to help the fish by the time such discoloration is noted.

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#### Lighting

Q. I am setting up a 10-gallon tank in which I plan to raise some guppies. How much wattage will I need in order to light the tank properly? My home is well-heated, and in past experience I have maintained my aquariums at a steady 80 degrees.

Fred Douglas,  
Birmingham, Michigan

A. A 25-watt bulb will probably be sufficient for your needs. In estimating wattage you should also take into account the kinds and number of plants you maintain as some require more light than others. I would also suggest that you try to maintain a lower water temperature. As a rule guppies don't do well at temperatures of 80 degrees or over.

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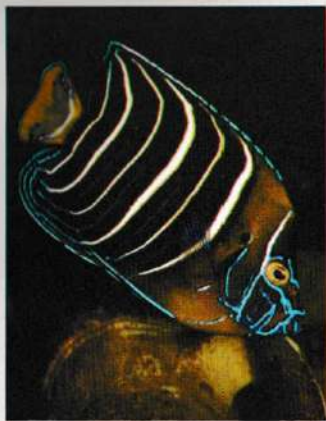
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58





## salts FROM THE seven seas

BY ALFRED A. SCHULTZ

**Q.** What is considered to be a sufficient amount of artificial light for the salt-water aquarium? Is there a possibility that too much light, artificial or otherwise, can cause fouling of the aquarium?

Robert Siegel

**A.** A 15-watt fluorescent light run for two hours a day is enough for a marine aquarium. An overabun-

dance of light will result in a heavy growth of algae. This will not foul the water and some of your fishes may enjoy it as an item of diet. It will affect the clarity of the water and take away some of the visual beauty of the tank however. What you should be careful of is to be sure that the inside surface of the reflector is not directly exposed to the water, as



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this may result in some costly, unnecessary losses.

**Q.** I have a 20-gallon tank I would like to use as a marine aquarium. Will this size tank be sufficient for Moorish Idols, or would I be better off with a bigger tank?

Dennis Duncan

Guelph, Ontario, Canada

**A.** You have not said anything about the size of the fishes you plan to get, but it's safe to say that a 20-gallon tank would be too small for these fishes in most cases.

**Q.** I have become interested in the yellow tang. Are they considered a hard species to keep in a marine aquarium? Where can I purchase this fish?

Kathy Norris

Canandaigua, N. Y.

**A.** The yellow tang (*Acanthurus flavescens*) is a native of the Florida coast. For the marine aquarium it is best to have specimens under three inches. Young fishes are bright yellow, and mature to an attractive blue color. It will take both dry and live food, and, once acclimated to the aquarium, is hardy and generally long-lived. Write to the marine dealers whose displays appear in this magazine as likely sources of supply for good fishes.

**Q.** Is there a preference between sand and gravel in the marine aquarium? If so, which is preferred and why?

George Sanchez

Novato, California

**A.** Silicate sand is best. It is pure white so is quite attractive, packs down hard so food cannot be buried under it to foul the tank, and what is not eaten can be seen. Some people who use a corner box filter do not cover the floor of the tank at all.

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### Tropical Fish Hobbyist



Marine angelfish, *Chaetodon kleinii*

**Q.** I have heard that it is considered unwise to keep two species of marine angelfish in the same tank.

Is there any way of keeping them without having them fighting among themselves?

Rita Clement

Willow Grove, Pa.

**A.** If you're thinking of keeping different species of marine angelfish in the same tank you would be better off to forget it. Most will pick on each other constantly, and two of the same species will always

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# MAIL CALL

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

### Labotropheus trewavasae

**Q.** Recently my *Labotropheus trewavasae* mouthbreeders spawned and everything went well until the eighteenth day. The female released a total of five fry one by one. Each one was about one half inch long and swam about the mother for about an hour. Then they would begin to swim erratically and die. When she released the last one, I caught it and moved it to another tank, where it survived and after two weeks is doing fine. I would appreciate any information you can give me on this species, especially what happened to these fry.

**Ed Jablonski**  
Chelmsford Massachusetts  
**A.** This fish is sometimes called the red top cichlid because of the red dorsal of the male. It comes from Lake Nyasa, and although it is highly adapted for scraping

algae from rocks, in the aquarium it accepts animal foods with relish. I have no idea what the problem was with the fry.

### Spawning Neons

**Q.** I have 15 neon tetras which are in good health. I tried to spawn them in a full 10-gallon aquarium and in one with only four inches of water. I have tried both bright lighting and dim. I have tried pairs, trios with two females and trios with two males, but no results. My water is soft and ideal for tetras so I haven't worried too much about that aspect. Do I need to separate the males and females prior to spawning?

**Eric Mitchem,**  
Victoria Park, Wales

**A.** There is an excellent article on breeding the neon tetra in *Breeding Aquarium Fishes* by Dr. Herbert R. Axelrod. You say your water is soft. Chances are that it

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### Tropical Fish Hobbyist



Neon tetras spawning

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is not soft enough. Try rain water or distilled water in small all-glass aquariums. Allow the water to age from two to four weeks before attempting spawning. The water must be crystal clear and the aquarium absolutely clean. The breeders should be kept in separate aquariums in similar water. Use pairs in a dimly lighted situation. If one pair does not spawn in 2 days, try another.

#### Bullied Oscar

**Q.** When I bought my oscars they were an inch and a half long. At that time my four-inch firemouth attacked them constantly and they never fought back. Six months later my oscars are nearly six inches long and the firemouth, still only four-inches long, continues to attack them and they still refuse to defend



Firemouth, *Cichlasoma meeki*

themselves. These same oscars do attack my eight-inch Jack Dempsey. When my oscars are nearly a foot long and my firemouth is still only four inches, will things still be the way they are now, or will my oscars finally start acting like oscars?

**Jon Kaufman,**  
Metuchen, New Jersey

**A.** This is a perfect example of conditioning. Just as Pavlov's dog salivated at the sound of a bell even when there was no food, your Oscars learned to fear even after the real danger was passed. Of course the firemouth is conditioned too. Chances are that a different firemouth would give the Oscars the right of way and they would then learn their normal role.

70

### June, 1969

#### Cancer

**Q.** I have a small batch of young swordtails which are pink in front and pure black behind. They were doing fine until about a month ago when in the black region they developed large black bumps. I have looked in every book I can find, but I cannot find a cure. What do you suggest?

**Mary M. Stein,**  
Seattle, Washington

**A.** Your swordtails have an hereditary skin cancer known as melanoma. It is caused by the interaction of several genes found in this genus. Although these have proven valuable for cancer research, it is undesirable in aquarium fishes. There is no cure. In general the more black a sword-tail has, the more likely it is to develop cancer. For example, a snag tuxedo is much more likely to develop the cancer than either a wag or a tuxedo.

#### Discus

**Q.** I have seven discus in a 105-gallon tank. They are two blue Heckels and five browns. The tank is lighted with Gro-lux light for about 16 hours a day.

1. Can the blue discus interbreed with the brown?
2. Can two or three pair breed in the same tank at the same time?
3. Will the light affect their breeding success?

**Ralph Gluck**  
Sun Valley, California

**A. 1.** The blue and the brown discus will

interbreed. This is one reason that the validity of calling them two species is questioned.

**2.** Two or three pairs will breed in the same aquarium if they have enough space. Your aquarium is probably too small.

**3.** It is widely believed that plant lights are harmful to fishes or their spawn. There is no evidence that this is the case.

#### Blue-Green Algae

**Q.** I have three aquariums which are infested with blue-green algae. It has a strong smell and covers everything. It comes off quite easily, but within a week it is back again. How can I get rid of it?

**Chris Anderson,**  
Porterville, California

**A.** This is one of the most difficult kinds of algae to eliminate. I know of no fish

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71



which will eat it. Snails do not seem to touch it either. Some of the commercial algicides will kill it, but then the decay of the plant causes an even greater smell than usual. Once it is killed, the aquarium water can be changed and the algicide used as a preventive measure. Blue-green algae flourish under incandescent lights. Fluorescent plant lights seem to prevent its growth.

Pararara

Q. I have a South American catfish that the dealer called a pararara catfish or Amazon tiger catfish. I would like to know its requirements and the total size it could attain.

P. Wettlaufer, Toronto, Ontario

A. The scientific name is Pseudoplatystoma fasciatum and its requirements are



Pseudoplatystoma fasciatum

identical to its more common relative Sorubim lima. It thrives on canned dog food. It reaches over four feet long in nature.

Chlorine

Q. I have several aquariums and I find myself constantly in need of water. How do you keep enough dechlorinated water on hand to take care of several aquariums?

Lois Vilmanyi, Mays Landing, New Jersey

A. There are a number of alternatives to using a dechlorinating chemical. One is to do nothing at all. Many aquarists use water directly from the tap because they have learned that it takes a great deal of chlorine in the water to affect fish.

Chlorinated water has an offensive smell when the concentration of chlorine is that high. Another procedure is to draw water into a plastic container such as a garbage pail and let it stand for several days. Another is to draw hot water into the bathtub and let it cool. Chlorine escapes faster from hot water than cold.

Ich Cure

Q. I have found a method for curing ich which never lets me down. When ich is discovered in an aquarium I add one drop of 0.75% malachite green solution for each gallon of aquarium water. This treatment is repeated every 24 hours until the small white cysts disappear. The same dosage is added then every third day for six days. During this time charcoal filters are shut off. Malachite green disappears spontaneously from aquarium water.

Jonathan W. Bonds, Ocean Beach, California

A. I once thought I had a sure cure for ich using quinine sulfate. It was not long before I discovered outbreaks I could not cure with quinine. Perhaps yours is more sure. Malachite green does not disappear from water. It is converted to a different form which does not show up in the water. Portions of the water should be changed over a period of time to rid the aquarium of it.

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Serpae Tetras

Q. I have just acquired two serpae tetras and after having them in my community tank for a few days I noticed my male and female mollies had torn fins. After that, two cardinal tetras disappeared and four out of nine molly fry were missing.

1. Are the serpae responsible for my losses? 2. How should these tetras be bred?

Sue Fridd, Rochester, New York

A. While some of the damage might have been caused by the serpae, not all of it can. The torn fins and missing fry might have been the result of adding the serpae, but



Serpae tetras

the missing cardinals disappeared for some other reason. Tetras and barbs which tend to be nippers should be purchased in groups of at least four. When this is done these fish spend more time watching out for their own fins and less time nipping at their tankmates.

2. Serpae are among the easiest of tetras to breed. They do require soft water and bushy plants. They are avid egg eaters.

Sodium Poisoning

Q. It has been my experience that many plants will at first thrive and then suddenly die. If conditions were right

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for them in the first place I don't understand why they die. I use an outside filter and a water softening filter as well.

Robert J. Richter, Norristown, Pennsylvania

A. Water softening filters add sodium ions to the water. In low concentrations, these ions have little effect on plants. If, however, they build up, they can cause plant deterioration. Sodium ion concentrations can build up if you replace evaporated tank water with tap water. The filter adds more sodium ions as it removes calcium and magnesium ions from the water. Since sodium does not evaporate, the concentration can reach high levels after a few months.

Horse-Face Loach

Q. I have a horse-face loach which is about four inches long. It spends most of its time burrowed beneath the sand. I would appreciate it if you would give me any details about it.

John R. Purves, Edinburgh, Scotland

A. A native of Southeast Asia, Acanthopsis chirotychus grows to about 6 inches in length. It is largely nocturnal and feeds on a variety of foods including tubifex and white worms. It is harmless to small fishes and moves a great deal of sand both by burrowing and by taking it in through the mouth and expelling it from under the gill covers. Its breeding habits are unknown.

Pop Eye

Q. Two of our Jack Dempseys developed pop eye. In Exotic Tropical Fishes there is a description of a disease called exophthalmia. There is no treatment listed and there does not seem to be much known about this condition. Has any treatment been found?

Mary K. Bengie, Salt Lake City, Utah

A. Exophthalmia may be caused by more than one factor. In at least some cases it has been proved that bacteria cause a buildup of gases behind the eye, forcing it out of its socket. Some authors recommend inserting a small hypodermic needle behind the eye to draw off the gas. This seems a hazardous procedure. Although no reasonably effective cure has been described, antibiotics are the best bet.

Selective Ich

Q. Ich has infected some fishes in my tank but not others. My dwarf gouramis and serpae tetras are infected but not the angels, glo-fishes or zebbras. Why does it only attack certain fishes?

Mrs. McGuckin, Hobart, Indiana

A. There is an old saying that all that glitters is not gold. Aquarists could just as truthfully say that all that spots is not ich, but whether you have ich or something else, the question is the same. Certain species, and, indeed, certain individuals, are more susceptible to diseases than others. Some times this relates to the condition of the skin of the fish. If the fish has been ill or chilled the mucus coat might be thin, allowing parasites to gain a foothold.

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Chocolate Gouramis

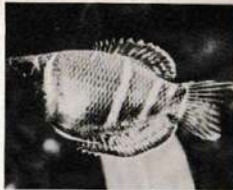
Q. I am planning to purchase some chocolate gouramis, Sphaerichthys osphromenoides.

1. At what pH should this fish be kept? Some books say 7.6 to 7.8 while others say 5.4 to 5.6. I am confused. 2. Does this fish require live food? 3. Are they suitable for the community tank? 4. How are they bred?

Tom Shula, Fort Worth, Texas

A. The chocolate is a fish which deserves a great deal more popularity.

1. pH with chocolates, as with most other fishes, is not nearly as important as water hardness. If the proper hardness is maintained, the pH will take care of itself. Virtually all the chocolates offered are imported wild fish and they demand soft water. I would recommend nothing over 100 ppm.



Chocolate gourami

2. Most imported specimens refuse prepared food at first and it may be necessary to cater to them even to get them to accept live foods. After they are eating these well, prepared food can be offered. They will accept it after a time. 3. Yes, although they are shy. 4. They are mouthbreeders.

ARE YOUR FISH SICK? advertisement for RID-ALL medication.



**Unknown Catfish**

**Q.** We have a catfish which we cannot identify. It resembles *Epiplatys dehaasi*, but it is dark blue with a silver line on the side and with a silver abdomen. The head is quite flat and it has large eyes. There are two pairs of whiskers. Can you identify it?

**Mrs. Gretchen Garvine, Fonda, New York**

**A.** It is impossible to be sure what your catfish is. It is important when identifying catfishes to know whether it has an adipose fin or not. Your fish is possibly *Silurodes hypophthalmus*, an Asian species. This one reaches 14 inches and is suitable for the aquarium only when young. Breeding has not been described. Another alternative would be *Pangasius sutchii*.

**Pangasius sutchii**



**Q.** In a 55-gallon aquarium I have the following fishes: two 4-inch kissing gouramis, four 5-inch blue gouramis, one 5-inch pearl gourami, two 2-inch dwarf gouramis, two 5-inch moonlight gouramis, two 3-inch spotted gouramis, two 4-inch paradise fish, one 3-inch albino paradise fish, one 3-inch Cutter's cichlid, one 6-inch spiny eel, one 5-inch spiny eel, one 5-inch peacock eel, one 4-inch tire track eel, one 4-inch angel fish, one 6-inch hoplo catfish, one 4-inch albino bullhead, three 4-inch bumblebee catfish, four 3-inch corydoras catfish, one 4-inch stinging catfish, one 4-inch porchole catfish, one 4-inch armored catfish, one 2-inch talking catfish, one 2-inch upside down catfish, and one 5-inch plecostomus. Is this combination okay?

**Larry Tobacco, Walnut Creek, California**

**A.** There is nothing wrong with the combination, it is the number of fishes that is astounding. You have 37 fishes with a total length of 142 inches. Allowing half as much air surface requirement for the air-breathers and the eels, you still have over 100 inches of fish. How to Keep and Breed Tropical Fish by Dr. C. W. Emmens recommends 635 square inches of surface in a well aerated aquarium for this many fishes. This is the approximate surface area of a 55-gallon aquarium. Most aquarists would say that the tank

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is overcrowded. It certainly is at capacity and no more fishes should be added. Aquariums which are this close to capacity are particularly susceptible to cloudy water and epidemics of various fish diseases. You would do well to eliminate about six fishes.

**Piranha Tank**

**Q.** I have an aquarium which contains a single piranha. I am having problems controlling algae in this aquarium, and nothing seems to work. I am considering adding a plecostomus to the aquarium to contain the algae. Since the plecostomus is armored, will the piranha bother it? It has been fed live goldfish exclusively.

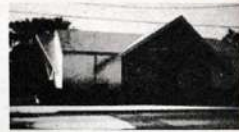
**M. Stolen, Evanston, Illinois**

**A.** Buy the largest plecostomus you can find. The piranha will probably pay little attention to it. It might suffer a few nipped fins before the piranha gets tired of a mouth full of spines.

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**Mistaken Identity**

**Q.** Recently I purchased a pair of fish that I thought were red-tailed black sharks, *Labeo bicolor*, but after I got home I discovered that all of the fins were red and the body never turns black, only a dark brown. What is the name of this fish?

**Robert Grodach, Beachwood, Ohio**

**A.** Your fish are no doubt red-finned sharks, *Labeo erythrurus*. Although they are not as striking as *L. bicolor*, they are worthy additions to your collection. They require the same conditions as *L. bicolor*.

**OOPS!**

On page 53 of the March issue we misidentified a fish shown in a color photograph as *Natropis lutrensis*; in reality, the fish portrayed is a *Hypessobrycon*.

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**Leeches**

**Q.** I found an eel in my aquarium, but I don't understand how it could have gotten into the tank. I have not added any fishes for about three months. The eel was about three inches long when I found it. Could you tell me how it got into my aquarium?

**J. Smith, Brooklyn, New York**

**A.** Although the creature you found was a leech, it certainly looks like an eel when it swims through the water. It probably got into your aquarium as an egg on some plants. I have frequently gotten *Vallisneria* plants with eggs on them from dealers. The eggs look much like those of snails but are hairless and pale brown in color. They are easily removed with the fingernail. When the small leeches hatch they burrow in the sand, where they escape detection. The aquarist usually first sees them when he is washing sand. A startling discovery indeed.

**Leopard Danios**

**Q.** 1. Are leopard danios a mutation of the spotted danio or are they a valid species?  
2. Have leopard danios ever been crossed with zebra danios?  
3. How are leopard danios spawned?

**Scott Simpson, Gainesville, Florida**

**A.** 1. They do not appear to be mutations of the spotted danio. They are much larger than the spotted as well. There is some

**Leopard danios**



question as to their validity as a species.

2. Yes, leopard danios have been crossed with zebrias. This is one reason why there is a question as to the validity of the leopard danio, *B. franki*, as a species. Another is the fact that no location has been given for their occurrence in nature.

3. Leopard danios are spawned just like zebrias.

**Battery Filter**

**Q.** I should like to filter ten aquariums with one large outside filter. Is it possible to avoid contaminating the other tanks with diseases if one tank is ill, apart from sterilizing the filtered water with ozone or ultra violet?

**Karl De Groot, Berchem, Belgium**

**A.** There is no practical way of preventing disease organisms from passing from one aquarium to another in such a set-up. On the other hand, it is no more difficult to treat ten tanks than one, provided you have a cure!

**Growing Plants**

**Q.** I built a 55-gallon aquarium which is lighted with three 20-watt bulbs. The hardness of the water is 325 ppm and the pH is 6.4. I have used the lights for varying lengths of time, but my plants will not grow at all. Why can't I grow plants when my fishes thrive?

**Raymond Lottes, Belle Glade, Florida**

**A.** When the fishes do well and the plants do not, there are two possibilities. 1. The light is improper in either quantity or quality. 2. The plants lack nutritional materials. The latter condition is more likely to develop in an aquarium with sub-sand filters which are being operated too rapidly. This can be cured in one of two ways. First, slow the filter down until the bubbles leaving the stem can be easily counted. Second, put the plants in small pots with some peat moss on the bottom and sand on the top. If your problem is light, and I think it is, there are two things

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to consider quality and quantity. I cannot tell whether you are using incandescent or fluorescent bulbs. Three 20-watt fluorescent bulbs would tend to provide too much light, while three 20-watt incandescent bulbs would provide too little no matter how long they were left on. Your best bet is to use one of the fluorescent bulbs designed to promote plant growth. Select the wattage which comes the closest to having a tube the length of your aquarium.

**Hair Algae**

**Q.** My 29-gallon aquarium is located in a bay window and receives too much light. As a result of this many of my plants have developed hairy green algae on them. I was told that I would have to break my tank down, throw away all my plants and start over. My swordplants and Vallisneria are putting out many runners and growing well and my fish

are healthy. Will I have to do as I was told?

**Wayne Ise,**  
Warwick, Rhode Island

**A.** It has been a mystery to me why aquarists panic about algae. Certainly aquarium water which is pea soup green can be unsightly and even a potential hazard to the fishes should the algae suddenly die, but the type of algae you describe is obviously doing no real damage. If your plants were dying because of the algae, then some steps would have to be taken. You certainly do not need to destroy your plants. This algae



*Prochilodus insignis*

can be easily controlled by one of the algae-eating fishes. *Placostoma* and Chinese algae eaters are among the most popular such fishes and kissing gouramis are moderately good for this purpose. If you want an unusual and efficient algae eater, try a *Prochilodus insignis* (if you can find one).

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**YOUR FISHES' HEALTH**

**PLISTOPHORA**

By  
**Roger Lee Herman**

spores are generally released only when the fish dies and decays. Apparently new fish take in the spores with food, perhaps as a result of picking at dead fish, as we have all seen fish do.

The ingested (eaten) spore breaks open and the sporoplasm inside crawls about like an amoeba. It enters a certain type of cell and begins to divide, forming what is

Fish parasites of the genus *Plistophora* belong in the order Microsporidia of the class Sporozoa. Sporozoans are tiny one-celled parasites that form spores resistant to unfavorable environmental conditions and to many chemicals.

Microsporidians form very small spores enclosed in a one-piece shell. They live inside the body cells of the host. Most species are parasites of insects but several, including those of the genus *Plistophora*, are common in fresh-water and marine fishes.

*Plistophora* infestations cause swellings of varying size in the muscle of the affected fish. Larger swellings are soft and when cut open appear to be full of a pus-like material composed of spores and cell debris.

Transmission of the infections from one fish to another is not understood. The spore-filled cysts seldom seem to rupture while the fish is alive. It is assumed that the



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called a "meront" or "schizont." After a period of dividing, spores are formed. At this stage, the fish cell has been destroyed.

One might suspect that this is the end of the cycle until the fish dies, and this is true of some microsporidians. However, the size of the cysts formed by *Plistophora* suggests that the spores release the sporoplasm within the cyst to again divide and form more spores. This process, called autoinfection, results in increasing the swelling's size. Spores may escape into the bloodstream and be transported to other sites where they form new cysts.

Fish infested with *Plistophora* may show symptoms in addition to cysts. Loss of color has been reported, especially with neon tetras.

This disease has even been called "neon tetra disease." Fish may swim in a tail-down position. Emaciation and sunken bellies are also symptoms of the disease.

Positive diagnosis can only be made by an experienced person with the use of a good microscope. This is because of the small size of the spores and the slight differences which determine the genus and species of microsporidians.

Unfortunately, there is no known treatment for this disease. Infested fish should be removed and disposed of. Tanks which contained such fish should be thoroughly cleaned and disinfected with a strong disinfectant such as chlorine (bleach). Potassium permanganate should not be considered as effective.

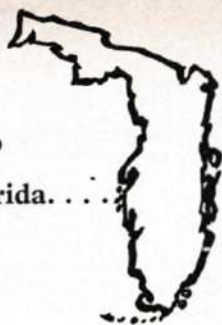
**MURDERERS!!**





## If You're Going to Florida . . .

BY DR. R. J. GOLDSTEIN



Most aquarists do not keep marine fishes for one or both of two reasons: (a) they cost too much, or (b) we just don't picture ourselves donning face-mask and snorkel at our age or physical condition. We may have used a scine some time in the past, but the results of our efforts were usually unattractive fishes or fishes that wouldn't live in our aquaria. Thus, this article presents some fresh approaches toward bringing non-marine people into the fold in a way that can be both enjoyable and, certainly, feasible. You *can* get some nice marine fishes. They will not be the beauties you often see illustrated, as these are mostly reef fishes, but you can get some very odd and exciting fishes nevertheless.

The first problem is when and where to go. Not all of Florida is productive. Practically the entire Gulf Coast is useless, except for a strip extending from about Pensacola to Panama City or slightly eastward. This part of the Gulf Coast is characterized by Caribbean

type waters that flow northward and bring reef fishes to the rocky regions (few, indeed!) of this part of the coast. You will have to be lucky to do well here. The rock jetties at Panama City have beau gregories and other beauties, but they'll have to be trapped or hooked, and that is difficult. For hooks, use #18 or #20 hooks which may have to be put on special order from your tackle shop; they are rarely kept in stock at this small size. You'll need light tackle, because with conventional saltwater tackle you won't even feel the fish bite, especially if you use sinkers more than two ounces in weight. Use a fresh-water light spinning rod and open-face spinning reel loaded with light (4-pound or 6-pound test) monofilament line . . . and make sure you rinse the whole outfit thoroughly after fishing with it in salt water. Fresh shrimp cut into small pieces is the best bait.

If you intend to use traps, then do not use standard minnow traps (double-funnel cylinders), as few reef fishes will enter. Get a couple



Young sergeant majors, *Abudefduf saxatilis*, among the more common species maintained in marine aquaria, are fairly abundant in portions of the Florida coastal waterways and can be caught more easily than many other species. Photo by Dr. Herbert R. Axelrod.

of old window screens and attach them with wire on three sides. The fourth side should be propped open with whatever materials you have available. Buy a mullet (the cheapest bait), tie a piece to a strong string, and lower this fish-on-a-string into the rocks along the jetty. You will catch crabs this way. Place one or more crabs into your screen trap, and step on them in the trap to crush them. The trap should be lowered into the water next to the rocks on some strong cord. Parachute or sailboat cord (400 to 500 lb. test nylon) is not expensive and is very desirable. You will get some beau gregories and sergeant majors this way, and these are nice marine aquarium fishes. Keep only a few

beau gregories in a tank, as they are very territorial and will fight viciously.

The other area of Florida that is most productive is the southern Atlantic coast, from about Fort Lauderdale or West Palm Beach southward to Key West. The southern Gulf Coast is included in this area, but not as far north as the Tampa Bay area; that area is not productive. The hook or trap method may be used, but the trap method is better, especially on the Keys. Again this method will yield beau gregories and sergeant majors. In addition, in both places, you will catch many grunts and snappers of various species. These should not be kept, as most are either not

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Despite its very odd appearance, the Sargassum fish, *Histrio histrio*, makes a most satisfactory aquarium inhabitant and is one of the most common of the fishes captured in floating Sargassum weed. Photo by Dr. Herbert R. Axelrod.

hardy (grunts), or too vicious (snappers).

The easiest way to collect marine fishes, however, without attracting undue attention from snickerers, and without any but the slightest effort, is to go to the beach like everyone else, but carry a very large dip net (about 10" size) and a Styrofoam<sup>®</sup> box or plastic pail. The box or pail should be covered and protected from the sun. The water should be changed several times in the course of a day to keep it cool. Go during the summer months when hotel and motel rates are cheapest.

Along the Atlantic coast swimmers are always distressed by the frequent appearance of "seaweed." This consists primarily of Sar-

gassum weed, and it is the greatest stuff in Florida! The weed is yellow to brown, usually floating by means of tiny berry-like floats all through it, and occurs in isolated patches a few inches in diameter to masses ten feet in diameter or more. Go into the water from waist to shoulder height, and scoop this material up in your large dip net. Shake it vigorously while it's still in the net, lift it out by hand, and throw it away. Your shaking will yield a profusion of goodies. Most of what you get will be tiny shrimp, from a quarter to an inch long, and bright yellow or dark brown. These shrimp are great fish food, but they're hard to keep alive, so don't keep many with your fish. Other



The beau gregory, *Pomacentrus leucosticus*, is highly aggressive but one of the most colorful of the fishes that can be caught by shore-based fishing in Florida waters; this is a young specimen. Photo by Dr. Herbert R. Axelrod.

shrimp may be green with dark stripes, or absolutely colorless, like drops of glass. Throw all shrimp away or use them in slight amounts for food. Small swimming crabs will also be found. These should be discarded as well, as they rarely live very long. The most common fish you will catch will be several species of filefishes. You will get many more than you need, so don't be a hog. Keep only a few. The filefishes you'll catch are flat, diamond-shaped, and blackish to mottled yellow-brown. They resemble triggerfishes in shape. Filefishes do not seem to live very long in marine aquaria (in my experience), but while alive they eat well

and are nice animals to have. They will take the standard fares, including frozen adult brine shrimp or minced clam. They love to attack live shrimp.

The next most common fish (that you can identify) will be the Sargassum fish. This fish looks like the seaweed itself and is a marvelous aquarium fish. They will eat other fish almost their own size, so they should be kept isolated. A gallon jar makes a nice aquarium for one of them. They will eat in the dark, so don't try to ship them back together with your other fishes. They will also eat each other. The best food consists of young mollies or other species which are weak or old and

should be destroyed anyway. You can haunt your local shop for dying fishes and use whatever you scrounge for food. Food for the Sargassum fish should be moving, so living fishes are best.

Other fishes found in the floating weed will be small jackfishes (family Carangidae), which will be silvery, silvery-yellow, blotched, or silvery black. They breathe very rapidly, and you can use this sign for an off-the-cuff "identification." Jackfishes are hard to keep and should be discarded, or kept separately for Sargassum fish food.

Now to some of the unusual things you may catch in the floating weed. One fish is very tiny and looks like a little black berry. I don't know what it is, but it may be a baby trunkfish. These do well in aquaria for a while. Slightly larger, and easily identifiable, is the baby spiny boxfish. These puffers make nice marine aquarium fish. You will pick up an occasional pipefish, which are also easily kept, but should be fed live baby brine shrimp. A rare find (I have only one) is the tripletail. This fish grows, in nature, to a few feet in length, but there is no such worry in the aquarium; you'll be lucky to keep it alive a month. They are fussy eaters, flat, and resemble Scats to a remarkable degree, even to a hint of reddish about the head. In the floating weed you'll also find some sergeant majors on occasion, usually together, and these should be given special care as they are very desirable fish and not often found in the weed. Occasionally

you'll pick up a spadefish (they look like freshwater angelfish), but these should not be kept, as they are not hardy in the tanks of the beginner. Young snappers will also sometimes be found.

You will also see weed that is not floating, but seems to collect in masses on the sand in the water. Scoop into this material. It is usually blackish in color, and here you will get most of your pipefish, spadefish, and snappers. The two most common snappers are the dog snapper (with brown bands on the sides and a blue streak below the eye on the gill cover), and spot snapper (silvery, with yellowish fins, some red margins on the spiny dorsal, and an ocellus on the rear flank). The dog snappers are vicious. You can keep the small spot snappers, and even very small dog snappers, but don't keep dog snappers larger than  $\frac{1}{2}$  of an inch. Try to keep only those snappers (of all species) which are smaller than anything else in the tank. And keep very few.

An occasional find in the bottom weed is the young of the lookdown. The lookdown resembles a threadfin, but can easily be distinguished if you have a photo or drawing of either. The young lookdown doesn't keep very well, but it's nice to have it for the few days it does live. A fantastic beauty!

There are many other things which you might find in the seaweed, but this should cover most of them. The watchword is trial and error, together with plenty of room.



*Biennius cristatus*, one of the Florida biennies, is a lot less colorful than some other fishes in its genus, but shares the interesting habits of the other biennies. Photo by H. Hansen.

Bring along several Styrofoam<sup>®</sup> boxes and many plastic bags and rubber bands. A cylinder of oxygen is great to have, but not absolutely necessary. Nonetheless, its use will give you great peace of mind and also enable the bringing back of things that might not survive the trip otherwise.

Another place to use your net is along pilings or breakwaters or the encrusted beach dividers between private and public beaches. Use the net two ways. Along the sand for the length of the structure will yield snappers and some sergeant majors. Scooping against the wall, in a scraping motion, will yield very nice little biennies. These resemble gobies and make nice aquarium

fishes. You may also pick up a sea urchin or two. You can try to keep one or two small ones, but don't try to overdo the invertebrates in your tank. They are harder to keep than the fishes. A couple of crabs are nice to have, but these should be walking, rather than swimming, crabs. Look at the last pair of "legs." If they are flattened at the tips like tiny oars, don't take them. If they are pointed like the rest of the legs, then they are okay to try. The best, of course, are the hermit crabs. These live in shells of molluscs and are found scurrying along the bottom, usually in shallow waters. The shells that they carry often are not very pretty. Throw in some pretty shells from a shell shop (after care-



### Tropical Fish Hobbyist

ful washing), and sooner or later the crab will switch homes. Keep plenty of shells in the aquarium to accommodate the crab as it grows.

Now what about the aquarium itself when you get home? The best aquarium is the all-glass tank put together with a neutral silicon compound. Use very little light, and it should be cool white fluorescent. You don't want to grow algae! The filtration system should be basically a deep undergravel filter. Three inches of standard natural gravel, mixed with small broken shells from the beach, is ideal. You can also add an outside filter, but the undergravel filter is essential to ease of maintenance. Synthetic salts are cheap enough to warrant their use. You must have a hydrometer. If your shop doesn't have any, ask your surgical supply house for a urinometer; they're the same thing. The water should have a specific gravity of 1.025. A little handbook on the marine aquarium is a must. I also believe that about  $\frac{1}{2}$  to  $\frac{1}{4}$  of the water should be natural sea water, so plan on taking some back with you.


How do you get your fish home?

**NOTE:** Anyone who wants to try his hand at collecting fish, whether they're freshwater or marine species and whether the fish are for his own use or for resale, is best advised to check with the conservation officials having jurisdiction over the area in which he intends to operate. Although there are normally very few restrictions relating to the capture of non-gamefish salt water species, this may not always be the case. Again, even when collecting in areas without restrictions of any kind, NEVER TAKE ANY MORE THAN YOU CAN USE.

We've already indicated plastic bags, Styrofoam<sup>®</sup> boxes, and oxygen (optional). Carry a 1-gallon size Styrofoam<sup>®</sup> ice box in the car, and fill it with ice from the motel. If you don't have one of these boxes, your motel manager will give you one for a buck; they keep one in every room. On the trip home, periodically put some ice around the plastic bags of fishes. Don't worry about chilling them; they'll be fine. Your only worry is the heat causing death by lowering the oxygen saturation of the water. The fish should be double-bagged, with plenty of air (or oxygen). If your car is not air-conditioned, the ice is an absolute necessity. When you stop to eat, park in the shade and keep the windows open if at all possible; this is not always possible if you have clothes on hangers. Thus, try to store everything of value in the trunk and keep the fish in the back seat. If you stop overnight at a motel, bring the fish inside.

If you're flying, why then (you old son-of-a-gun) you could have afforded those coral fishes in the shop all along! Good fishing!



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