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tropical fish hobbyist

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TRUE HI-FIN LYRETAIL SWORD

tropical fish hobbyist

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cover

Featured on our cover this month is a pair of true hi-fin lyretail swordfish; the top fish is the male. These fish, unlike the "hi-fin" lyretail swordfish we have seen in the recent past, actually have the true hi-fin gene. The other fish are simply lyretails with slightly enlarged fins, a characteristic that seems to be associated, naturally with lyretailedness. The science of genetics is playing an ever-increasing role in our hobby. Talented breeders, armed with a knowledge of this science, are able to select those characteristics they want in a fish, and then, through a series of breedings, they come up with the desired result. One such breeder, Dr. Joanne Norton, tells you all about the new true hi-fin lyretail swordfish in an article that begins on page 4. Photos by Dr. Joanne Norton.

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Pages 33 and 34, 67 and 68. These pages are perforated for easy removal and punched to fit into the Looseleaf Edition of EXOTIC TROPICAL FISHES.

rates

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September, 1967

editorial

I have often thought that hobbyists have a tendency to take dealers and their shops a bit too much for granted. Where would you be without your dealer and his shop? Up the Amazon without a paddle.

Let's forget the obvious fact that without dealers and their stores there wouldn't be a hobby. Recall instead how many times you asked your dealer for advice and he gave it . . . advice that saved you from making a mistake that would have cost you plenty in time or money or aggravation. That advice was free. Did you really appreciate it?

A good dealer is worth his weight in discus. His store is always a nice place to be. His stock is invariably healthy and strong. He is friendly and helpful, always willing to give you the benefit of his knowledge and experience. Don't take all this for granted. If he's busy, don't tie him up with questions that could wait until the next time you come in. If he gets a penny or two more for a fish, don't go to his competitors. There are dozens of ways to show your dealer that you appreciate him. Why not start with a sincere "thank you" the next time he gives you some of that free advice?

Mike Reed

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Tropical Fish Hobbyist



This is a true hi-fin lyretail male. The dorsal fin of this brick red swordtail is much larger than that of any ordinary lyretail male. Photo by Dr. Joanne Norton.

True Hi-Fin Lyretail Sword

BY DR. JOANNE NORTON

Lyretail swordfish, the beautiful new fancy-finned swordtails (*Tropical Fish Hobbyist*, Sept., 1966), are now becoming available to hobbyists. Unfortunately, these lyretail swordfish have been called (enthusiastically) lyretail hi-fin swordtails because their dorsal fins are larger than the dorsal fins of ordinary swordtails. However, this designation is not really accurate: a lyretail swordfish's dorsal fin, which is about the same size in males as in females, is never as large in a full-grown specimen as is the dorsal of a true hi-fin swordtail. Also, lyretail swordfish do not have the dominant gene (H) for hi-fin dorsals. Therefore, a lyretail swordfish should not really be called a hi-fin lyretail unless it has a very large dorsal fin like that of a regular hi-fin swordtail. Actually, all fins of a lyretail swordfish are lengthened to some extent, and the enlarged dorsal fin is only one result tied in with the lyretail character. The true hi-fin gene is not present in a lyretail swordfish that does not have a dorsal fin like that of a hi-fin swordfish. The dorsal of a lyretail swordfish of the type that has been called, mistakenly, lyretail hi-fin swordtail is considerably smaller than that of either a hi-fin swordtail or true hi-fin lyretail.

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September, 1967

After observing that some lyretail offspring are produced by an ordinary swordtail mated to a lyretail sword, I knew that lyretail finnage is due to a dominant gene. I also knew that the hi-fin dorsal is caused by another dominant gene (*Tropical Fish Hobbyist*, Jan., 1967). In order to see the combined effect of both of these dominant genes, I crossed a lyretail sword female with a hi-fin sword male, hoping that some of the offspring would have the hi-fin gene (H) and also the lyretail gene (L). This mating did produce some true hi-fin lyretail swordfish having both dominant genes. Also, in the same brood, were ordinary swordtails (having neither hi-fin nor lyretail fins), hi-fins, and lyretails.

Both lyretails and true hi-fin lyretails begin to get enlarged dorsal fins when about a month old. Because of this, these two types look alike at that age. At about 2 months most of the true hi-fin lyretail males have dorsal

This is an ordinary lyretail male swordtail. The large dorsal fin occurs actually in association with the lyretail characteristic but is not nearly as large as the dorsal of the true hi-fin lyretail swordtail (see photo on opposite page). Photo by Glenn Takeshita.

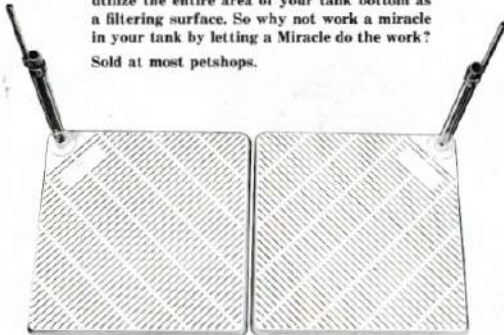


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fins that are definitely larger than would ever occur in a lyretail male, even a full-grown one. At 2 months, female lyretails and female true hi-fin lyretails are difficult or impossible to tell apart, as they may have about the same size dorsal fins. Usually by 3 months, definitely by 4 months, a female true hi-fin lyretail has a dorsal fin like that of a female hi-fin, which is a much larger dorsal than a female lyretail ever has.

Addition of the hi-fin character to lyretail swords has two visible effects, the most obvious one being the greatly increased size of the dorsal fin. The other effect is on the anal fin. In many females, this fin grows much longer in true hi-fin lyretails than in lyretails. The anal fin (gonopodium) of a male true hi-fin lyretail is even more modified than that of a male lyretail. In a male true hi-fin lyretail, the gonopodium has a splintered appearance, developing into a group of about four to six long thread-like parts. None of these parts looks like the gonopodium of an ordinary male swordtail.

Some people have questioned the fertility of lyretail sword males because of the very long gonopodium. However, I have noticed that male lyretail swords have a fin similar in size and shape to the gonopodium of an ordinary male swordtail. This short, gonopodium-shaped part is underneath the very

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long part of the gonopodium, which becomes over an inch long. Even so, it may be that at least some lyretail sword males are either sterile or else not capable of mating. Several virgin lyretail females kept with one lyretail male for several months after they were breeding size never had any young. These females, when put with a hi-fin male, later produced young. Several other virgin female lyretails kept with a different lyretail male did produce young, however. So, perhaps some lyretail males may be fertile, at least when young, while others may not. It would take considerable time and effort to find out what percentage of the males can be used for breeding and at what age. But at least it is helpful to know that this problem may exist in lyretail males. Knowing that lyretail finnage is due to a dominant gene, you can expect some lyretail offspring from a cross of a lyretail female with an ordinary swordtail male. Therefore, if you have lyretail swords that are not producing any young, you can add one or more ordinary swordtail males and get lyretails from this mating. Most of my lyretail females have produced young when kept with fertile males.

Just by looking at true hi-fin lyretail males with their very modified gonopodiums, I suspect that breeding difficulties may be greater with these

This half-grown true hi-fin lyretail sword female shows a large dorsal fin that later grew to twice this size. Some female true hi-fin lyretails have an elongated anal fin like this one does, but others do not. Photo by Dr. Joanne Norton.



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This full-grown ordinary lyretail female swordtail has the large dorsal fin that is associated with the lyretail characteristic. Note how much smaller her dorsal is, however, than that of the only-half-grown true hi-fin lyretail female on the opposite page. Note too that the ordinary lyretail female's anal fin is not elongated. Photo by Dr. Joanne Norton.

than with lyretail sword males. So far, I have had no virgin females that produced young when kept with true hi-fin lyretail males, even though these males do court the females. So, to get more true hi-fin lyretails, it may be necessary to mate either lyretail females to hi-fin males or else true hi-fin lyretail females to either ordinary or hi-fin males. I have true hi-fin lyretail females that have produced young when crossed with ordinary males.

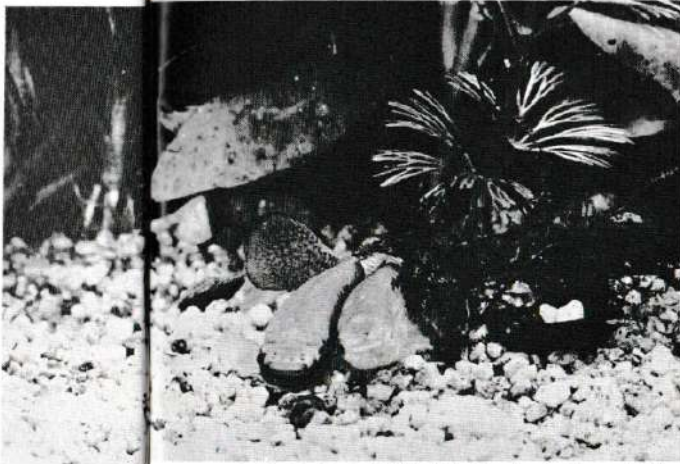
True hi-fin lyretails have beautiful finnage, which does not impair their swimming ability. While the males may not be useable for breeding, this poses little problem in production of true hi-fin lyretails, since all one has to do is keep one or more ordinary swordtail males along with the true hi-fin lyretails. Lyretail females can be very prolific, often producing broods of over 100. One of my lyretail females, mated to a hi-fin male, produced 176 young. I have not had true hi-fin lyretails long enough to get much information about their brood numbers.

Of the fancy-finned swordtails now on the market, true hi-fin lyretails are by far the most spectacular. They should become available to hobbyists some time soon.

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Pachypanchax playfairi

BY RUDOLF ZUKAL
ERNO, CZECHOSLOVAKIA



A pair of *Pachypanchax playfairi* shake side by side as they deposit an egg at the base of some plants. Photo by Rudolf Zukal.

From tropical East Africa and the islands of Malagasy, Zanzibar, and the Seychelles this egg-laying toothcarp was imported into Europe in the year 1924. It was named for its discoverer, R. L. Playfair, and described in 1866, and over the years was known as *Haplochilus playfairi* and *Panchax playfairi*. The German hobbyists call it "Tüpfelhechtling", the spotted little pike.

The fish's body is somewhat rounded, flattened above. The base of the tail is laterally compressed. The general body structure resembles that of fishes in the genus *Rivulus*. The fish attains a respectable size of 4 inches, the female a little smaller. The wide mouth is rounded, and the dorsal fin, similar to those of the other pike-like fishes, is located far to the rear. The back is dark brown and the belly is yellowish. In proper light, the body sides gleam an emerald green. On the head and body sides there are rows of red dots. The unpaired fins are yellow, edged with lighter yellow, and

adorned with red rows of dots. The female is less intense in color, and her yellow fins are without the rows of dots, and the dorsal fin shows one black spot.

These fish should be kept in a medium-sized tank (10 to 20 gallons), which is well planted and also has floating plants on the surface. Good opportunities for hiding should be provided. They require some warmth and, for this reason, should be kept at a minimum of 68° F. Normal tap water is fine with a slight salt addition (1 teaspoon to 2½ gallons of water). This salt is by no means essential.

The fish are sometimes quarrelsome, even toward others of their own kind. Besides a sufficiency of live foods they should be offered young fishes to eat. It certainly is not advisable to keep them with smaller fishes that you value, for this could lead to disaster.

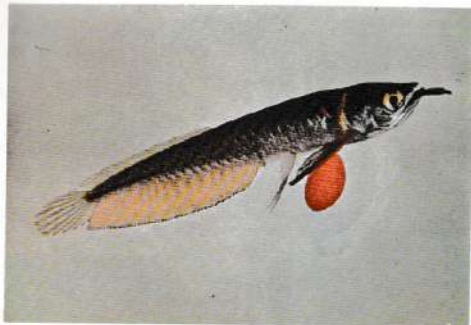


Pachypanchax playfairi should have a well planted tank in which to spawn. The pair in these photos is investigating just such a tank. They spawned later and were photographed. Some of the resultant photos are those shown in black and white with this article. Photos by Rudolf Zukal.



Breeding *Pachypanchax playfairi* poses no great problems. Small tanks may be used for this purpose. The temperature should be raised to 75 to 78° F., and the fish will spawn willingly in the plant thickets, algae, or even in the gravel. They constantly change their spawning sites and also may lay their eggs in the roots of floating plants, as well as among the plants in the middle regions or close to the bottom. The eggs are usually expelled

Continued on Page 37



Arowana youngster with yolk sac. This particular fish was regurgitated from the mouth of an adult that was caught in South America. Photo by Dr. Herbert R. Axelrod.

Arowanas Spawmed - Fry Doing Well

BY TEX MAUPIN

Baby arowanas swimming in and out of their father's mouth! This "first" was witnessed by thousands of customers at my store (Tex's Tropical Fish, in Long Beach, California). Fish hobbyists came from near and far when it was learned that the first successful spawning of this rare fish had occurred.

Osteoglossum bicirrhosum is a "living fossil" (one of the oldest forms of life) and is perhaps the most graceful of all aquarium fishes. It comes from Guiana and the Amazon Basin and reaches a length of 3 to 4 feet. The fish has become very popular in aquarium circles due to its size; beauty; and smooth, graceful swimming motion.

Our spawning of this fish was not something that just happened; it was a result of about 7 years of hard work, including a careful study of the species both in available literature and in our tanks. It was common knowledge among hobbyists on the West Coast that we were attempting to spawn these unusual fish. Some degree of success

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was achieved 2 years ago. At this time a spawning occurred, but there was no embryological development. Since that first spawning there have been two more that were equally disappointing. New males were introduced to try and correct whatever was going wrong. Each time, the eggs were left to fungus on the sandy bottom of the aquarium. They were ignored completely by the parents. All the spawnings occurred at night and were unobserved. Either the eggs were not fertilized by the male or the very necessary mouth care was not carried out by the parents.

This latest spawning, which has created so much excitement, was carefully observed in every detail. A new male, much younger than any of the previous ones, was introduced. The female is about 6½ and the male about 3½ years old. Their respective sizes are 30 and 24 inches in length. Sex differences are as follows: the female is much more full-bodied than is the male. The lower part of the male's mouth extends up and over the upper part. Also, his pelvic fins are longer than those of the female.

Approximately 6 weeks prior to the spawning, a very interesting pattern developed. The male stopped eating, and the female started eating twice her normal quantity. It became apparent that eggs were developing within the female. She got very full, and her breeding tube was visible. Her diet was strictly live goldfish about 3 to 4 inches in length, and she would consume as many as 30 or 40 a day. The male's behavior was almost human at this time. Refusing food completely, he would dive to the bottom of the tank and gather up goldfish which were hiding in a corner or behind a rock. Then he would release them right in front of the female. At other times he would steer the frightened goldfish in the direction of his mate. It was obvious he wanted the female to get all the food she needed during this period. About 2 to 3 weeks prior to the spawning, the pattern reversed itself. The female began to refuse food. She was enormous, and her breeding tube was extended approximately ¼ of an inch outside her body. The male became a voracious eater, consuming as many as 100 goldfish a day. It was almost as though he was preparing himself for some kind of ordeal.

A few days prior to the spawning, the fish began to circle and pass closely under one another. There was also a peculiar head shaking by both fish. This action was similar to that of large cichlids, such as severums and Oscars just prior to spawning. The female paid increasing attention to the male and would often go considerably out of her way to swim beside him.

The spawning occurred on September 18, 1966 at 6:30 p.m. Water

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conditions: pH neutral, temperature 80°F, hardness 18 DH. A 360-gallon aquarium with an undergravel filter and Gro-Lux fluorescent lighting was used. The aquarium was bare except for one large rock and a cluster of artificial plants (plastic) in one corner.

The fish spawned side by side in a slight recess in the sand. There were approximately 150 eggs produced. Then the fish turned, facing each other, and scooped the eggs into their mouths. After this they rose to the surface with their mouths bulging. Of three eggs left on the bottom of the tank, the female picked one up a few moments later. The remaining two were left to decay. The actual spawning lasted only about 5 minutes.

A chronological sequence of the events following the production of the eggs on the 18th of September is as follows:

September 19—There is a marked decrease in the bulge of the mouth of the female.

September 22—Determined that the female swallowed her eggs, since she is starting to pick on the male. Removed female from tank.

September 23—Confirmed the fact that the female has swallowed the eggs by introducing into her tank goldfish, which she consumed immediately. Introduced goldfish into spawning tank. Ignored by male.

September 25—Three ejected egg casings seen floating in tank. Male refused food in form of goldfish. This indicated he still had eggs.

October 4—Sighted brief glimpse of tail of baby arowana in partly opened mouth of male. This occurred when parent fish became excited when he turned into the bubbles from the subgravel filter.

October 6—Tested male with goldfish. Refused.

October 11—Tested with goldfish. Refused.

October 27—Tested with goldfish. Accepted. Goldfish appeared to have been swallowed.

October 28—Goldfish that was taken October 27, ejected into tank.

November 4—Tested with goldfish. Refused.

November 5—One baby arowana observed dashing along water line in tank. Quickly scooped up by father. Size about 2 inches long. Appeared to have no yolk sac but angle of observation made this difficult to determine.

November 7—Floating plants introduced into tank at one end to form hiding place for fry if and when they are released.

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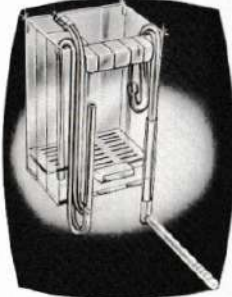
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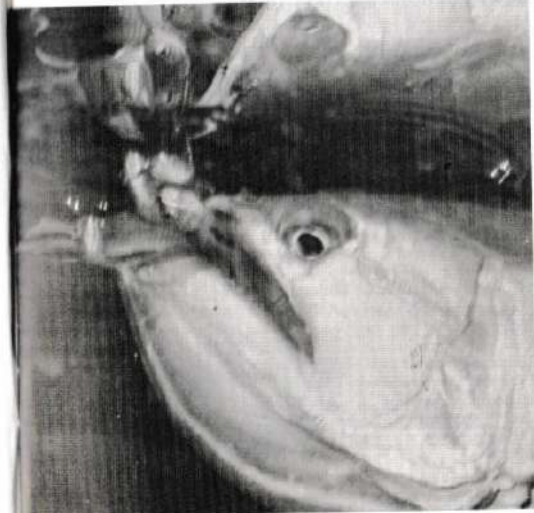
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November 16—One baby arowana observed for 3 minutes swimming around the mouth of male. Slight yolk sac present. Baby was released near surface. When wanted to go back in mouth, nudged the adult in the mouth area. Was then accepted by parent. Subsequently two babies observed out of and going back in parent's mouth.

November 17—Six babies observed. One quite weak. Has nipped fins. Apparently other babies picking on weak one inside the parent's mouth. Introduced suitable food for baby fish (five daphnia, live baby brine shrimp, and adult brine

This picture, taken under poor conditions, shows the male arowana with the young in his mouth. Photo by the Independent Press-Telegram, Long Beach, Calif.



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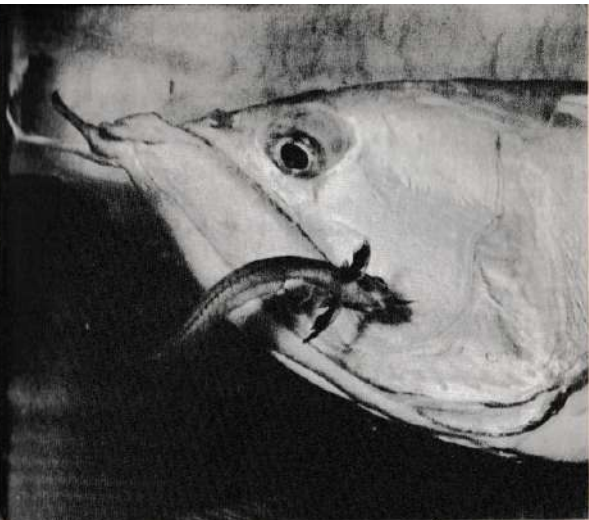
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One of the young arowanas swims close to the protection of the male's mouth. Photo by the Independent Press-Telegram, Long Beach, Calif.

shrimp). Yolk sacs were observed to be almost completely absorbed.

November 18—Anywhere from one to six babies let out more frequently throughout the day. Frequency is about every 20 minutes. The weak one is getting very weak now, being left out of the mouth more by adult. The adult is showing no signs of weakness, having not eaten in 51 days. Baby fish have shown no signs of eating. No interest in food whatsoever. All kinds of live food, including adult brine shrimp, baby brine shrimp, daphnia, and baby guppies are now kept in tank to try to entice baby fish to commence eating. Yolk sacs are now completely absorbed.

November 19—Baby fish out of parent's mouth approximately 50 percent of the time. Two babies have found refuge in the

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foliage in one corner of the tank and remain there, refusing to be taken back in the mouth. Weak baby appears to be gaining strength. Baby fish still refuse to eat although tank is alive with various types of living food as mentioned above. Introduced medium-size guppies to consume part of excess of brine shrimp and daphnia in tank, and possibly encourage baby arowanas to start eating. Also, introduced several small goldfish for the same purpose and to act as food for parent arowana if and when he is ready to start eating. Goldfish are completely ignored by large arowana.

November 20—Baby fish spend about 75 percent of time outside of the father's mouth. Two babies still remain in foliage, refusing to be taken back in the mouth. Weak baby appears much stronger and now swims at surface with the others. Two babies are observed eating adult brine shrimp. Parent fish still not eating, although there are long periods when no babies are in his mouth.

November 21—Parent fish ate three goldfish, his first food in 64 days. Baby arowanas (except weak one) eating brine shrimp. Father refused to take any of the babies in his mouth, although four made numerous attempts to get back in. Two babies still hiding in foliage.

November 22—Baby fish all eating, including the weak one. Babies no longer congregate around father's mouth. They appear to be definitely on their own. Swimming in all areas of the tank. The two babies which were hiding in foliage are out most of the time and hunting for food. Father fish ate 25 goldfish.

November 23—All babies eating ravenously. Formerly-weak baby just as strong as all the rest. All baby fish now eating brine shrimp, daphnia, and guppies. Father ate 35 goldfish.

November 24—Made tragic mistake of feeding babies ahead of father. While babies were snapping up brine shrimp, father fish made one quick pass and scooped up two babies and swallowed them immediately. Father fish was then given 50 goldfish which were consumed in seconds. Remaining four babies removed from tank and placed in 15-gallon aquarium.

November 25—Babies eating brine shrimp, guppies, and daphnia. Growing like weeds. Father eating 50 to 100 goldfish daily.

In summation, the babies have now reached the length of 8 to 10 inches, (April 23, 1967). The breeders are back together in the 360-gallon tank. From their behavior, I would guess that another spawning is not far off.

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Continued from Page 13



The pair of Petchypachox playfairii head for some plants at the bottom of the aquarium to spawn. Photo by Rudolf Zitel.

singly but can also be produced a few at a time, depending on the ripeness of the female.

Spawning is extended over a period of time, and if feeding is sufficient, there is a spawning on almost every day. Unfortunately the fish sometimes eat eggs, and, for this reason, I advise switching them to another tank from time to time and removing the eggs with a glass tube or a pair of tweezers and putting them into a small container. The eggs are protected by a tough shell and are not at all sensitive. They hatch after about 12 days. The fry are about 1/4 of an inch long at first, and are constantly searching for living foods.

YOUR FISHES' HEALTH

BY MIKE REED

Preparation for Winter

In many parts of the world, the coming of the fall and winter seasons requires of the hobbyist a bit of preparatory work. First on the list of things to do is getting indoors any fishes that have been housed outside for the summer. This must be done before the first chilly weather arrives. What a shame if all the fishes that have gotten so strong and healthy in your outdoor pools get exposed to low temperatures that weaken or even kill them.

Keep in mind when moving your fishes indoors to aquariums that you'll need enough room. The fishes have probably grown considerably, and there may be a greater number of them if they spawned while they were outdoors. Don't crowd your tanks. Give any extra fishes that you have to friends, or sell or give them to your dealer.

Of course, it goes without saying that the water in your aquariums should be of the same temperature and chemistry as your pool water. You'll need a thermometer and a pH test kit and hardness test kit to determine this. If the water in the pool is clean enough, your best bet is to fill your aquariums directly from the pool. Any changes you want to make in the water chemistry should then be made very gradually.

Your fishes may find it a bit difficult to readjust to life in an aquarium. Give them plenty of time to make the adjustment. When they return to full color and are eating as readily and as much as they used to, they are once again comfortable in their relatively confined winter homes.

Whether your fishes were outdoors or not, there are several things that should be done in the fall. Chances are that with all your summer activities you have neglected your hobby somewhat. This means you had better give your tanks a good cleaning. If it's necessary, tear a particularly dirty tank down completely and set it up anew fresh and clean. Get all the excess algae off the glass, equipment, and ornaments. Stir the gravel up a little to aerate it. Be sure your filters are clean and working properly.

Get the water level up to where it should be. If this requires the addition of quantities of water in excess of 10% of the total capacity

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of the aquarium, use aged or chemically dechlorinated water.

Chances are that you unplugged your heaters for the summer season. Before plugging them back in, be sure they are suspended far enough into the water for their thermostats to be submerged. (If the thermostat is out of the water, it will operate on room rather than water temperature.) Be sure the heater is working properly. It may have been damaged or become stuck in the "on" or "off" position during the summer.

If you have been using screened aquarium tops to keep your tanks cool, check the wiring in your winter fixtures, and while you're at it clean the stainless steel up. Don't forget to lay in a good supply of bulbs of the wattages you need.

Keep in mind that it is the winter months in which you get the most pleasure out of your tanks. It's also in these months that you have (or are willing to take) the most time in caring for your aquariums. This means that this is a good time to add those fishes and plants that you have wanted but been putting off buying. If you have been planning on buying a new tank, do so at this time.

Many hobbyists like to begin their attempts at breeding a new species or two in the fall. This is a good idea not only because you have more time and energy to devote to such a project, but also because tank conditions (particularly temperature) are easier to control during the cooler months.

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Tropical Fish Hobbyist

The Joys(?) of Keeping Tropical Fishes

BY STELLA SWAIN RICO

Struggling to keep tropical fishes alive and content is time consuming enough, but, in addition, it is alarming the way it forces you into other related pursuits!

Sooner or later, if you are an avid admirer and master of wet pets, you are pushed, shoved, absolutely compelled into writing, photography, biology, and becoming a society member (you cannot be a recluse any longer) and an avid, eager bargain hunter.

One of the most pleasant of the above is being a society member. It does not exasperate you and tax your limited patience as the other pursuits can so frequently do. I had kept tropical fishes for about 6 months before I finally got sick and tired of my friendly tropical fish dealer nagging me to attend a meeting of our local society. (He always thrust their monthly publication at me when I entered his shop.) So . . . to shut him up once and for all, I reluctantly went to a meeting. What a bonanza! It was crowded with fellow fish lovers. (I don't know what else I expected.) I was in seventh heaven.

Now, instead of my friendly dealer nagging me, I am too frequently nagging someone else to attend *just one meeting!* (I am smug in my knowledge that to a tropical fish addict "just one meeting" will turn into many more.)

Enough has been written about the maddening desire for more and more fishes, and bigger and BIGGER tanks (which run into more and more money). This unquenchable thirst for fish, fish, and more tanks turns most of us hobbyists into first-class bargain hunters. (Those penny-pinching, budget-minded housewives have nothing on us.)

At a dealer's that you know well, you might see a fish you just can't live without. You want a pair. They are \$3 each. You only have \$7 in your pocket. You didn't plan on seeing these gorgeous fish. Darn the dealer for having them! You need \$2 for several canisters of freeze-dried foods, so you get the dealer in a dark corner (away from his other customers) and whisper, "I'll give you \$5 for a pair of those *Exocoelous thydodes*". If you are a good steady money thrower away at the dealer's, he will frequently send you into fits of ecstasy by muttering "O.K." *Eureka!* A bargain!

You need another 200-gallon tank. You have too many fishes for your current 89 tanks. You want to price tanks at the various dealers, but you do not want your regular dealers to know you're stooping to such a low

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level as to compare prices. You can boldly telephone all of the dealers that do not know you, and you can even use your own voice. But ah—you have to be tricky with the dealers that know you. You have to disguise your voice heavily. (You can either hold a pencil in your mouth or stretch a handkerchief over the mouthpiece, but, too frequently, at the end of the conversation they say, "Goodbye Mrs. Klotchikiss".) Better yet, you can have someone else telephone for you. (This is not as embarrassing.)

Using such methods of acquiring reasonably priced good tanks, your original dealer thinks you still have the ten tanks you bought from him, whereas you really have the aforementioned 89 tanks. Naturally you don't dare tell him you are buying tanks elsewhere (you might not get the *Exocoelous thydodes* for \$5 a pair.)

When you hear that a dealer halfway across town is selling fresher tubifex for less cash than your regular dealer, you spend more on gas for your car to go there than you do for the worms, thinking gleefully that you're getting a real bargain. Then you are at a total loss when your regular dealer says, "I suppose you need worms as usual . . .".

All this, of course, is costing you oodles of money you don't have. Then you begin racking your brain on how to get the fishes to work so they can feed themselves. (Look at all the dealers that started as hobbyists!) Ah ha! Naturally you avidly digest all of the tropical fish publications. That's the answer! If you love so much to read about fish, and others' experiences with them, so others must love to read about it too!

So . . . you begin writing. Naturally you pick the fishes you have had personal experience with, and to add what you don't know about them, you read, read, and re-read your reference books. It dawns on you as you write feverishly that it really is good for you; since you are writing for others you *have* to be accurate, and since you are compelled to check your facts, you are learning a great deal. If you just read something once you are apt to forget it, but believe me, when you write about it, you *don't* forget!

How you are snared into biology is obvious. Some of your fish are certain to come down with a disgusting disease now and then (usually now). If it is a favorite fish, you are more frantic to find a cure. You closely study his little respiration, then his little scales (offentimes protruding from dropsy), all of his little moving parts, and you go a little off your rocker. By the time you're through you know the fish intimately. You may even reach the point of dissecting a fish after its death to seek the reason it died, or performing an emergency Caesarean on a pregnant female that has just expired. (All this is biology.)

Trying to get fishes to spawn is the most prominent pursuit in our hobby,

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and if your fishes do spawn (usually in a community tank), aren't you there watching every single phase of the procedure, even if it is two o'clock in the morning? (That's biology too.)

The most trying of all the side effects of tropical fish keeping is feebly attempting to get your little wet pets' images on film for posterity. You can't understand what all the fuss is about. Can taking a picture really be so hard? Na... they must be making a mountain out of a molehill.

You decide to take pictures of your little darlings to accompany the articles you are now writing. (And also to show around at your society meetings. Instead of pulling out photos of the children, you pull out photos of your fish.) Your first roll of film is a total loss. Every frame is just a big gigantic blur from the flashbulb reflecting off of the front glass of your aquarium. You backtrack and devour every piece of writing you can locate in three counties on photographing tropical fish.

After weeks of practicing and countless rolls of ruined film, you finally master the art (and believe me, it is an art!) of tilting the camera downward so there is not any glare on your precious pictures. Fine. Now you can take pictures of your aquariums with your little box camera, but you find if you get too close your fish look like little balls of fuzz. You can't tell your cat from your gourami. For the time being you make do with a simple closeup lens. (Of course you still can't get as close as you want to! You have a burning desire to see every single pore of your fish on film. Do fish have pores??)

Next you find that you also have to allow for the deviation in what your trusting eyes see thru the view-finder and what the picture will actually be like. This keeps things sufficiently complicated. It takes you many many more rolls of film to master this art too. (Meanwhile, of course, you are saving for a good, and expensive, single-lens reflex camera, for you have read that with a single-lens reflex camera the picture will turn out exactly as it appears thru the view-finder.)

When you have finally mastered enough of the cunning tricks of fish photography, you proudly send some photos to an editor. Then you find out that prints or negatives won't do for color pictures. To reproduce color on a printing press, transparencies, or slides, are required. Now all of your color photos are virtually useless (except for personal use), so you start all over again. (Oh no! Not the same old things you've been photographing for months! Aaaaak!)

Have I left anything out? Probably plenty. I'm sure there are some of you out there who are having trouble with your neighbors because you're doing something like trying to breed and raise tubifex in your back yard!

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Flat and Finny

BY JERRY CURRIER AND MARTY SMITH

Old Mother Nature is probably the world's greatest artist when it comes to adaptation. With a masterful stroke of her brush she adapts life to the highest mountains and the deepest oceans. Under the northern lights and in the blazing Sahara, life exists. Adaptation takes many and varied forms: the fleetness of an antelope or the armored home of the tortoise, the remarkable radar of a bat or the keen eye of an eagle, the sleek liness of a hunting cat or the patient lurk of a spider in its web, the beautifully precise forms of a bee hive or the haphazard propagation of a dandelion. These are all kinds of adaptation. Why so many strange and unusual forms? Survival! Adaptation is almost synonymous with survival.

A fascinating part of keeping and breeding fishes is the many examples of adaptation that can be observed: the cichlids that stand guard over their eggs, the archer fish who "shoots" his lunch, the schooling colors of many fishes, the air breathing ability of the labyrinth fishes, or the speed and agility of the danios. All of these are insurance for survival, and the varied examples illustrated give an indication of Nature's versatility in preserving her creatures.

In this article we are going to examine one of the most unique forms of adaptation that we as aquarium hobbyists have a chance to observe, the so called "flatfish" or freshwater sole (*Achirus* and *Trinectes* species).

No doubt somewhere in the misty reaches of evolution the flatfish had ordinary ancestors that swam about upright. For reasons known only to these same ancestors, the course of survival made them take a new road in development.

When the flatfish breaks out of its egg it has one eye to each side and swims upright like any other fish. Early in its life, however, strange things take place that set the flatfish apart. For one thing, the swim bladder is absorbed, leaving the fish without its ability to maintain equilibrium with the surrounding water. With this exception the internal structure of the flatfish remains substantially the same as that of any other fish. But then comes the event that sets the flatfish apart. He develops a roving eye! One eye actually "migrates" to the opposite side of the head. We asked the Department of Ichthyology at the California Academy of Sciences here in San Francisco about this, and it seems that which eye migrates depends on the fish; some are right eyed and some are left eyed! Be that as it may, the flatfish ends up with two eyes on one side of his head and none on the other.

This naturally makes him pretty vulnerable to attack on the "blind" side. The flatfish solves this problem by flopping over and swimming with its

blind side down. Through all of this the flatfish retains the normal complement of fins allotted to him, and they all remain in the original places. The only unusual thing is that the dorsal and anal fins extend the length of the body and what appear to be vestigial fin rays are extended from them around the head. The mouth and gills stay in their proper places as well.

It might appear that this would tend to hamper the flatfish's ability to swim. Not at all! By causing a series of undulations in the elongated dorsal and anal fins, flatfish can swim very rapidly. Although they seem to get some assistance from the caudal fin, this fin is not used as a prime swimming organ as it is by many other fishes. Flatfish usually stay close to the security of the bottom and swim in short fast hops, in all likelihood because of the vulnerability of their blind side to attack.

The flatfish can burrow under the top layer of mud and leave nothing showing but his eyes, which protrude like tiny periscopes. From this position he can make swift pounces on any living food that comes along. Another aspect of the flatfish's adaptation to life on the bottom is his remarkable ability to change color to match his surroundings. The color can range from a very pale gray to a deep black. At other times shades of brown may be apparent. Thus he is afforded further protection from predators. The flatfish is so good at this camouflage act, that he can even mottle his body to match a variegated pattern. (We have kept flatfishes in aquariums with mixed black and white gravel, and they will seemingly disappear by matching the colors exactly!)

Most people associate all flatfish with salt water, for the varieties seen in the food markets are usually from the sea. However, the aquarium hobbyist has his choice of several species of freshwater flatfishes. South America boasts numerous varieties of *Achirus*, but the most commonly seen flatfish in the United States is *Trinectes maculatus*, which is quite prevalent on the Eastern Seaboard of the United States. The rarity of the South American species in the United States is probably due to the excessive cost of their collection as compared to our native forms. At any rate, the young of *Trinectes maculatus* are frequently available to the home aquarist and are the fish we observed as the basis for this article.

The average flatfish in the home aquarium never reaches a length of much over 2 inches, while in their natural habitat 6 inches is not uncommon. The reasons for this stunted size are not clear, but the restricted size of the aquarium and the possibility of inadequate diet are probably contributing factors.

Many authorities agree that the flatfish is guilty of nipping the fins of its tankmates. We have not noticed this to any great extent although they will bite at anything that looks alive and wiggles in front of them. The trailing ventral fins of an angelfish might cause this reaction. We feel that this may be a reflex action caused by inherited instinctive traits, as our observations indicate that they are relatively sensitive to movement around them. Even so, we would discount the incidence of nipped fins as we have kept flatfish in community aquariums with a wide range of other fishes and have noticed no great problem in this respect.

Another interesting characteristic of the flatfishes is their ability to cling to the glass sides of the aquarium by body suction. As a matter of fact, it is very difficult to remove a flatfish when this happens, and the danger of injury is great if prying him loose is attempted. This habit can be most exasperating when you are trying to net one, and a great deal of patience is usually required.

Temperature tolerance is average. Although the flatfish seems to do quite well in waters of 68 to 80° F., we would recommend a standard of 72 to 75° F. Chemical conditions do not appear to be critical; we have kept them in waters that range from very hard and alkaline to soft and acid with no apparent ill effects. Sterba in his *Freshwater Fishes of the World*, suggests that the addition of a teaspoon of sea salt for each gallon of water may be beneficial, but we have never found this necessary.

Feeding is no great problem, as these fish will accept a wide variety of dry, frozen, and live foods. Where practical, they should have an abundance of live foods such as brine shrimp and tubifex worms. Be careful though; we have actually seen this fish overeat so much brine shrimp that they died. This has happened on two separate occasions. Consequently, we would recommend care to prevent overfeeding of live foods.

Breeding has not been accomplished in the aquarium. This is quite probably due to the restricted growth. We have not been able to distinguish sexes and can find no indication in available literature on this subject. For this too the small size is no doubt the chief reason.

Over and above the opportunity to study the flatfish from the standpoint of adaptation, an added advantage can be realized from its moderately good scavenger qualities. This should not be taken to mean that he will clean up all of the left over food if the tank is overfed. As with the various catfishes, one should not expect the impossible. However, the flatfish will supplement the scavengers already present.

In view of the many uncertainties surrounding the flatfish and his unusual habits, we would recommend that anyone looking for a different fish give this one a try. Whether you want a conversation piece or are interested in serious observation of environmental adaptation, you will find the flatfish quite suitable.

Answer to an old puzzle . . .

A Cure for Cryptocoryne Disease

BY GERHARD BRUNNER
HAMBURG, GERMANY

"Meantime my once-lovely cryptocoryne thicket has become no more than a bunch of bare stems. What causes these transparent decayed spots? How can one get rid of them? Who can answer these burning questions?" This is what Hans Tusche wrote in 1950, and we must admit frankly, 14 years later, that we are still making just as many guesses about these glassy decayed spots as we were then.

Although the last stage is always the same, decay of the leaves down to the beginning of the rhizome, this disease runs various courses. The most common is the appearance of glassy, circular spots, where the leaf structure later decays. Such a leaf decays completely in a matter of days, weeks, or months, depending upon how strong a foothold the disease has taken. In its acute form, cryptocoryne disease runs a very quick course. Usually the leaves turn glassy at the tips and the decay progresses rapidly from there, turning a flourishing clump of cryptocoryne into a sorry mess of decayed-leaf remains in a few days.

We are still in the dark scientifically as to the cause of this disease. Antagonistic processes, disease-causing changes in water conditions, and many other hypotheses have been given. As long as the hard-working plant pathologist could find no causative agent, it was concluded that in this disease there was an upset in metabolism which was caused by a secondary attack of microbes which were encouraged by a lessened vitality. A Dutch plant pathologist was able to observe the breakdown as a deterioration of the diseased cells. Once the attack by microorganisms has started, the disease cannot be stopped without the proper remedies.

Where might the causes of such a metabolic upset lie? Doubtless we must look for them in the unnatural living conditions we usually give to our aquarium-grown cryptocorynes. It seems very doubtful at the present time that the constantly vegetative multiplication and always-submerged culture has left behind it degenerative changes which could cause a disposition toward disease. Perhaps H. H. Murrin came closest to the truth when, in a Dutch publication, he mentioned the absence of a biocatalyst, the product of autolytic fermentations in the water, a too high content of carbon dioxide, and too much light as possible causes of a metabolic upset in these plants.

It is well known that cryptocorynes with a coarse, bright green leaf structure are able to withstand this disease. Not a single case has come

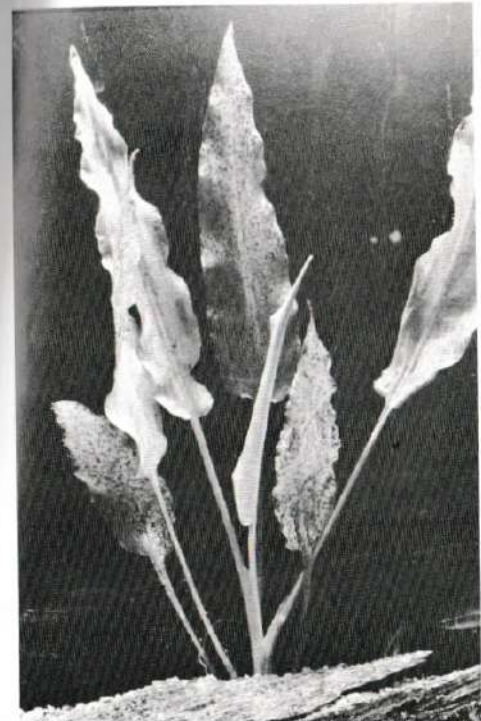


The ugly decomposition of the leaves of these crypts will continue right down to the root line. Photo by Vladimir Sedletz.

to our attention among *C. nevillii* or *C. ciliata*. I have also been unable to find a case of leaf rot with *C. balansae* so far. Why do these species remain untouched? Is it because of their leaf structure or a greater light tolerance? Probably nobody can answer these questions at this time.

Almost as many remedies have been recommended as there have been articles published about the disease. One article, where a hobbyist puts the blame on an overabundance of fish excretions, mentions curing the disease with regular additions of fresh water. Another article designates cryptocoryne rot as a disease most commonly found in the tanks of cleanliness fanatics. Ammonium nitrate and phosphoric acid were recommended. Dr. Meyburg got good results after adding antibiotics and vitamin supplements.

Now, however, there seems to be a remedy which is most effective: the feared addition of copper. As far back as the 1920's metallic copper (copper cleaning pads) was used with success in the conquest of hydra as well as cryptocoryne disease. The use of copper salts visibly brings the disease to a standstill, but at the same time, these salts are poisonous to plants and



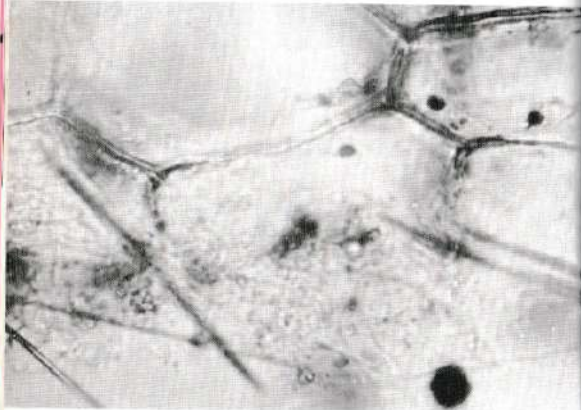
Cryptocoryne ciliata is a species that is rarely if ever attacked by cryptocoryne disease. Photo by Vladimir Sedletz.

fishes alike. The great problem is to find a proper dosage, one which is at the same time harmless to fishes and higher plants but still effective against cryptocoryne disease.

The solution to this ticklish problem comes to us from Dutch aquarium hobbyists. A dosage which has so far proven harmless and still effective is given as follows: 1 gram of copper sulfate (crystals) is dissolved in 100 grams of distilled water (a few drops of sulphuric acid may be added to make it mix better). Then, 1 drop of the resulting solution per quart of aquarium water is added, mixing thoroughly. Use a pipette to measure out the drops. **KEEP THE POISONOUS MIXTURE AWAY FROM CHILDREN!** Use only crystalline copper sulfate. Turn off the filtration for a couple of days, and do not repeat the dosage. This Dutch method is a more dependable method of adding copper to a tank than by using metallic copper under varying water conditions.

All heavy metal salts are extraordinarily poisonous when highly con-

A microphotograph of diseased cryptocoryne tissue after considerable decomposition has taken place shows considerable damage to the cell membranes. Complete decomposition is not far off. Photo by Vladimir Sadilek.



Healthy crypts make fine decorative aquarium plants. They grow and multiply slowly but surely to form dense stands of their own kind. Photo by Vladimir Sadilek.

centrated. An overdose can have catastrophic results. For this reason the greatest value must be placed on strictly accurate dosage. After a proper amount of copper sulfate is added, the cryptocoryne decay usually ends promptly, and the plants begin to grow again after a time. At the same time, any excessive growth of algae is halted as well. This may cause trouble for any algae-eating fishes, which should be netted out before the solution is added. In any case it is advisable to watch the fishes closely, and to remove them promptly if they seem distressed when the copper sulfate solution is added.

Further examinations will be required to determine if the copper salts, besides cutting down microbial growth and the spread of algae, are also effective in aiding the metabolic processes of the plants (the inactivation of certain ferments). Copper sulfate has long been a valued remedy for the conquest of algae. Until now it has been used in such concentrations that higher life in the aquarium was endangered. Lately copper sulfate has also been used in marine aquaria and has proven of value against the parasite *Oodinium*.

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the "common" class. Several small snails would make very little difference in the hardness, neither would their shells.

Puffer

Q. Today I purchased a puffer as a kind of novelty for my 15-gallon tank. He is about 2 inches long and has black and yellow spots.

1. At a temperature of 74° F. and a pH of 7.2, is it safe to keep him in the tank?

2. I'm feeding him frozen brine shrimp, dried daphnia, and flake food, and I wonder what else you could recommend for him.

3. Is there any truth to the statement I read in a tropical fish book that claimed that puffers eliminate snails from your aquarium?

4. Will the puffer be aggressive to my Berlin swords, zebras, rasboras, and black waggail platies?

David Wiley, Seattle, Wash.

A. 1. The temperature could be a bit higher, and the pH is about right.

2. I would not recommend the flake food or dried foods of any kind. Chopped clams, mussels, or pieces of the larger shrimp are relished.

3. One of their favorite items of diet is snails, which they pull from the glass sides, rocks, and plants and crush with their rabbitlike teeth.

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I would hesitate to trust them in community with any slower fish species.

Temporary light
Q. I have a 6-gallon tank and approximately 18 fish, and I will soon be getting a 15-gallon tank, but without a reflector. I want to know what to use for artificial light until I get one.

Steve Shaffer, Spokane, Wash.
A. Maybe you have a reading light that sets on a desk and has a gooseneck for adjustment. There is a type being made nowadays that has a transformer in the base which cuts the 110-volt current down to 12 volts and makes use of an automobile bulb. These have a gooseneck which can be adjusted to various heights and angles and use a very small amount of current. Such a lamp would be ideal.

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2. I am using a little aeration from an airstone. Is this recommended for fry 5 days old?
3. The inside of the glass has a slime coating on it. Is this dangerous and what can it be from?
4. Is a larger tank of 5 gallons capacity good to use for the fry (approximately 100) until they grow to a size of 1/4 to 1/2 of an inch? They are 1/4 of an inch now.
5. Can I install an undergravel filter and gravel in the tank?
6. I keep adding 1 glass of water from the main tank each day. Is this good practice?

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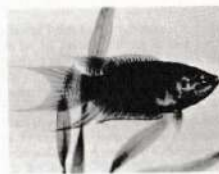
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7. I have a male pearl gourami and a female snakeskin gourami. Would they breed?
8. I would like to know if there are any tropical fish hobby clubs in Staten Island?

Dino S. Giordano, Staten Island, N.Y.

- A.** 1. As you are starting off with a very small tank, I would recommend changing to a larger one as soon as possible. Young paradise fish can be moved as soon as they are free-swimming.
2. It does no harm.
 3. If the slimy coating is green, it is algae. If it is grayish, it is infusoria. In either case it is good practice to scrape it off with a razor blade or ball of steel wool (not the kind that contains soap!).
 4. The only thing you could say about



Macropodus opercularis.

the 5-gallon tank in preference to the 2 1/2-gallon one is that it's a little bigger, but nowhere near big enough.

5. It wouldn't hurt.
6. It doesn't do any harm, and, for that matter, I don't see where it would do much good either; by the time the young are large enough to go into the main tank, they will probably be strong enough to withstand small change in water chemistry.
7. Probably not, and if they did, chances are the eggs would not hatch.
8. The Staten Island Aquarium Society still meets monthly in the Barret Zoo, to the best of my knowledge. Although I have been too busy to attend meetings, I am still an honorary member there.

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Where did they go?

Q. I recently my friend and I became interested in breeding bettas. So far we have bred them successfully four times. The first hatch is about 2 months old and about the size of baby guppies. When they hatched, there were about 200 fry. They were all doing well until about a week ago when they began disappearing. There were no visible dead fry and no visible hydra, and yet the fish were too small to jump out of the tank. Where did they go?

2. What causes male bettas to refuse to build a bubblenest? So far this has happened twice with two different males. I removed one of these males and put another in. This one built a nest and spawned within the next hour. Is there anything that can be done with such reluctant males as the first two. One of them is a valuable Libby.

3. A month ago my friend successfully spawned his rosy barbs. The parents ate all the eggs they could find. After 2 weeks we were sure that there were no eggs left and were anxious to breed bettas again. Later that day, we were successful with them. When the fry hatched out (about 400), we noticed a few larger fry in with them. A closer look showed us that these larger fish were rosy barbs. They were three times the size of the bettas and immediately started eating them. What made the barbs hatch so late?

4. Isn't it unusual for betta eggs to

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hatch within the first 15 hours with the temperature at 82° F. and the pH at 7.4?

Andy Payne, Scotch Plains, N.J.

A. J. When a very young fish dies, it

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becomes a food for its brothers and sisters. The fry that did were no doubt eaten by those that lived on.

2. A male betta that does not want to spawn will not build a nest. If you want them to change their ways, pamper them with good foods at frequent intervals.

3. The barbs did not hatch late; they hatched on time. They hid, and you didn't see them. They ate whatever micro-organisms were present in the tank until the presence of "easy pickings" in the form of eggs and newly hatched fry caused them to throw caution to the winds and come out of hiding.

4. Yes, by a few hours.

Red-finned sharks

Q. Several months ago I attempted to spawn a pair of red-finned sharks. The two fish would rub against each other, circle the tank, and repeat the process. They joined jaws cick-fashion and tugged at each other for quite a while, then proceeded to chase the other fishes away. The female got "cold feet" at this time and ran away. The two sharks were separated, and the female died a few days later. The male also showed signs of expiring, swimming on his side almost all of the time. He was then put into a fish pond, where he grew to a length of about 10 inches, and still lives today.

2. I introduced a pair of flag cichlids into a fishpond along with several live-

bearers. The female died 2 days later, but the male survived and is still there, but the strangest thing is happening to him. The top of his head is starting to turn gray. Is this a normal color change?

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3. I also tried to breed paradise fish in a 10-gallon aquarium. The male built his bubble nest, but the female refused to go near it. She is filled with eggs and has gotten pale, except for the dorsal, caudal, and anal fins, which have retained their high color. Is this normal? The male was put in the company of an albino female which responds to his courting, but is not ready to spawn, as she is carrying no eggs. Is it normal for a paradise fish to lose interest in a female that is ready to spawn and court another female that is not full of eggs?

Joseph Barry,
 Ft. Myers Beach, Fla.

A. J. It might be a bit more accurate to say "take female got cold fins and swim away." Maybe they were spawning or trying to, and maybe they were just play-

ful; there is no record that they have spawned in captivity for anyone. That 10-inch length is interesting; maximum length is given as half that in several works.

2. Even though turning gray on top of the head may be normal for a goby like myself, I have never seen it happening to a flag cichlid. If the skin is healthy, and the gray is not a patch of fungus, I see no cause to worry.

3. It could be that the female was egg-bound and could not get her eggs out. The male then turned to the other paradise fish, the albino that was not yet ready. She probably mated up with quite a heating.

Plant growth

Q. 1. I am interested in keeping tiger barbs, raboras, cherry barbs, cardinal tetras, black tetras and some scavenger catfish. I know that most of these fishes are best kept in slightly acid water, but I want to have a lush plant growth in my tank, and most plants grow best in slightly alkaline water. The only fish that I am interested in breeding are the barbs and black tetras. What do you suggest?

2. Is it true that Amazon sword-plants don't grow too well with an under-gravel filter?

3. Why is it difficult to get Amazon

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swordplants and cryptocorynes to grow in the same tank?

4. After water has been made acid with phosphoric acid can eggs be put in it immediately for hatching or should the water be left to age?

5. You have a great magazine.

Lance Perry, Lottant, Ill.
A. 1. The only thing you could do with a group of fishes like this is to take the middle road: keep the water neutral. Barbs and black tetras will spawn quite readily in neutral water, so you're in business!

2. It seems that Amazon swordplants do not take too well to having a circulation of water around their roots, so you might have to resort to a small subterfuge: get a shallow flowerpot and plant your swordplant in this. Then sit it on top of your gravel.

3. I have heard of this. Probably both plant species need a generous amount of a certain type of maintenance and compete for it when there is not enough for both.

4. I do not recommend in most cases

Amazon sword plant.



changing eggs from the tank in which they were laid to another tank. It is easier to remove the breeders and leave the eggs alone. When this is not feasible, put the eggs in aged water as nearly like what they came from as possible.

5. Thanks! We never get tired of telling this to all and sundry, and by the same token we like to hear it from others.

Aquarium remedies

Q. 1. Is a neon light or an ultraviolet light best for a 15-gallon aquarium? (The aquarium gets no sunlight.) What wattage is best?

2. I am interested in photographing my fish. Would it be possible for me to do this? (I have no experience.) If so, is there any special equipment I would need?

3. When I read the ENCYCLOPEDIA OF TROPICAL FISHES, I came to a sentence that read: "Any fish treated with any of the usual aquarium remedies is useless as a breeder in almost any instance." Is this true or misleading? (Two hobbyist friends claim this to be untrue.)

Donald O'Connor,
 Roselle Park, N.J.

A. 1. By a "neon" light I assume you mean a fluorescent light, which would be my choice. Get a reflector made for your size of tank. It will be sold with a bulb of the proper wattage.

2. I would not recommend that a beginning photographer start with fish photography. If you must try, the very least you will need is a fairly good single-lens reflex camera, a tripod, at least two flood lights, and an endless amount of patience and film.

3. Many breeders disagree with your

two friends. The object of most aquarium remedies is to destroy the parasite which the fish is infected without destroying the fish itself. A fish's reproductive organs are very sensitive, and in all too many cases a fish which has been cured of a disease becomes useless as a breeder as a result of the cure.

Catfish

Q. 1. Your January issue and several others mention that catfish "have a healthy appetite of their own and cannot remain in good condition on merely the leavings of their tankmates." How do you get food to them without fooling with live worms? Is there any commercially prepared food designed to sink to the bottom especially for catfish? I have four in a tank with about 60 guppies.

2. A recent issue said mystery snails would not eat plants. I have about 100

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young mystery snails in a 2-gallon tank. I feed them regularly. I also put excess water spritz into their tank, and it disappears in 3 or 4 days. Think they eat plants after all?

Art Hayes, St. Louis, Mo.

A. 1. A good stunt to make prepared foods available to catfish is to put some in a small jar filled with fresh water and give it a chance to soak up some water first, then pour it into the tank. Don't leave the food in the small jar for any length of time, however, as it can spoil quickly.

2. Mystery snails, it is true, are not entirely innocent of a little plant-s nibbling, but they do not have the insatiable appetite for anything of a vegetable nature that their big cousins the apple snails have.

Nylon net

Q. I have no questions at the present time, but a discovery I have made might be of interest to some of your readers. After reading a well-known columnist's repeated praise of nylon net, I decided to try it for cleaning my plastic inside filters. It is perfect. The net removes all algae and scum from the plastic and leaves it looking like new. It is thin and pliable enough to reach all holes and crevices. It is also good for scrubbing the glass on tanks. It does not scratch the surfaces and washes completely clean after use.

Ellen P. Brandy,
 Chevy Chase, Md.

A. I must add that the nylon net should never have been used with any kind of detergent before being put into the aquarium water.

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How come?

Q. After several rather frustrating attempts to keep different varieties of tropical fish, I finally decided to concentrate on guppies. I use three 20-gallon tanks and seven 10-gallon tanks, in the hopes of keeping my best fish isolated from the less desirable ones. My success has been relatively good, and I was just getting to the point of wanting to brag about my fish when I read a couple of disturbing answers to GUPPY CORNER questions. You said: "I have found that fish do best in medium hard water, 10 to 14 degrees of German hardness (DH) and a little below neutral in pH." And: "I use tubifex worms, baby brine shrimp, adult brine shrimp, and white worms, plus all the frozen foods available in pet stores and at least 15 different kinds of dry foods."

I have tried to maintain all my tanks as close to 2 or 3 degrees of hardness as possible, and the pH as close to neutral as possible. I have also fed newly hatched brine shrimp and a good quality dry food that they seem to go for. Naturally, you can see the reason for my consternation.

E. C. Dugger, Metairie, La.
A. The habitat of the guppy is not in the upper Amazon region, where the water is soft. The guppy was found originally in the lower parts of rivers, even in brackish waters, on the islands of Trinidad and

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Barbados. My fish are doing very well in medium-hard water. About 25 degrees of German hardness is the limit where fish and plants will thrive in a satisfactory manner, but it is known that some fish will breed in much harder water than I mentioned. It is also a known fact that harmful bacteria, parasites, and other troublemakers will find it harder to exist in water which is acid.

As for food, it seems to me that a large variety is very beneficial to the fish. I recently checked, and found that there is a variety of over 30 different kinds of food available. Particularly good are the new freeze-dried fish foods.

Guppy love

Q. About 3 months ago I got a pair of common guppies and put them in a 5-gallon tank. The male always chased the female, and she gave birth 3 times before she died unexpectedly last week. I went out and bought another female to keep the original male company. Now, however, the male just moops around on the bottom of the tank, completely ignoring the new female. Could it be that he is staying true to his first mate?

C. U. Babie, New York City, N.Y.

A. Sad to say, guppies just can't "fall in love". Your male is probably sick, perhaps with the same disease that killed the first female.

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Baby fish food

Q. As a fish lover, I have a problem: I have about 35 baby guppies about 3 months old. So far I have fed them "baby fish food". Should I continue to feed them this food or tropical fish foods? If you think that I should feed them baby food, let me know.

Sergei Selancalepore, Hoboken, N.J.

A. As the guppy increases in size, naturally the time comes when he is able to consume larger pieces of food. At such a time you should stop feeding baby food and provide medium grain foods. A good rule of thumb is to see that the size of the food is never larger than the fish's eye.

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By Alfred A. Schultz

Caught in the Net . . . On a recent visit to Florida, I had an opportunity to attend a meeting of The Florida Marine Aquarium Society. This society, which was founded in 1955, now boasts a membership of well over 200, and most of the members were present at the meeting! It might be interesting to other groups to know some of the reasons for the success of this group of marine hobbyists. To start, the meetings are held in a beautiful room (at The Museum of Science, in Miami). The meeting starts at 7:30 p.m. for those members who are interested in general information, such as: how to build an all glass aquarium, how to set up a

marine aquarium, etc. The regular meeting starts at 8:15 p.m. There is usually a guest speaker and the door prizes are good ones. (The night I was there, the door prize included two marine fishes and two all-glass aquariums.) Once during each month a visit is made to one of the members' homes. This is an opportunity to meet fellow members on a more personal level and to see how their aquariums are displayed. This house visit is usually attended by approximately 50 members.

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those members who want to learn to collect their own fishes. The practice and importance of conservation is also discussed. Members are taught to replace rocks and not to bring home more fish than they can safely transport or can use in their home aquariums. An annual show is held for the hobbyist, and awards are made for the best fish and the best aquarium.

I enjoyed the meeting that I attended very much. I hope some of the information above will be helpful to other societies.

Q. A friend of mine has given me some very discouraging information. He says that saltwater fishes are too hard for me to keep, and they are too expensive.

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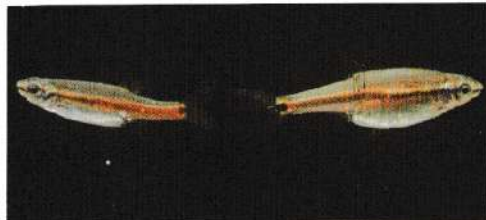
White cloud. Photo by Dr. Heribert R. Axelrod.

The Great White Cloud-Garnet Mystery Solved!

BY DR. MARTIN R. BRITTAN
SACRAMENTO STATE COLLEGE,
Sacramento, California

Around 1935 a pretty, hardy new aquarium fish showed up on the east coast of the United States. Originally collected and described from Kwangtung (Canton) Province of southeastern China, it bore the name White Cloud Mountain fish, from the name of the mountain upon whose

Hemigrammocypris lini. Photo by Dr. S. Weitzman.



85

Tropical Fish Hobbyist

slopes it was first captured. By 1938 it had already reached California through San Francisco from Hong Kong.

In later years more importations of the white cloud, *Tanichthys albonubes* Lin 1932, were made into the U. S. and Europe, and since the fish is easy to breed, large aquarium-spawned populations were built up. However, as descriptions and pictures of them entered the aquarium literature, conflicting color descriptions arose. Some descriptions attested that the fish had the dorsal reddish or yellowish at the base (the former in males, the latter in females) and bluish white along the outer margin, others that the dorsal was brownish at the base, becoming red (in males) or orange (in females) along the margin (there were some other differences in coloration, too). As the confusion deepened, some aquarists noticed that the two types interbred freely. The forms with the white-tipped dorsals were typical of the white clouds in the eastern U.S. and were often called the "Vermont strain", while the forms with red-tipped dorsals were typical of white clouds in the western U.S. and were usually referred to as the "California strain". Eventually, many stocks became badly mixed. Various experts, seeking an explanation, considered that there were two strains, varieties, or races of a single species or two closely related, interfertile species involved.

As if sent to add to the confusion, in 1951 a newcomer appeared on the scene from Hong Kong. Rakowicz and Weitzman (1951) described its importation and breeding. It was promptly named the "garnet" because of its reddish color. Although there was a superficial resemblance to the white cloud, it was identified as belonging to the genus *Aphyocypris*. Some people, however, then and later, confused the garnet with some of the variants of the white cloud. I was among them (Brittan, 1958:12), confusing the red-tip white cloud variant with the garnet, and erroneously reversing the names of the two strains of white clouds, i.e., calling the white-tip "California" and the red-tip "Vermont". Yates (1940) reported what he thought were hybrids between *Tanichthys albonubes* and *Aphyocypris pooni*; this crossing later turned out to be hybridization between the two strains of the white clouds.

In 1952, while examining a series of white clouds, *Tanichthys albonubes*, in the Stanford Natural History Museum, I found that several specimens were not of this species and reidentified them as *Aphyocypris pooni* Lin 1939. Later I (1958:13) and others identified the garnet as *A. pooni*. The garnet soon disappeared from the American aquarium trade, but persisted in Japan for some years longer, at least. Its breeding in Japan is reported by Makino (1958).

Now, Dr. Stanley Weitzman, of the Division of Fishes of the U.S. National Museum, and Lai Lee Chan, of the Fisheries Research Station, Aberdeen, Hong Kong, have analyzed and resolved the problem for us. In an excellent paper in *Copeia* (No. 2, June, 1966) they detail some interesting discoveries.

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First, Weitzman and Chan found that the white cloud has two distinct races or color variations representing it in American and European aquariums, a White Cloud Mountain (Cantonese) race or color variant, on which Lin's original description of 1939 was based, and a Hong Kong race or variant (there are perhaps other races elsewhere in China); the former is equivalent to the Vermont strain with its white-margined dorsal, the latter to the California strain with a red-margined dorsal fin.

Second, Weitzman and Chan discovered that the name *Aphyocypris pooni* given by Lin is invalid because A. W. C. T. Herre in February, 1939, having received a copy of the manuscript of Lin's original description, inadvertently used the name in a published paper before Lin's paper saw print in April, 1939. Herre, thinking Lin's paper had been published, sought to point out the differences between Lin's new *A. pooni* and Lin's previously described *Tanichthys albonubes* (based on the Cantonese race). Herre was, in fact, describing the Hong Kong race of *Tanichthys* and not *A. pooni* at all! However, since Herre's use of the name meets the scientific requirements of a new species description, the name must be credited to Herre, not Lin. But Herre's name, *A. pooni*, is of a previously described fish, the white cloud, *Tanichthys albonubes*, and so cannot be used for Lin's new species (later identified as the garnet). Consequently, the latter must be renamed. Weitzman and Chan propose that it be renamed *lini* in honor of Lin, and, upon examination, find that it does not belong to the genus *Aphyocypris* Günther 1868 at all, but to the genus *Hemigrammocypris* Fowler 1910.

Third, they redescribe both *Hemigrammocypris lini* and *Tanichthys albonubes*, and redefine *Tanichthys* and *Hemigrammocypris*. The authors point out that the white cloud is the only minnow with a single confluent nostril on each side of the snout rather than two separated ones.

The authors are to be congratulated on finally resolving this vexing problem.

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Look at the coloring of this fish. Is it any wonder that they call it the royal gramma. Photo by Dr. Herbert R. Axelrod.

The Royal Gramma

BY CRAIG BARKER

Due to the increasing popularity of marine aquariums and the improved methods of keeping marine fishes, more information is being obtained on some of the so-called rare and hard-to-keep species. One of these is the royal gramma, *Gramma loreto*. Once a seldom-seen, expensive rarity (up to 35 dollars each, when available), the royal gramma is now usually available from reputable dealers at a price most marine aquarists can afford.

Most of the aquarium books written on saltwater fishes do not mention the royal gramma. If reference is made to it, there is little information or first-hand observation.

The royal gramma is easily identified by its striking beauty, an anterior of vivid purple and a posterior of bright orange plus a black dot at the top of its anterior dorsal fin. Not only the novice, but also the seasoned diver and aquarium specialist stop to admire its beauty.

Its usual aquarium length of 1½ to 3 inches makes it suitable for the

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average home aquarium. Its maximum size of 5 inches makes it a likely prospect to be one of the few marine fishes whose adult stage is small enough to be bred in captivity.

The royal gramma's natural habitat is in the waters off the Bahama Islands. Here it lives under ledges located usually at a depth of 40 feet. However, it is not uncommon to see them in water either deeper or more shallow than this. A peculiarity of the royal gramma's habits is that he swims upside down under the ledges, but when introduced to the home aquarium, he swims right-side-up with no harmful effect.

Contrary to popular belief, the royal gramma thrives in captivity when basic marine aquarium procedures are followed. I have had best results when using an undergravel filter in conjunction with an outside filter. The fish likes its water kept between 70° and 75° F. Temperatures up to 80° are tolerated, provided the tank is well-aerated and not crowded. I have kept

Due to its extremely vivid coloration, the royal gramma looks good against even the most colorful background. Photo by Karl Knoske.



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the royal gramma in both artificial salt water and regular ocean water with equal success.

The royal gramma is a very hearty eater. It will thrive on either frozen or live brine shrimp and baby guppies. Other mainstays, such as the new freeze-dried foods, chopped shrimp, tubifex worms, chopped earthworms, and beef heart make it an easy fish to satisfy. Dry food is also eagerly accepted once the fish has become acclimated to the aquarium.

Royal grammas usually do not fight with each other or with fish of another species. It is advisable, however, to keep them away from fish which they could swallow. Consideration should be given to providing each royal a place where pipe organ or lettuce coral can be used as a home in which to retreat for protection. I have seen as many as 25 royal grammas in a 35-gallon tank with no difficulties arising. This was only for a short period of time and is not recommended as a long-term arrangement.

One interesting habit that royal grammas have is locking jaws with each other. As yet there is no explanation for this other than playfulness. However, it could be a pre-spawning activity similar to the ones practiced by certain freshwater species.

At the time of this writing, I have a pair of royal grammas which have been living in captivity for more than a year. Instances of royal grammas living 2 years in captivity are not uncommon. This feature alone makes the fish an excellent buy for one's money.

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