

September, 1968

tropical fish hobbyist

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tropical fish hobbyist

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cover

One morning recently, a young and pert *Gymnecorymbus ternetzi* swam to his bedroom mirror and said to his old lady morning, "Mirror, mirror on the wall, who is the fairest of them all?" "Confident and sleek, the young tetra awaited the reply he has been getting faithfully for a long, long time. The mirror's voice coughed and then belted, "Well, I hate to tell you, but it ain't you kiddo!" The young *Gymnecorymbus ternetzi* upon hearing the mirror's response, was visibly all shook up. "What do you mean, I'm not the fairest of 'em all. Look at my gleaming black and silver coloring. Look at my elegant finnage and streamlined and fin." "Well, that's all true. Yesterday you were the fairest in all the kingdom. But the vibrations told me that this very morning, something new, something out of this world has been developed... the new G.T., the new you." "You must be mistaken, there's only one me, only one *Gymnecorymbus ternetzi*." "No, you're wrong" retorted the mirror, "a luxuriously long-finned new variation now exists that was bred in Poland and that the swinging Gulf Fish Farms have raised and is making available in quantities. This new groovy black tetra is taking over your title, you're no longer number one in the aquarium kingdom. You've sat on your laurels too long." "I knew I should have listened to my barber, and let my fin grow longer so I could have adopted the new mod look. O.K. mirror, let this new guy take over, but watch out, because maybe I'm going to grow a beard and some new black bands, and I'll even polish my silver sides and..."

Photo by Dr. Herbert R. Axelrod.

exotic tropical fishes supplements

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, 1968

editorial

The other day when our cost control department told us that the rising costs of printing and labor had finally forced TFH to up the price of the Hobbyist a nickel... I didn't add to Dr. Axelrod's unhappiness by letting him see my disappointment... but inside I really felt like I was losing an old friend. The Hobbyist at thirty-five cents was becoming a tradition. I went back to my typewriter trying to temporarily forget this new development.

After work, that same day, as I walked up to the Square to catch my bus home, I noticed a crowd of youngsters merrily running towards one of those musical sounding ice cream trucks. One cute kid was lagging behind the rest, and as he approached me, he angelically smiled, then whispered, "Hey mister, do you have a quarter for an ice cream cone?" "A quarter for an ice cream cone! What giant of an ice cream cone will you get for a quarter?" "Wa do you mean jeeiant? It's just regula ice cream." By this time we were near the truck; I looked at the prices, and do you know something... the kid was right... you couldn't buy anything gigantic for a quarter. At this point I thought to myself, "Where have you been, Joe? Still living in a 5 cent ice cream cone world?" Anyway, I bought the child the ice cream... his smile would have melted the heart of any scrooge (including mine) as he said "Thank you."

As I walked ahead with the sound of bells in my ears, somehow I felt better than I had throughout that whole day. Not because I had been a good scout and bought a child ice cream—although that was part of it, but mainly because that little incident had better enabled me to realize that the Hobbyist in these days of spiraling economics would still be a great buy at 50 or 75 cents. Let's face it, the Hobbyist still costs less than the other fish magazines. And where else today can you buy a little adventure and a great deal of information for forty cents? It even beats ice cream as a bargain.

Joseph M. Bellanca

ULTRA-EXOTIC GUPPY BREEDERS



And still the guppy keeps marching on! Look at this recent creation by Mr. M. C. Yeow of Singapore. What unusual coloring—no wonder more guppy societies have sprung up all over the country this year. The suspense in guppy circles is what will be the next new development in guppies, what will be the new break-through? Will it be new tail formations? Dorsal changes? Or will there be some wild fanciful color mixtures and patterns? Guppies potential quite often exceeds human imagination. This can be seen when a sport occurs in a brood of fish that defies all rules and is overwhelmingly beautiful. Will it be the Germans, English, Americans, or the insatiable Asiatics who will draw something new on the guppy horizon?

The fickle finger of fashion sometimes points to a style and then over-exposure to the public finally kills this same style till it is revived by another generation who will either add, or make some subtle changes with it—they may even present it to the public all over again 10 years later just as it was originally, as in the Pop Art school of thinking. There seems to be the same pattern of fashionable trends in the art of guppy-styling. Ultra-exotic guppy breeders are very aware of this history of variations and revivals in guppy-styling. Dr. Foo Pang Teng is the aquarist responsible for these incredible Delta Blacks which are living proof that guppy breeding is both a science and an art.



BY MORGAN KHOO KAY ANN
SINGAPORE

Like all guppyists throughout the world, we do appreciate reading about people who breed prize-winning guppies. We would also like to learn their techniques and to see a picture of some of the famous strains which we have not seen or even heard of before.



If one decides to specialize in the guppy, this decision should not be based upon the fact that guppies reproduce easily. *Lebistes reticulatus* (= *Poecilia reticulata*) requires meticulous aquarium maintenance if the aquarist desires to result in super-fine specimens as depicted on these pages. Even though guppies are diminutive in proportions, they should not be crowded in tanks if you really want their finnage to attain maximum stature.

We take for example, Mr. M. C. Yeow, an ex-government agriculturist who entered five entries at the Singapore Aquarists' Society's 3rd Guppy Show. Out of the five entries competing, he won two First Prizes and two Second Prizes. This was certainly impressive for the simple reason that there were only four classes at the 3rd Guppy Show, namely, "Red Tail Class," "Blue Tail Class," "Black Tail Class" and lastly the "Any Other Variety Class." His success struck everybody at the competition and show.

Singapore measures only 14 miles wide by 25 miles long, and with the astounding population, many people have to live in Government-built flats, towering approximately twenty stories high. M. C. Yeow and his family are among one of the Government-flat-dwellers. Using every available space, Mr. Yeow has twenty three aquaria all around his narrow verandah, measuring only 6 x 12 feet. These are three-tiered glass tanks, each holding approximately 50 to 60 gallons. Of course he has smaller ones to keep the fry. It was observed that he built shallow rectangular glass tanks fitted with roller-skate wheels at the bottom so they could easily be rolled in and out from the available space between the cement floor and the base of the lowest tiered tank. In these he placed his ripe females awaiting delivery of young. Mr. Yeow's females must be well trained not to jump out of these shallow rectangular tanks!

Mr. Yeow does not believe in cement tanks with glass fronts, he maintains that water stored in these tanks becomes too cold during the hours from dusk to dawn. When water gets too cold, fungus trouble develops and generally ruins his prize specimens. Contrary to his belief, there are a number of first class guppy breeders who maintain that their fishes kept in cement aquariums are devoid of fin rot, etc. Nevertheless, it is understandable that with all glass tanks there will be less fluctuation of water temperature than in cement tanks. Therefore, it can be concluded that all-glass tanks are safer than cement tanks. (The Editors disagree with this!)

Visitors who viewed Mr. Yeow's collection often admired his excellent collection of $\frac{3}{4}$ black with black tail (Delta Blacks), the $\frac{3}{4}$ black with scarlet tail and others with variegated tails, etc.

It is not strange to note that Mr. Yeow, despite his great success, does not practice rigorous control over inbreeding, line breeding or outbreeding. Nevertheless, by experience he did outcross to male or female specimens which take his fancy. In other words Mr. Yeow breeds his fishes by choice, basing on the appearance of the specimens to breed the best.

Precisely, two years and nine months ago he sold away his collection of beautiful *Phalaenopsis* hybrids (moth orchids) just because he saw the beauty in guppies and was fascinated at the thought that they were live-bearers.

It is interesting to note that the latest Guppy book published by TFH on 'Guppies in Color', displays a color photograph of the Delta Grey with blue/black caudal fin, and it was recorded that this fish was not fixed in Germany. At this point, I would like to add that this variety is among the commonest in Singapore, and the strain duly fixed a long time ago.

It is this variety that has been used basically to produce the Delta Stock. The Delta Black was originated by one Mr. Ho Ah Hong of Singapore about two years ago when he crossed a Delta Grey with blue/black caudal fin to a Delta Black with red caudal fin. The Delta Black is a large size guppy with jet black pigmentation covering from the tip of the delta tail up to the gills, and the pectoral fins are black too. Dorsal is basically an off-greyish blue with black markings or spots.

Recognized color standards by local and foreign guppyists and organizations have majored in discussions and we hope to be able to finalize the whole system very shortly.

The Delta Black, is a new strain prevailing in Singapore and among the finest examples are those bred by Mr. Foo Pang Teng, strangely enough another Singapore flat-dweller who is a painter by profession and a very modest individual. It is a delight to see the large number of all-glass aquaria neatly arranged in tiers around his sitting-room, and occupying the small available space close to the kitchen.

This hobbyist has been breeding guppies for a number of years. He started with the common Blue Tails and has done selective breeding to improve his stock. His prize-winning Delta Black which came in first place at the 14th International Guppy Show was derived from the strain mentioned above and many guppyists will envy the black pigmentation covering from the tip of the tail right up to the point close to the gills. Similarly these fishes have black pectoral fins. Now that the black pigmentation has covered most parts of the fish's anatomy, I still have not seen one specimen with a completely black dorsal.

Mr. Foo's Delta Black females are the ultimate in guppy breeding. Every specimen has a well rounded torso, clear pectoral fins, and a large caudal fin, heavily textured with a distinct wide triangular or rounded tail. Covering half of the length of the body right up to the tip of the tail, the color is a solid velvety black. Mr. Foo is a discreet breeder, and his strain is faultless. He maintains that his Black strain will breed 100% true. I had the privilege to visit him, and I am just baffled at the quality of fish that swim about in his tanks in the small sitting room and the kitchen.

Mr. Foo has no elaborate feeding program. He is a painter by profession and as many of us are working people, we have to feed our stock with time-tested dry fish-food (imported and home-made), live food consisting of tubifex worms, Daphnia and newly hatched baine shrimp.

A NEW Variety of



G.T.O.



Gymnocorymbus ternetzi

A New Variety of *Gymnocorymbus ternetzi* G.T.O.

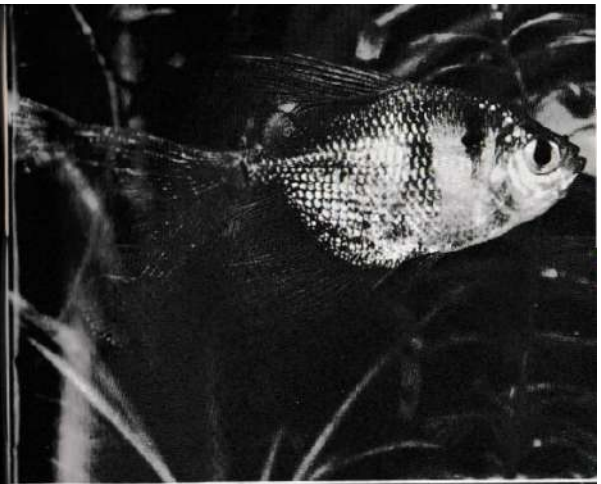
It has been about three years since a new variety of the *Gymnocorymbus ternetzi* was discovered within the aquarium of certain Polish hobbyists. This species, because of its beautiful body shape, has received a very enthusiastic acceptance from all hobbyists. Many of them always ask for the Polish Tetra when buying new fish and thereby completely overlook the common "black tetra" which have been bred for many decades.

The lengthened veil-like fins, which look very beautiful, especially with grown-up fish, are the decoration—pride of the Polish Tetra! The elongations of the fins are approximately twice as long as the fins themselves including all fins except the adipose. The dorsal fin looks very beautiful and fantastic since it reaches to half the length of the tail fin. At its end there is a small swallow-like veiltail which sometimes sinks down slightly. The tail fin is always beautifully expanded even though it is quite large; the back edge is always shown arched to the inside. There are also observed mutated modified forms of tail fins, e.g. swallowtail shapes. This new variety of tetra shows the same colors as *GYMNOCORYMBUS ternetzi* but with modified fins; the anal fin, hanging down like an apron is truly outstanding. Grown-up fish sometimes show fins torn at the lowest part and this is apparently caused by being caught and moved from one tank to the other.

The front and abdomen fins have screw-like ends. They can be observed best when the fish stands with its head to the front glass at which point it appears like a dragon fly moving its wings. The sexes are difficult to distinguish as there is no specific external sexual dimorphism. The male fish, however, usually is smaller and slimmer with a lighter tail fin. It seems that moving around has become more difficult for the fish because of the lengthened fins, they swim more quietly, similar to the Betta-fish.

How did the new variety of *GYMNOCORYMBUS ternetzi*, commonly known as "Polish Tetra" come about? This was really an accident? In 1964 Mr. Francisek Kawalec, member of the Polish Aquarium Society P Z M A in Bytom, observed one single fish within a few hundred of young fish which showed lengthened fins. Mr. Kawalec didn't know anything about mutation and related matters. Nor, did he know the rules of inbreeding, etc. But he had the instinct for something new, which always leads to intensive trials. This influenced him to search for a system and new results.

We're calling this new fish G.T.O. The G.T. stands for *Gymnocorymbus ternetzi*. The O. is because most people who have seen this fish for the first time have reacted with "Ohhh... how lovely." So G.T.O. is our nickname for these eye-grabbers with the flashy tail tinders. And a whole new world, a whole new look is available to the tropical fish hobbyist with the new G.T.O. What a groove your tank could be with these new beauties. Did you notice the Madagascar Lace plants in the photo? Dig 'em! They sure would make an all right complimentary background for a tankful of G.T.O.s. But you say plants are "bad news." Well not these Madagascars, they're plastic, but they look for real, and the important critics (the fish), give them four stars. Photo courtesy Gulf Fish Farms.



Here with this exquisite specimen, the length of the fins have been developed to such an increased measurement that the form of the fish now seems to actually flow somewhat like the regal movement of the angelfish. Photo by Zukal.

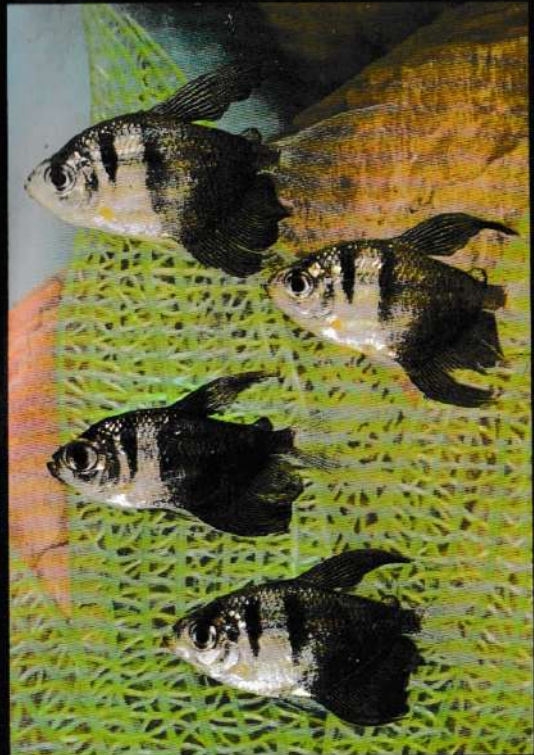
He very carefully kept this single fish and observed it all the time, finding out later that it was a female fish. He then looked for a beautiful and healthy male fish and put them together in a carefully set up breeding tank.

The first trial brought about 800 young fish with about 25% showing the newly discovered lengthened fins. As soon as the first generation was grown up, Mr. Kawalec started inbreeding and he finally resulted with 80% of the new variety with the lengthened fins. The more he followed up inbreeding, the smaller was the percentage of fish with common fin length. And, as it was expected, this new variety received great acceptance from all hobbyists. Many visitors from abroad inquired about this new fish and there have been shipments to various parts of the world. In 1966 Sander Zszylynski of Hungary and Mr. Hartel of East Germany received a few fish. Later on larger lots were sent to Mr. Jiri Taborsky of Praha (120 fish) and Mr. Sander Zszylynski (140), Mr. H. Stallknecht and Dr. S. Frank received some fish as well.



hh...

These new beauties are the result of combined efforts—the Polish aquarist first noticed the sport and stabilized it, then the Czechs developed it to its present external splendor. Notice the real increase in fin size; this is no rage over a silly millimeter longer. This new variation of *Gymnocorymbus ternetzi*, through the new look of its longer fins, is given an added dimension of grace. A school of these new G.T.O.s in movement is truly a wonderful sight to behold. Photo courtesy Gulf Fish Farms.



The "Polish Tetra" doesn't indicate any additional difficulties for breeding. However, since the breeders H. Zsyzlinsky and Hertel reported poor success, we would like to initiate broad discussions and exchange reports. Thusly, we would like to report the following points observed for breeding as described by Mr. Kawalec:

The fish need clean water, temperature to be about 77-82°F.; hardness of water 2-5 DH; pH 7; tank size from 5 to 10 gallons is suitable. A few myriophyllum and nitella, carefully cleaned and disinfected, are all right. One single pair of fish to a tank. The Polish Tetra lays many eggs; a female in good condition lays about 1,000 eggs at a time. It often happens that hungry fish eat up the freshly laid eggs, so you should remove them from the breeding tanks after eggs have been laid. It takes 24-48 hours to hatch the fish. The first 3-4 days they hang at the glass or even lay at the bottom of the tank and take their nourishment from the yolk-sacs. Thereafter, they are free swimming and require quantities of good food. It should be live food such as the nauplii of bosmines, cyclops and daphnia.



"Darling, did you forget to feed you-know-who today?"

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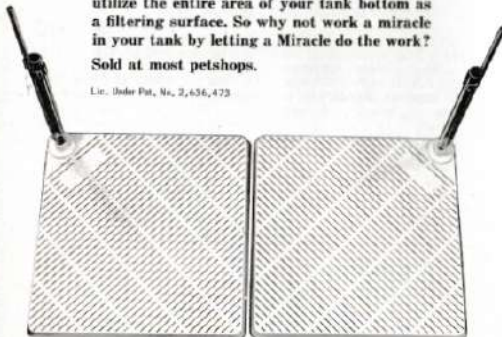
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become detached from the nest or the glass and are struggling to reach the top. Also, the eyes of the fry are quite apparent. An inexpensive magnifying glass would be of aid here. You do not mention seeing eggs when the pair embraced. It could be that these were false matings. I have seen many of them. It could also be that the eggs were eaten by the male or that they did not hatch. My advice is to try again.

BREEDING LENGTH

Q. Since I do not know the age of my fish, I would like to know at what length a male and female betta should be for breeding.

Roger W. Moore,
San Mateo, California

A. Length is not an important consideration. Males and females hardly an inch long have produced healthy if small broods. If the female fills with eggs and the male builds a nest, they are old enough to breed.

PEACEFUL MALES

Q. Recently I witnessed 2 nearly mature male bettas living together in a 10-gallon tank with moderate planting and no partitions. There have been a few minor squabbles, but otherwise everything was OK. Unfortunately, only one now survives due to a minor fight. Do you

SQUIGGLY THINGS

Q. My husband and I thought we'd try our luck with bettas. The male blew his nest, they embraced, and in 48 hours there were little white squiggly things stuck on the glass. Some say they are babies and some say they aren't. We called an aquarium shop and they said to put methylene blue in the tank. We did this and also used fry food. Now all the squiggly things are off the glass and are no where to be found. What happened?

Mrs. Paul Tucker,
Deatur, Illinois

A. First, I do not think that your "squiggly things" were fry. While betta fry may be white, they usually only squiggle unless they have

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think it is possible that two male bettas or perhaps many male bettas could live together?

Jim Glasson,
Morris Plains, New Jersey
A. I wonder how "minor" the fight could have been if one male died. I do, however, think it is possible for a number of males to live in the same aquarium provided that the males were raised in the same tank and that no males were added or returned after being removed. The males establish a pecking order while they are young and before much damage can be done. The order is fairly stable until a new male is added. Then the entire order has to be worked out with many injuries and possibly deaths resulting.

NO BETTAS FOR SALE
Q. Looking back over the February "Bettaphile" you mentioned a recent mating of green bettas. I have found it impossible to obtain green females and I would like to know if you could send me C.O.D. 3 female green bettas.
A. I am surprised that you can not find female greens. In my experience they are perhaps the most commonly available. I do not sell fish, but there is at least one advertiser in this magazine that sells show bettas. I am sure he can fulfill your needs.

BIG RED

Q. I spawned 2 red bettas, the mother being the most beautiful female betta I have ever seen. You would almost think she was a male. Right from the beginning one baby matured rapidly. He is now just over 3 months old and almost as big as his mother. He is the only true bright red of the spawn and is about 1 3/4 inch long with fins an inch in length. I read that bettas are not fully matured until 9 months. At this age, is my male normal and the others sub-normal, or is he an extra-ordinary specimen? Would you advise a brother-sister spawning of this nice specimen, or should I try to find a more red female?

Mrs. June Callaghan,
Seneca Falls, New York
A. It is not unusual for 1 or 2 fry in a brood to grow much more rapidly than the others. Once this initial size advantage develops, these larger fish get the lion's share of the food and grow even faster. It is a good idea to put such fry in another tank to let the smaller fish grow with less competition. Either of your plans for spawning can result in the kind of bettas you want. It is impossible to say which is better. The best solution is to try both kinds of crosses.

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Daphnia by the Thousands

BY JULIAN A. CAVALIER

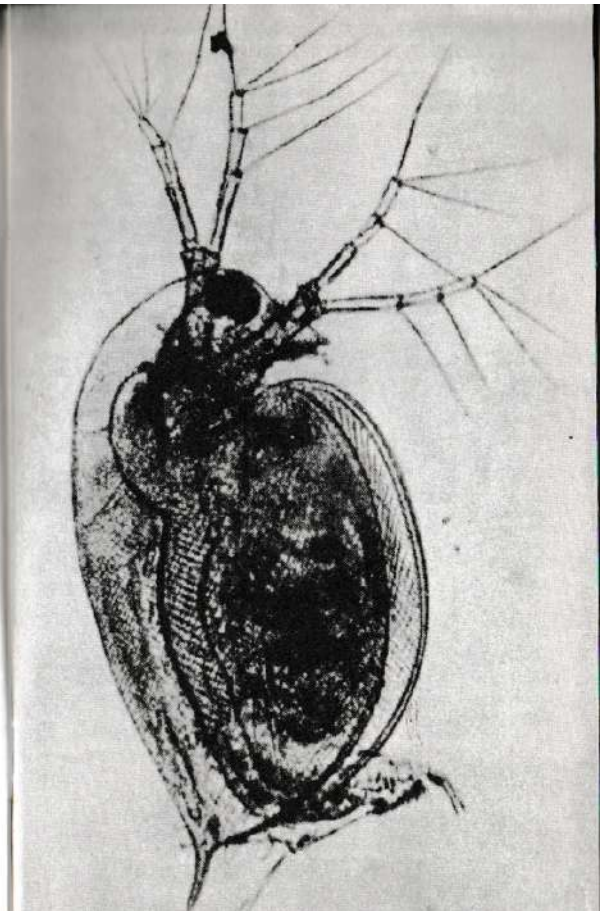
Have you ever noticed how your tropical fish become overly active while being fed on live foods? Baby fish will often tackle adult live brine shrimp, nipping and tearing at it, even though these fish may be as small, or smaller than his prospective meal. Most fishes relish live foods, but their diet should still be supplemented with dry foods and other varieties of nourishment that are available on today's market so as to give them a well-balanced feeding. Your fish will prosper if given this varied diet much more so than if they were to be kept on only one food.

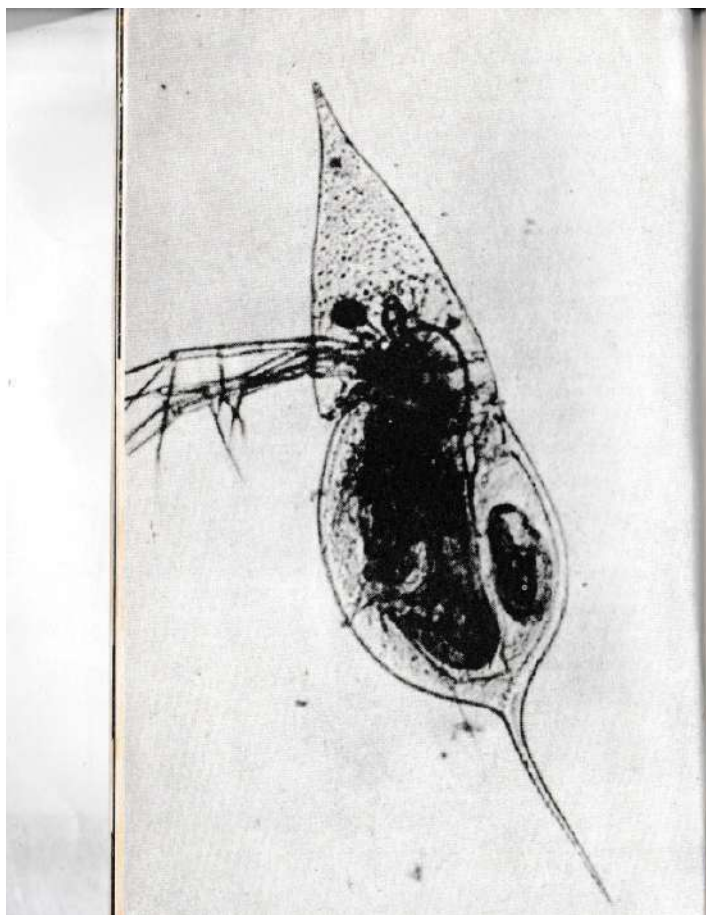
One of the easiest live foods to culture is daphnia, provided, of course, you carry out the procedure for raising daphnia in the proper manner. By this I mean, giving the daphnia an environment well suited for its existence, such as: plenty of tank space, the right water conditions, and food. Given these basic elements, daphnia will thrive and multiply enormously, thus providing for your fish another live food that can be cultured in your own back yard.

A large capacity container, about 40 gallons or more, such as a barrel, wooden tubs, refrigerator liner or even a washing machine liner, provides an inexpensive and satisfying enclosure that may be obtained at most junk yards or at the city dumps. I prefer the use of liners as the white baked enamel coating provides a good reflecting source for sunlight which helps promote the growth of green algae onto the sides of the container.

Since daphnia eats infusoria and other single-celled algae, the container should be filled with aged green aquarium water, slightly alkaline, and then the tank should be set in a place where it will receive at least a few hours of sunlight each day. Add some infusoria tablets along with a small amount of rotting tree leaves, and crushed lettuce. In place of manure, I have added aged water from a two gallon bird bath. The daphnia tanks continue to receive this bath water from time to time in making up for evaporation every two weeks or so. The idea is to pollute the water to a certain extent, but not to over do it as you will reduce the dissolved oxygen in the water that is required for the daphnia. True, you may add mild aeration with an air stone, but this is, in some cases, not always feasible. If you have an

Don't reach for your Yellow Pages to look up the number of your nearest exterminator, for this menacing looking creature is only a very enlarged photo-study of *Daphnia magna* which in reality reaches to only about 1/4 inch in diameter. This crustacean though, is one of the larger species of *Daphnia* and makes an excellent food for aquarium fishes. It is much safer to feed these tiny organisms to your fishes in smaller quantities several times a day, than to feed in one big batch since there is always the possibility of fouling the aquarium water because the uneaten ones may die and rot for any number of reasons including oxygen depletion, temperature changes, etc. An aquarist can find these crustaceans living in stagnant, algae rich waters.





aquarium with green algae on the glass, scrape this off, scoop it up in a net and add it to your daphnia tank also. There are many other methods of creating an environment suitable for daphnia. However, I have found that with just the above ingredients the microscopic plants and animals soon thrive as does the daphnia which multiplies with fantastic results.

To start the culture, daphnia may be found in small drainage pools, marsh and swamp areas or most places where stagnant water is found. If you find daphnia in any of these places you can also take some of the water along to put in your daphnia tanks. Other sources for a starting culture may be found through advertisements in this magazine.

In order to have a good supply of daphnia and to insure its continuation, I would suggest setting up more than one container. If it is not feasible to use large vessels, a few 10-gallon tanks, without hoods, set in the sunlight can be used, although the amount of daphnia obtained from these will be at a minimum. I do keep a few 10-gallon tanks outdoors with daphnia as standbys. As the daphnia multiplies in these tanks the excess is netted out and put in the liners. These standby tanks are a just-in-case arrangement, if all the larger tanks should fail through some unforeseen circumstances. They are also used for experimental purposes with various daphnia cultures.

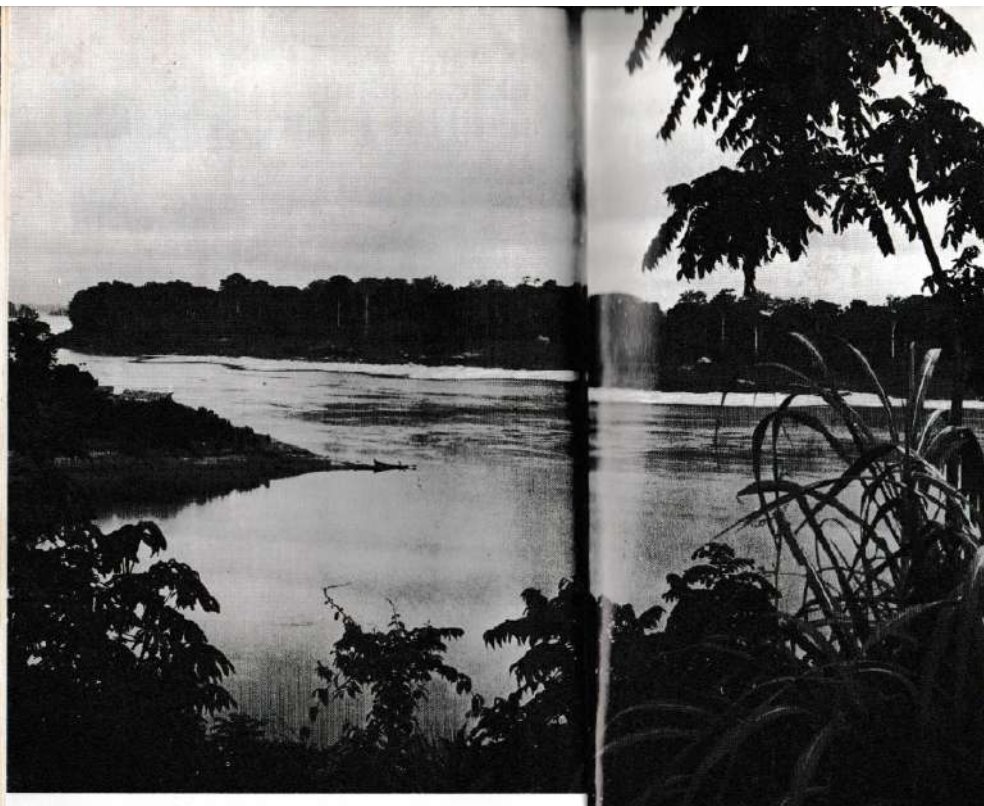
Within two or three weeks after adding the daphnia to the tanks, you will find thousands of the little crustaceans in amongst the adult daphnia. With a few light sweeps of a large, fine mesh shallow net, you can scoop up a nice treat of live food for your fish. If the net is forced too vigorously near the bottom of the container you will probably stir up the decaying vegetation that has settled there. Most of the daphnia will be near the top of the tank close to the source of sunlight, therefore, it should not be necessary to go too deep in the tank with your net. Don't be surprised if, in the Spring, you find mosquito larvae wiggling amongst the daphnia. Feed them to your fish too, they'll love every morsel.

If outdoor tanks cannot be maintained, and you still wish to have daphnia, you can set up a 10-gallon or larger tank indoors, preferably placed near a window to receive sunlight. If no window is available, a well lighted tank with hood should produce green algae, but don't expect too much from small containers. In any case, do not let the tank water get too warm as daphnia must be kept cool, about 60 degrees is fine; a slight aeration should eliminate most odors.

Daphnia cucullata, the Helmeted Daphnia can be better studied in this enlarged view. Its strange appearance can be likened to many things including a mouse with a pointed head. Would you believe that this funny looking thing possesses a heart, intestine, and complex eyes. It is even capable of changing its shape with the changing of the seasons. You can find this species of daphnia inhabiting larger lakes.

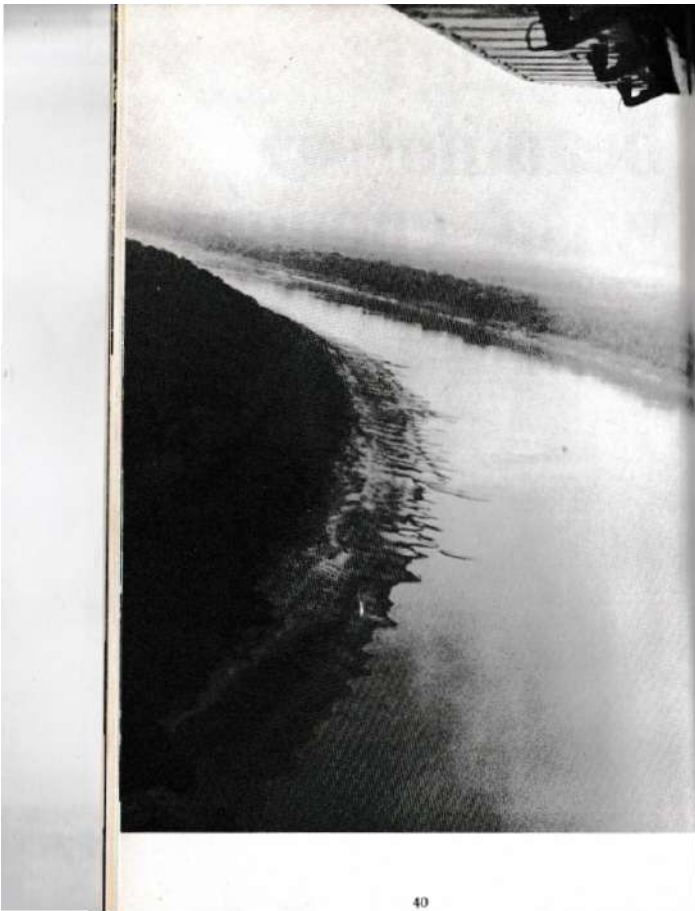
Understanding Your Hobby

SOME FACTS ABOUT WATER



It would be more convenient if the aquarist could just say, "water is water." But the truth of it is, that the natural fresh waters in different parts of the world, and even in neighboring areas, are different in their chemical, physical and biological components. The science, limnology, is concerned with all of these factors intrinsic to the make-up of freshwater bodies such as in this river, the Rio Purus in northwestern Brazil which is surrounded by lush foliage and rich in mineral content.

BY J. M. BELLANCA



We who love the tropical fish hobby have two sets of conditions with which we must contend and understand: the conditions in which fishes naturally lived—their original, wild habitat—and the new artificial environment in which we hobbyists have placed them—the aquarium setup. An analysis of the waters in both of these environments—natural and artificial—must be undertaken so that we can attain a more proper maintenance of our fishes, consequently leading to healthier fishes with greater longevity.

Man has taken these incredibly beautiful creatures from the *hydrosphere* (waters of the world) deciding to keep them in front of him so as to have the joy of watching them. The fishes haven't complained yet. And, there are those hobbyists who claim that the fishes should not grieve, for in their natural habitat, they are early victims of disease, starvation, and predators. There is, of course, some truth to these claims, only, if we maintain these fishes properly, or at least as well as, they might have enjoyed in their original environment.

To fishes, that mysterious substance called water, is a many splendored thing: not only is it the major part of their external environment through which they move, it is the medium through which they obtain their necessary supply of oxygen. Water is to fishes, what air is to people. You could say that fishes breathe water just as people breathe air, for even though fishes differ in biological form from humans and do not live via the same medium (air) through which people exist, nevertheless fishes also obtain their needed supply of oxygen by taking their medium (water) through their own biological system (bodies). Fishes are biologically structured to accommodate this aquatic respiration. And, respiration, is the correct term, for there is both an intake of oxygen and a releasing of carbon dioxide by the fishes.

Having followed the course of this river in South America from the view of an airplane, we easily were able to see the many physical differences in surrounding environments that affect the chemical composition of the river water itself. Seeing this river travel its course through many different kinds of terrain, one begins to better understand why variances in the chemical composition of this one river do exist. No body of water, whether it is a running body of water (*lotic*) or a still water system (*lentic*) is absolutely homogeneous: there are degrees of variability for instance, caused by the degree of light penetration in still water systems. This zonation ultimately affects the kinds of fishes that are able to survive. One of the variances in lotic freshwater systems is of course the current. And in the river, depicted from this airplane, there are areas where the water possesses a very strong current, and some distance down further, the water is almost as still as one might expect to find in a lentic system. The degree of water current, according to leading scientists, may be responsible in contributing to the biological structures of the fishes attempting to survive in these waters.

So you can see, that although water is of great importance to the human constitution, it is even more dramatically vital to fishes; it is not only their house, but also their supermarket. This is why we must attempt to investigate the conditions of water as it exists where fishes live naturally, so that we can better duplicate, or even improve upon those conditions. Thusly, in setting up a new and artificial environment—the aquarium—we have a twofold problem. We must understand the home-waters of the fishes and the interaction of the fishes with the water, besides having to know something about the water which comes out of our own kitchen faucets—the water, with which we hobbyists will use to create this second unique system that we call an aquarium. It is logical in this type of investigation that we then begin with acquiring knowledge that is valid to both situations, namely, the characteristics and behavior of pure water.

Water is about 800 times as dense (mass per unit volume) as air at the same temperature. A liter of water will contain much less oxygen than a liter of air at sea level at the same temperature. To demonstrate this point, a liter of fresh water at 68° F. contains at air saturation, only 9.4 mg. of oxygen, while a liter of air at the same temperature contains about 250 mg. of oxygen!



Pond in Trinidad.

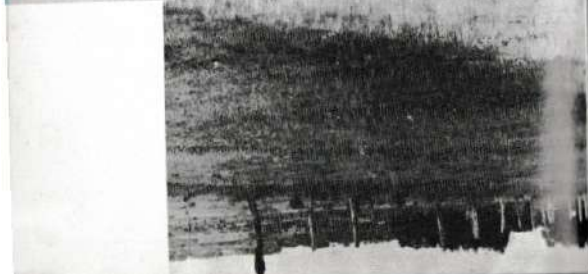
A pool outside Leopoldville, Africa.



The aquarist gets a better picture of the diversity of water conditions possible when he keeps in mind that there are many kinds and classifications of bodies of freshwater, including lakes, rivers, swamps, bogs, springs, ponds, creeks, brooks. These ecosystems individually possess unique characteristics, but generally, they can be evaluated for biological considerations in terms of their temperature, their amassing of respiratory gases, their amassing of biogenic salts, and the amount of water transparency.



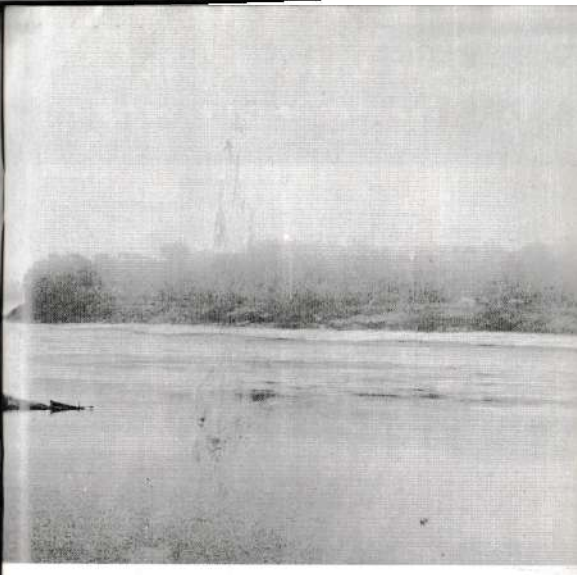
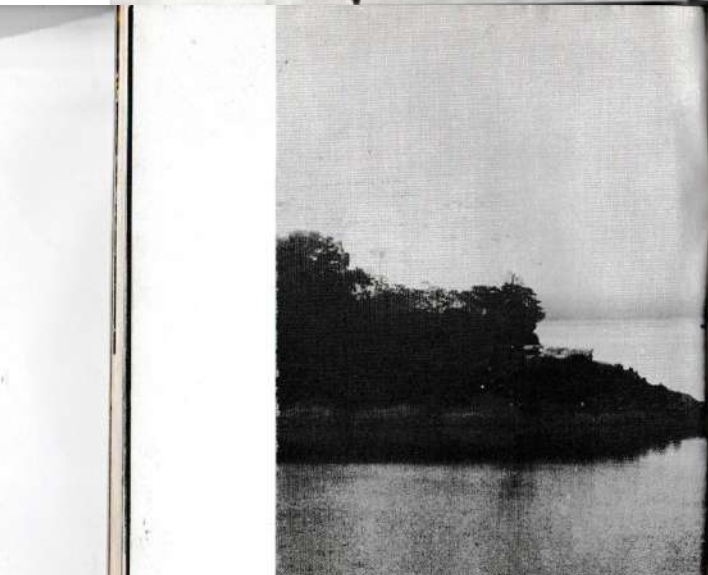
Overflowing river in Africa.



A stagnant body of water such as this **intermittent marsh** created by rainfalls presents a different set of living conditions for fishes than does a system of running water. For one thing, **oxygen** is more plentiful and more evenly distributed in a body of running water. Some scientists suspect that the biological structure of the fishes attempting to survive in such an environment. Dr. Axelrod netted many lovely animals in this marsh near **Cabo Frio, Brazil**.



For practical significance to the hobbyist this means that both the fresh waters in nature and the fresh waters in his aquarium, if taken in equal volume and equal temperatures would both hold 28 times less oxygen than an equal quantity of air of the same temperature. Thus, water as a respiratory medium poses certain problems as to the access to oxygen. Fishes utilize less oxygen than terrestrial vertebrates, but the above-mentioned limiting factor of water as a respiratory medium is still of great importance to the aquarist as a consideration in keeping his tropical fish healthy and happy.



The different seasons bring about many changes in our freshwater systems. For instance during the heavy rain season of the River Purus in South America, soil and debris are loosened at the river banks and become part of the river. The chemistry of the water, of course, then undergoes changes. Muddy waters then limit the amount of light penetration, since these waters have become less transparent. This in turn affects the photosynthesis by plants which require light for this process.

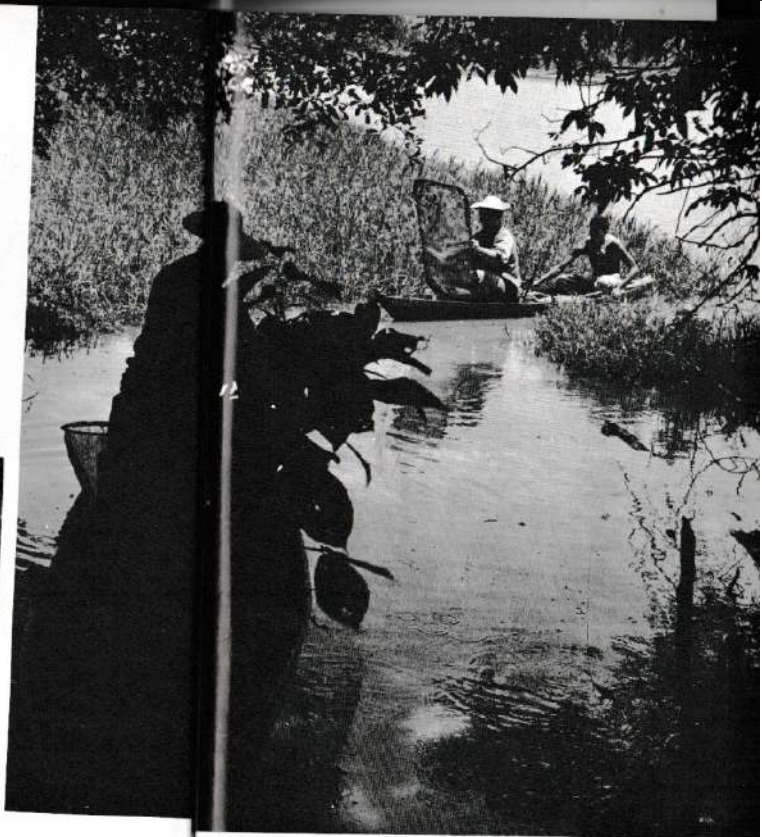


Although water is the most frequently occurring liquid in the world, and possesses properties and structure which are common to other liquids, in many ways it is still atypical. Within this context, of interest to the hobbyist aquarist, should be the fact, that the surface tension of water is a great deal higher than most molecular liquids. *Surface tension* is that force which fights against any attempts to increase the surface of the liquid. In fact, any try at breaking or stretching of a liquid's surface meets with resistance, and in the case of water, this resistance is extraordinarily strong. In aquarium maintenance, the knowledge that water possesses this property to such a degree, can be useful to him in improving his means of aeration and filtration.

The gnarled twisted appearance of the trees in this swamp is indicative of the conditions that prevail in the freshwater system. The climatic factors which contribute to the structure of this vegetation also affects the chemical composition of the waters and in turn influences the biological structure of the organisms within this swamp. So when you look at these trees and see drama, you are correct.



In the natural state, the main sources of oxygen in aquatic habitats is derived by diffusion from the air, and via the process of photosynthesis by water plants. In a stream there is usually more oxygen available to aquatic organisms than there is available to animals living within the environment of a pond. There are those aquarists who state that the aquarium fishes which tropical fish hobbyists have not been successful in spawning, are possibly lacking some necessary chemical ingredient within their aquarium water that is present within the waters of their original water-habitat. This is one of the reasons for the intense interest scientific analyses of waters from the wild.



The partial decomposition of vegetable or animal matter in or on soil forms what is known as humus, this in turn forms humic acid in water. Fishes who thusly live in a freshwater environment containing this kind of chemical composition probably would benefit from a similar water composition within



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MAIL CALL

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Algae Everywhere

Q. I am a hobbyist. I get your *Tropical Fish Hobbyist* magazine each month. However I have a problem with algae growing in one of my aquariums. I have 3 scavengers in it, and the proper lighting with cover, but the algae grows faster than I can keep it out. I did notice in one booklet you referred someone with this same problem to Nov. 1966 issue. That was before I started taking the book. So if you would put your information concerning this in your next issue, I would appreciate it, and hope the other subscriber will also see it. Also, it is so hard to find Hi-fin swordtails around Jacksonville, Fla. I have looked in all pet shops, but they don't have any. Do you know where I might purchase some.

L. Warren
Jacksonville, Florida

A. You say that you have the proper lighting and cover. But what wattage is the bulb, and for how long of a period do you allow this light to remain on daily? Also, is this tank getting any sunlight?

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Tropical Fish Hobbyist

There are several forms of algae which the aquarist can quickly identify by color . . . the blue, brown or green. The blue algae is somewhat difficult to eradicate. This form of algae can be caused by the accumulation of too much waste materials. Overfeeding is part of this problem. Many experts believe the best way, and only way to remove algae is by the maintenance of proper water conditions. That particular issue of the *Hobbyist* contained an article about "light," describing it as an important factor in the health and lives of all fishes. It was stated in this article, that an overabundance of light can irritate the growth of algae. If you are interested in purchasing some Hi-Fin Swordtails, why not contact some of the advertisers in our magazine.

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September, 1968

Community Breeding

Q. I am interested in breeding tropical fish. I would appreciate any information you might be able to help me with. I am furnishing you with the following information so that you then might better understand my problem.

1. I have had a 30-gallon tank since December 1967 and have not tried to breed any fish. Since reading your column, I have considered breeding my fish. I also have a 15-gallon aquarium in which I have unsuccessfully tried to breed two rainbow cichlids. They have tried too, but nothing ever came of it. What is wrong?

2. I would like to know all possible requirements for breeding a community tank of 30 gallons. It contains 3 angel fish, 4 black mollies, 2 gouramis, 5 neons, 4 zebrafish, cardinal tetras, 1 algae eater, 3 swordtails and several guppies. I have bred mollies three or four times

and yet haven't had any fry that lived. Any information or references you might suggest will be greatly appreciated.

Jack Loggins
Schereville, Indiana

Pterophyllum scalare



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Cichlasoma biocellatum

3. Both sexes are colorful but the male is more colorful, displaying, especially at spawning time, a great many blue metallic spots; the females are also slightly smaller.

4. At spawning time, you should give live food such as brine shrimp, daphnia, and if you can't get any live food, try raw beef heart (small portions); they should also accept freeze-dried brine shrimp and daphnia.

5. Occasionally in your local pet shops you'll see some real whopping big specimens of Jack Dempsey, *Cichlasoma biocellatum* — I saw some real beauties, about 8 inches total length.

6. Thank you we appreciate your saying so.

Simple Answers?

Q. I have a 10 gallon tank with 12 fish ranging from about one inch to three inches in size. My friends who have kept fish for many years say this is too many, others say this is too little and I don't know which one to believe! I have looked at these charts concerning this but can't make anything out. These charts are so complicated I don't think anyone could figure them out! Isn't there a simple way to figure out how many fish belong in a tank regardless of its size? If so could you tell me about it.

Herbert Harris, Rutland, Massachusetts

A. There's been an old rule floating around the aquarium hobby for years which goes something like, a gallon of water for each inch of fish. This is not a bad guide; you can't go wrong with it — it's the safest simple way of setting up a tank. But Herbert, it's like everything else in this world, if you are searching for a magical one word answer to your problem, no such thing exists. The more you get into this hobby, the more you realize there is to know and learn; that's what makes it so much fun and challenging. Did you know that young fish consume more oxygen



Crowded Tank?

than some adult fishes? This then would somewhat qualify the old rule of an inch of fish per gallon. Active species also have more demanding oxygen requirements. This knowledge would again qualify that old rule. So your bet since you don't seem to have the patience to read and investigate the fish world is . . . use this old rule, but make sure you have plenty of good aeration and proper filtration. If you don't have more than 3 three inch fishes in your tank — you'll probably get by. But at the same time, they probably won't

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Reader Suggests

Q. Needless to say, I enjoy T.F.H. immensely and don't want to miss a single copy. I would like to suggest an idea for an article that would have great interest for me

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and I think for many of your readers. Many of us would like to photograph the results of our years of carefully brooding fish. Many of us have snapped roll after roll of film with no or poor results. There doesn't seem to be anything available on the subject, at least in the photography books that I can find. We see the beautiful photographs by Dr. Axelrod, Zakal and others in T.F.H., and feel frustrated. Therefore, an article on photographing aquarium fish would be instructive and interesting to many of your readers.

Brantz Von Mayer, Mexico

A. There are a lot of people writing to T.F.H. every day who are in agreement with you; it is natural to want to photograph your aquarium, since you have personally

thought up the decorating ideas and have carefully selected the fishes and made your aquarium a living thing of beauty. Besides you get a big kick from showing friends pictures of your own beautiful fishes. Sometimes photography helps you to be more objective about how your tank looks. You can use the photos as a guide to correcting anything that you think doesn't look so hot after having seen what it really looks like in the picture. You can also with photography, keep a record of all the fishes you have ever kept, all of those favorite pet fishes that you've cared for. Photography is also a good device for measuring the growth and growth rate of your young fishes, and new born fry. You can look forward to articles on how to take fish pictures in forthcoming issues of T.F.H.

familiar moments



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By Paul Hahnel

Getting Started
Q. I'm fourteen years old—just starting to brood guppies. I have five fifteen gallon and one ten gallon tank available for the breeding of my newly acquired blue veiltail guppies. I don't plan on raising them commercially, I just want them for pleasure. Can I get along on just one fifteen gallon aquarium? If not, how many aquariums should I use?

2. At what age will guppies begin to breed?
3. How many times a day should I feed the newborn babies?
4. Should I or shouldn't I use a feeding ring or a breeding trap or why?
5. Do you know of any place where I can send to get information on how to join a guppy club, or a tropical fish club for that

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6. I enjoy reading your magazine, especially Guppy Corner.
Mark Batell, Downers Grove, Ill.

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A. 1. If you are stating that you have 5 tanks of fifteen gallon capacity and one ten gallon tank, then I would say you have a good beginning for really becoming an advanced aquarist. But, if you are going to limit yourself to the use of a single fifteen gallon tank then of course, you will have much less space for your hobby; you should then be able to maintain only about 25 guppies.

2. Checking on my red strain, I determined that the females were ready to be fertilized at the age of six weeks.

3. New born babies should be fed as often as possible. And if you have the time then I would recommend every 2 to 3 hours. But make sure that you feed them only a portion which they are able to consume within five minutes. Otherwise you might pollute the water, since unaten food begins to decay quickly.

4. I use a feeding ring to prevent any dry foods from spreading over the surface of the tank water. But I do not use a breeding trap because from my own experience, I find that it too tightly confines the female. Instead, I plant all my tanks with a fine leaf waterplant, also float some of these same plants at the top of the tank so that the fry will have a hiding place.

5. For information about joining a club, write to Emery E. Mann, 13701 S. 82nd Ave., Orland Park, Ill. or write to Ken Amus, 4115 Joliet Ave., Lyons, Ill.

6. Thank you very much.
Guppy Disease
 Q. I follow your column in the Tropical Fish Hobbyist and enjoy reading the principles you offer in the caring of guppies. I have a question that has been bothering me about some of my young guppies.

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1. The tails of the young guppies have been going to a point and hence losing their ability to swim. I have had to discard these guppies as they never recover. What might be the trouble?

Ray Newey,
 Bend, Oregon
 A. 1. Pointed tails on young guppies is not an uncommon occurrence in hobbyist's tanks. This condition is caused by bacteria. If this infection spreads to the body of the fish, then it is usually too late to even attempt to cure it. I have read in some literature concerning fish diseases that "Phenoxethol or Acriflavine is used in the successful treatment of this disease."

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*Salts From
 The Seven Seas*

By Alfred A. Schultz



Q. Can I use the same remedies in a salt water tank that I use in my freshwater tank to cure disease in my fish?

Anthony Ricci,
 Louisville, Ky.

A. Do not use any medication prescribed for your freshwater fishes on the salt-water fishes. Use only those medications made especially for marine aquariums.

Q. How much light does a marine aquarium need?

Sam Loscalzo,
 Mt. Pleasant, Tenn.

A. Since most marine aquariums do not contain plant life, light is not essential for anything, but for the fishes to see their food. Therefore, light should be used mostly for feeding. Turn them on at least one hour before feeding, and leave them on for one hour after feeding.

Q. I recently decided to change half of the water in my tank. Since I no longer had or was able to purchase the original brand, I used a different brand, and lost all my fish. Can you possibly tell me what could have happened?

Mel Richards,
 Melrose, Mass.

A. With most synthetic salts, the basic formula may be the same but they may vary with the use of trace elements that are added to the mixture. If possible, always stick to the same brand.

Q. What is the best food for a four inch LIONFISH?

Tom Correlle,
 Sioux Falls, S.D.

A. Live food is the best for your fish. At four inches, your fish will eat guppies, small pieces of clam meat and beef heart. I have often fed mine with frozen spearings which I have obtained from a local

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bait shop. I use a thin clear plastic rod, that is pointed. With this rod, I impale one of the dead fishes and move it in front of the mouth of my lion fish, and it does not take long before he grabs it. It's cheap and economical.

Q. Living in New York City, I am lucky in being able to catch an occasional fish specimen for my 20-gallon marine aquarium right at the local beaches. So far I've caught and have been able to keep local species of sea horses and pipefishes, plus some very small puffers. I once caught a sea urchin and intended to add it to my tank, but it died before I brought it home, and I don't think I would have had good luck with it anyway, since I've had bad experiences with small crabs and star fishes that I've caught in local waters. But now that summer is here I'm tempted to try to keep some of the small crabs that live in the sand; the ones I mean don't look like regular crabs and don't have pincers. They have a domed shape and look like small eggs. They are tan in color and can be easily caught just by digging in the wet sand near the

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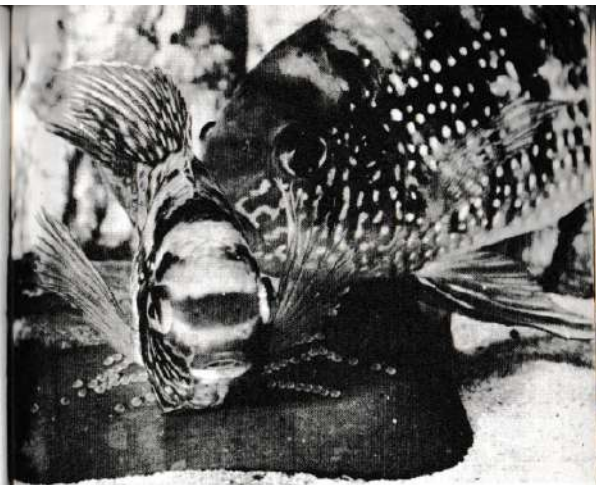
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water's edge. Could I safely keep two or three of these in my aquarium?

Larry Cochrane,
 Brooklyn, N. Y.

A. The crab you mean is Emerita talpoida, very common on the East Coast. I would advise against trying to maintain any of these interesting little crabs in your aquarium, because they wouldn't live very long. These sand crabs are accustomed to living near the surf, and an aquarium doesn't provide enough water agitation for them. Also, they feed by straining bits of food out of waves that pass over them, so they are not suited to aquarium living. Chances are great that if you put some into your tank they'd just dig into the sand and die there.



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CORIS JULIS (L.), A COMMON MEDITERRANEAN WRASSE: PROBLEMS OF COLOR-PATTERN AND TAXONOMY

ENRICO TORTONESE
Museum of Natural History
Genova (Italy)

About twenty species of Labroids are known from the Mediterranean, but the subfamily Corinae, so well represented in all the tropical seas, has only two members: *Coris julis* (L.), very widespread, and *Thalassoma pavo* (L.), a denizen of warm waters, chiefly found in Southern and Eastern Mediterranean zones.

Coris julis is a colorful fish, living on *Posidonia* beds and near rocky or gravelly bottoms; during the winter, it reaches lower levels (more than 100 meters). This wrasse eats mainly small invertebrates, breaking with its strong jaws and teeth the hard shells of molluscs, echinoderms and crustaceans. Adaptation to such feeding habits is to be recognized in the morphology of the mouth and pharynx, and very likely in the secretions by which the swallowed hard materials are disposed of (Tortonese, 1952).

Spawning occurs in spring and summer; the eggs are spherical and buoyant, with an oil globule and a diameter of about 0.65 mm. The hatching larva is about 2.3 mm long (Sparta', 1956).

This pretty fish is easily kept in aquaria; however, it suffers from cold and is frequently hidden in the bottom, with only its head protruding. This is also a common habit in nature. *C. julis* is particularly interesting for the remarkable variation in coloration, which may roughly be outlined as follows: some individuals are of smaller size and show a brown or reddish back; a yellow band along each side separates this color from the white lower parts of the body. Sometimes there is a dark brown band alongside, accompanied by whitish bands above and below. The specimens with this kind of livery were named *C. giofredi* (Risso). Others are larger (maximum size: about 20 cm standard length) and more colorful. Their back is brownish or greenish; the lateral band is red or orange, with wavy borders accompanied by a narrow blue line; there is an elongated black spot along the anterior and lower border of the lateral band; a dark blue spot is seen at the angle of the operculum and a black one among the first dorsal rays, which are a little elongated. These specimens were named *C. julis* (L.) or *C. vulgaris* (Val.). Of course, minor variations occur in both the above mentioned basic

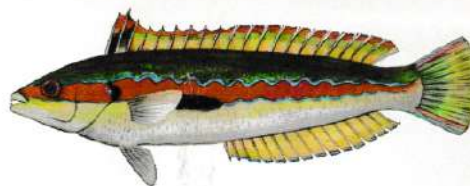


Fig. 1—Livery of *Coris julis*. Watercolor by E. Tortonese.

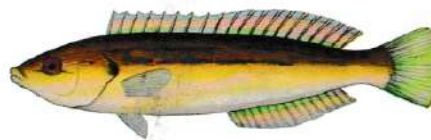


Fig. 2—Livery of *Coris giofredi*. Watercolor by E. Tortonese.

types of livery. These are found everywhere: I observed a great number of specimens in the bay of Genova, at Naples, Monaco, Tripoli (Libya), Rhodes, etc.

According to Moreau, Courret, Lo Bianco and other students of Mediterranean fishes, the two forms were to be considered as different species; other authorities, such as Steindachner and Günther, recognized a sexually dimorphic single species, *C. julis* being the male and *C. giofredi* the female. The results of recent researches support the existence of only one Mediterranean species of *Coris*.

Reinboth (1957), who studied material from the French coasts, found that a change of sex occurs. The *giofredi* livery is shown by all the young individuals, by the females and by some males; the *julis* livery is shown only

by large specimens that are old females become functional males. Almost contemporary were the investigations carried on by Bacci and Razzauti at Leghorn, with fishes from this locality and from Sardinia. These authors clearly proved (1957, 1958) that *C. julis* is a protogynous hermaphrodite; both males and females may have the features of either *julis* or *giofredi*, as the change of sex, which occurs very rapidly, is not strictly connected with a change of livery. Of course, individuals with an intermediate look will appear. The two Italian authors mentioned above noticed that "young individuals were all females and they showed the *giofredi* livery".

A few years later, the picture was complicated by new discoveries. Pras (1964), who studied the French *Coris* without references to the previous researches, announced the existence of three different kinds, namely:

- (1) "king wrasse", large (longer than 12 cm), with *julis* livery; very widespread, until at least 80 m depth.
- (2) "red wrasse", smaller (reaching however 14 cm), with *giofredi* livery: red back, pink-whitish sides, pink-yellowish belly. Found here and there with the preceding: these two forms are mixed and intergrade.
- (3) "brown wrasse", differing from the red because its back is purplish brown. It lives separate from the other two forms, more near to the shore; there is no mixing, nor intergradation. Pras suggests that only forms 1 and 2 can probably be recognized as forming a single species; he actually prefers to join them as *Coris julis* forma *vulgaris* and give the name *C. julis* forma *littoralis* to the brown wrasse. Some questions immediately arise. Perhaps the change of sex occurs only in *vulgaris*? Perhaps the brown wrasse always keep the same livery? We have a biological and a taxonomic problem, strictly connected.

For the present moment, it seems to me that the best opinion to be held is this: *C. julis* is a single and well defined species (we have no evidence for the contrary), which, as Bacci and Razzauti have stated, is protogynous hermaphrodite. The *giofredi* livery is more variable and differs with the depth, being "brown" along shore and "red" further down; large specimens with *julis* livery live only in relatively deep water. Along the rocky coast of the bay of Genova, I found many *Coris* that were all referable to the "brown wrasse", so this really appears as a more littoral kind of livery. Bacci and Razzauti worked with this same form, showing its evolution to *julis*, so it appears more than probable that both the "brown" and the "red" wrasse represent the young stage (the so-called *giofredi*) that later becomes the "king wrasse". As a consequence, I think that there is no reason at all for keeping the names *vulgaris* and *littoralis*, as proposed by Pras; they have no meaning according to the current nomenclatorial procedure.

The situation in *C. julis*, here briefly outlined, is a very good example of the problems posed by "well known" species of fishes and should stimulate researches on other Labroids in which similar situations may occur.

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Exploring The Witty World of Puffers



I couldn't believe my eyes the first time I saw a puffer. It was a Saturday morning over at Aquarium Stock in New York, and I was taking a tour of their 3 hundred or so aquarium setups when I spied a curious little creature in a tank. The way this little thing was swimming around was hysterical; it moved just like a helicopter, going straight up and down the tank without having to change its body position. I was so captivated by the antics of this funny little fellow that I immediately called over a salesman and asked "What is this nutty little thing?"

"That's an African freshwater puffer."

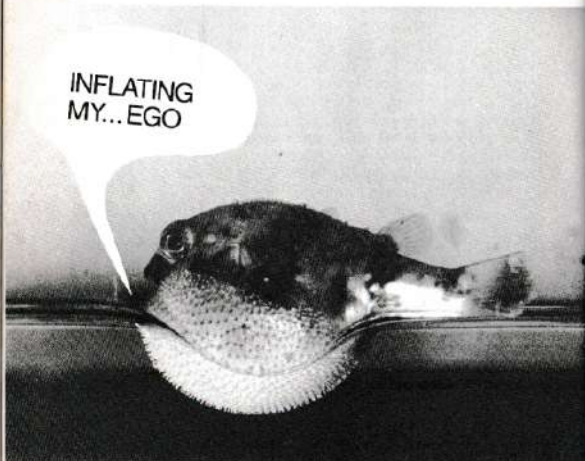
"Is he more than five dollars, because that's all I have on me."

"Well, we don't get this species in too often, but he's less than five dollars. He'll cost you only \$3.50. But remember he's got teeth. And he will bite other fish."

Well, I bought the puffer, and didn't take heed of what the sales-

man said because I figured, how could a little beauty like this be that mean. So I placed him directly into my 20 gallon tank containing small angelfish and my pretty dwarf gouramies. Wouldn't you know it, every morning I found a fish chewed up right in half. Finally, hating to admit it, I realized the villain was my new puffer who must have waited till nite time when the other fishes were resting in place, for in the day time he tried to chase them but they were too fast for him. I took him out of the 20 gallon and then placed him into a 5 gallon tank of his own and he was more fun than a 3 ring circus; he investigated every nook and cranny of the tank. His eyes seemed almost human the way he was able to move them around. And for some reason the way his lips were always

moving, I had the impression that he was whistling. This puffer became my prize possession. In no time at all, Harry began to recognize me when I entered the room to feed him. Harry convinced me with his intelligence and witty ways that I should learn more about puffers by reading all the scientific literature and asking questions of the many advanced aquarists who I knew. I found out that these zany little fellows inhabit mostly brackish waters but there are certain species which are unique to only freshwater such as my African puffer *Tetraodon lineatus*. But



most of the brackish water species can be converted to freshwater anyway. Behavior-wise, these creatures are a treasure house of material: besides being able to puff up at will like pop corn, some of these species enjoy burying themselves in the sand just showing their eyes and snout. Their teeth are powerful, especially the species whose teeth are formed into a beak-like formation. All of these puffers love to crunch on snails. The Leopard Puffer, *Tetraodon schoutedeni* is probably the most sociable species and can be kept with other fish that are larger than itself. BY BOBBY NEVINS

These puffers which offer the aquarist a delightful spectacle also offer the aquarium world a real challenge in maintaining them; for they have strong territorial instincts, thusly requiring some ingenuity on the part of the tropical fish hobbyist in creating an environment that can properly contain these aggressive traits, while simultaneously putting them in an advantageous view for the onlooker. Photo by Hansen.

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What would the crowds at Coney Island say if they saw this character buried there in the sands? U.F.O. . . . ? This *Tetraodon* species couldn't care less about anyone's reaction to his strange behavior, because to him it isn't odd; he's doing his own thing, which is really his way of making himself feel comfortable and safe. Photo by Hansen.

Rivulus holmiae

BY RUDOLF ŽUKAL
BRNO, CZECHOSLOVAKIA

Many advanced aquarium hobbyists nowadays find that they prefer to specialize in certain definite fish groups. Such a group that is popular is the egg-laying toothcarps (Cyprinodontidae), to which *Rivulus holmiae* belongs. This fish is not particularly well known. It was first introduced from Guyana into Europe in the year 1956. Despite the fact that it is easily bred, it is seldom seen in hobbyists' tanks.

The body is elongated, but sturdy. The fish attains a length of 4 inches. The brown basic color gleams greenish to bluish, lighter below with white on the belly. From the pectoral fins to the caudal base, the entire body is covered with rows of red dots. The black eyes are adorned with a ring of gold.

Sex differences are easily distinguished in grown specimens. The male has a tail that is bluish black and edged above and below with orange. The tail of the female, on the other hand, is blackish and lighter toward the base. The rest of the fins are brownish red.

The fish require some heat; a temperature no lower than 72° F. is recommended for keeping them. Because of their size, they should be kept in a large, long tank. They are very shy, so their tank should be thickly planted. There should be floating plants on the surface. Medium-hard water is recommended. When they get a sufficient amount of good food, these fish are peaceful and can be kept with tankmates that are not too small. *R. holmiae* are skillful jumpers, and for this reason their tank must be covered with a tight-fitting cover.

In 1966 I placed six of these *Rivulus* in a newly set up tank, and the next morning I found it empty. All the fish had jumped through an inch-wide opening, and I found them thoroughly dried out about 35 feet from the tank. I assumed that during the night they had jumped out and flopped across the floor to a source of light, namely, a crack of light under a nearby door. Do they do the same thing in their native waters? I am convinced that most of the egg-laying toothcarps make their homes in small pools which frequently dry out completely, and for this reason they have a well-developed instinct of self-preservation which gives them the power to jump in the direction of other pools of water. I have observed this with other fishes also.

When *R. holmiae* have a tank to themselves, there is a possibility of collecting their eggs carefully with a glass dip tube and allowing them to hatch in a small tank. If they are housed in a community tank, a medium-sized all-glass tank is used for spawning the fish. Tap water, heated to 78° F. and not too deep is perfect. There should be a sufficiency of fine-leaved plants. The female lays her eggs one by one. In the course of 24 hours, a great many eggs may be laid. They are large and clear, and they are attached to the plants with tiny threads. Usually the parents do not eat them. The eggs hatch 10 to 14 days later, and the fry remain near the surface of the water after they become free swimming.

Camera close-up

Photos by Zukal.

SPAWNING BALLET

Quite often people talk about how beautiful animals look when they move about. These same people usually neglect to mention the grace and symmetry within the fish world. We tropical fish hobbyists though are well aware

of the beauty of movement exhibited by some of our aquarium fishes whose body locomotion sometimes verges on the dance. Here a male and female *Rivulus holmiae* during their spawning ritual move about in the most amazing synchronized dance-like movements. Their performance of dazzling virtuosity includes a serpentine kind of choreography during the courtship and egg-expelling processes. What is even more beautiful is that the performance is unrehearsed and that the 2 fishes have unified their talents, making the movements of two fishes look like the rhythmic flow of one entity

