

October 1967

tropical fish hobbyist

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SPAWNING ANGELS

tropical fish hobbyist

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contents

Breeding Angelfish	4
<i>Aplocheilichthys lineatus</i>	12
<i>Pseudotropheus zebra</i>	33
Hawaiian Freshwater Shrimp	56
Raising Brine Shrimp, <i>Artemia salina</i>	61
<i>Rachora sumatrana</i>	67
Observations and Experiences with <i>Julidochromis ornatus</i> and <i>Julidochromis marlieri</i>	85

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features

Your Fishes' Health - 25, Mail Call - 69, Guppy Corner - 80, Salts From The Seven Seas - 82.

cover

Ever meet a hobbyist who hadn't kept angelfish at one time or another? Angels have been around for about as long as any of us can remember, and they haven't once lost their great popularity. At one time you would have had to pay an almost unbelievably high price for angels, but now their price is down to where virtually any hobbyist can afford a pair or two. One of the nice things about angelfish is that they can be kept in a community tank, as are the ones on our cover this month. However, some people keep large tanks in which they have only angelfish. These hobbyists often set their goal at having at least one pair of every type of angel available. If you know what you're doing, breeding angels is really quite easy. For the full story on breeding them, read the article beginning on page 4.

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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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October, 1967

editorial

In the August issue, Dr. Axelrod told you on this page of William Vorderwinkler's serious illness. He also mentioned that those of you who wanted to send Bill cards should send them here, and we'd see that he got them.

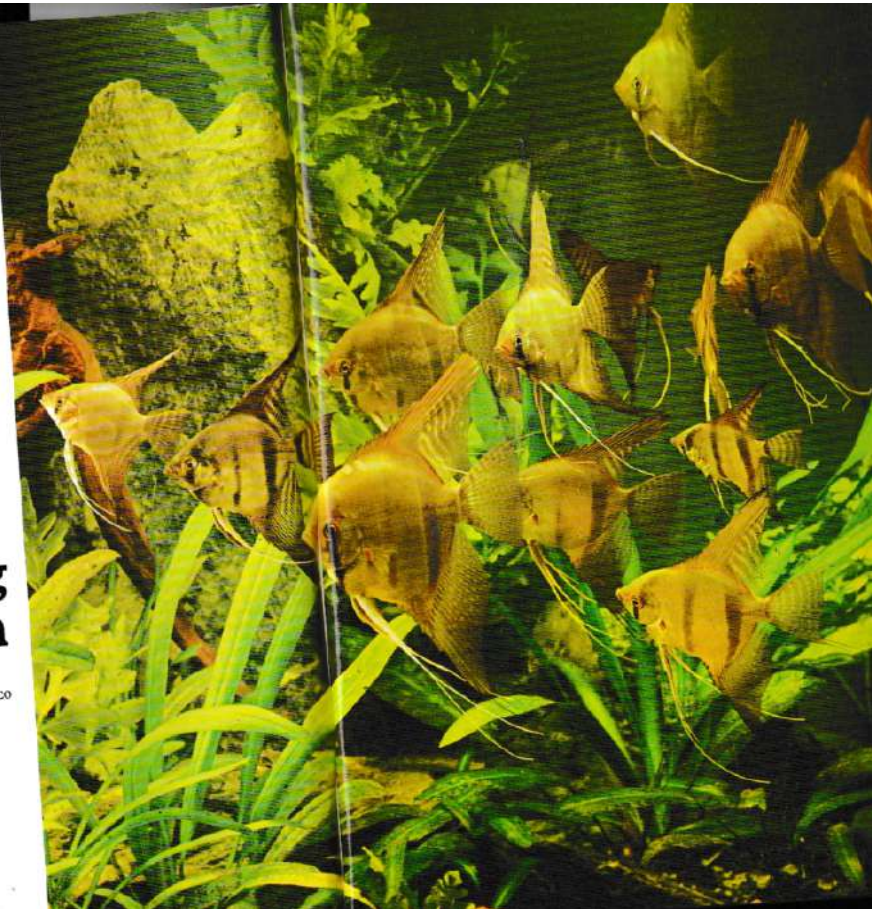
Well, Bill is still pretty sick, but not so sick that he doesn't appreciate all the cards you've been sending in. It takes pretty special people to go out and spend their time and money to send a card to a fellow they don't know personally and Bill would like to thank you all individually. However, even if he were well, that would be a pretty big task, so he wants me to thank you all now.

Those of us who have worked with Bill over the years would like to add our thanks to you. Bill is one of those one-in-a-million guys. The only thing warmer and more open than his writing is the man himself. He knows that we're with him a hundred percent at this time, and now he knows that so are many of you.

Mike Reed

Breeding Angelfish

BY PHILIP S. FRANCO



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Next to the familiar guppy in popularity is probably the majestic angelfish. It seems that anyone who has an aquarium has had at least one of these beauties gliding about in it at one time or another. With the many varieties available now, such as the black, black lace, veiltail, etc., this fish is more popular than ever. After raising thousands of these beautiful fish and having the same question asked, "How can I raise angelfish?" I felt that there was a need for an article on easy-to-follow procedures for the raising and breeding of this fish.

As is true in raising fishes of any kind, the parent stock is very important, so careful attention should be given to the selecting of future breeding stock. Purchase at least one dozen young angels. When choosing the fish be very careful of bargains, as there may be very good reasons for a low price. Look for good color, fin development, and overall vitality. An important fact for the potential breeder to remember is to make the first attempt with the common angelfish. These breed more readily, and you will not be disappointed into dropping the idea of breeding angelfish because all your black or veiltail angels died or they just wouldn't pair off. These fancier varieties are fixed mutations of the common angel and are all, therefore, more delicate and more difficult to induce to spawn.

The young fish you select should be placed in as large a tank as possible to insure proper growth. At least a 50-gallon tank is preferable. This can be a community tank with other non-aggressive fishes present, or just a bare tank with some Amazon sword plants to give the angels a feeling of security. The temperature should be maintained in the high seventies. Good results can be had at 75° to 82°F. By feeding a varied diet of frozen or freeze-dried brine shrimp and tubifex along with a high-protein dry food, the angelfish will grow rapidly and reach maturity in 6 to 8 months, depending on the age of the fish when purchased.

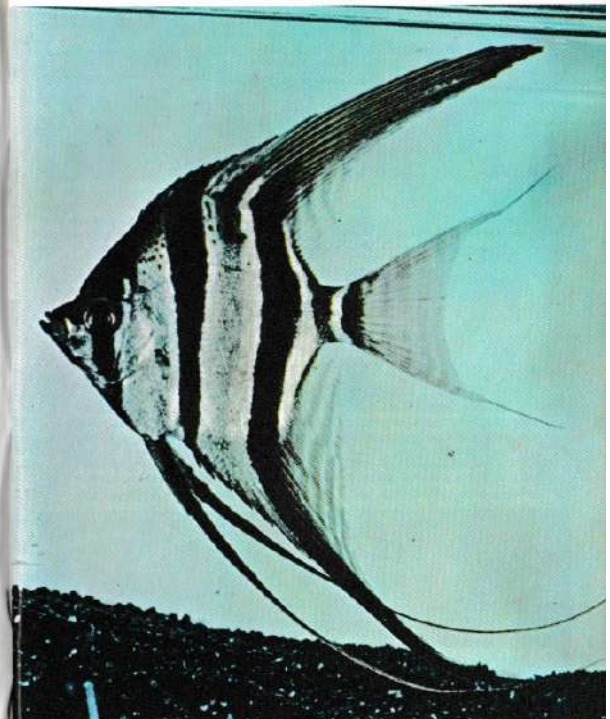
The first sign of pairing is a general restlessness. In addition, every now and then two or three fish square off as if to fight. Some spread their fins until it looks as though they will rip apart, and the fish then grapple mouth to mouth . . . a scene familiar to anyone who has raised any of the other cichlids. When suitable mates are finally found, the fish will stay together. At times a pair will keep all the other fish from part of the aquarium. When this happens, the pair can be removed to its own tank, or left in the raising tank until it produces eggs. This will give one more clue to it being a paired pair, but not one hundred percent certainty, for it is not uncommon to have two females pair off, mate, and lay eggs together.

The breeding tank can be any size from 10 gallons up. I have found that a bare tank with a potted Amazon sword plant and a piece of slate placed at a slight angle to a side glass makes an ideal setup. This gives the fish a choice of the plant or the slate on which to place their eggs. The water pH should

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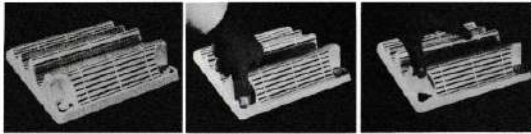


The spots around this pair of angels are not bubbles. Look carefully, and you'll see that they are fry catching the light at various angles. These youngsters have only just reached the free-swimming stage. Photo by H. Finler.



This is *Pterophyllum altum*, a species of angelfish not seen nearly as often as the common *P. scalare*. Identifying features of *P. altum* include its extended nose and mouth and its generally heavier, more elongated body and fins. Photo by Dr. Herbert R. Axelrod.

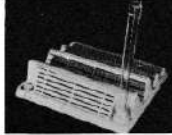
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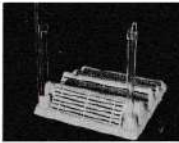
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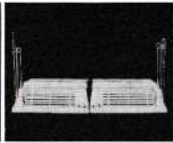
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be about 7.2, the hardness about 150 ppm. Keep the temperature at 78 to 80° F. Don't worry if your water is a bit soft, for it seems that with angelfish the hardness is not that critical. What is important is the correct temperature and pH. Angelfish thrive on partial water changes. Once a week, 50% of the water in my angelfish tanks is changed, using aged water. This includes the breeding and rearing tanks. I never let my tanks go acid in pH (below 7.0), as this will stop egg laying. If angelfish do stop egg laying, they can be induced to spawn again by frequent water changes (about 25 percent every 2 or 3 days).

Once your pair is set up, patience and continued feeding of the best foods available is necessary. First signs of egg laying will be when one fish develops a rather large blunt breeding tube from its vent. The tube will show up 1 to 2 days before egg laying. This is the female's tube. The male's breeding tube usually doesn't show up until the day of egg laying, and it is small and pointed. (One thing of interest that I have observed is that when angelfish reach breeding age, if they are fed heavily with live food, the females' breeding tubes will protrude. This does not mean they are going to breed, but I have used this "false show" to isolate female angels so that I may place them with possible males or males who have lost their mates.)

After the breeding tube is observed, watch for the next sign, which will be the fish busily cleaning the slate or Amazon sword leaves. Both fish usually take part in this pecking away at the selected egg receiver until they are satisfied that it is as clean as possible. At times the piece of slate or leaf will be cleaned to a point and then abandoned for some reason for another location. As egg laying approaches, the fish will become increasingly nervous, especially when you are watching. There is no one time of the day that angelfish prefer for laying their eggs. They will spawn any time from dawn to dusk. As the time approaches, the less the fish are disturbed the better the final results. The eggs are placed on the selected spot by the female, closely followed by the male for fertilization. Anywhere from 100 to 600 eggs are laid, depending on the size, health, and age of the female.

Next the decision must be made as to how the eggs are to be hatched. One way would be to let the parents take care of the eggs, which they will usually do jealously. The male and female will take turns fanning the eggs and picking off those that fungus. This will continue for 2 to 3 days, and then the eggs will start to hatch. At this point the young are transported by mouthfuls from one location to another. This lasts for about 5 more days, until the young begin to swim. To be able to witness this parental activity, however, one takes the chance of losing the eggs, young, or what is more important, one or both of the parents. If the parents feel that the eggs or young are in danger, they will devour them. Also, angelfish parents will

Continued on Page 14



Aplocheilichthys lineatus

BY RUDOLF ZUKAL
 BRNO, CZECHOSLOVAKIA



Facing page - Two photos showing a male *A. lineatus* trying to crowd a female into the plants to spawn. Photos by H. Abel. Above - A pair side by side and about to spawn. Photo by Hansen.

Compared to the amount of literature in existence about other members of the subfamily Cyprinodontidae, not very much has been written about the striped panchax, which was imported into Europe from India and Ceylon as early as 1909. Many hobbyists avoid keeping this fish because of its aggressive nature and its size, which approximates 4 inches. I have kept these fish with medium-sized characins and have never observed any cannibalism. Small fishes, such as baby guppies, are swallowed with great relish. Such meals consisting of small living fishes are highly beneficial and should be given regularly. Otherwise, the striped panchax is an undemanding fish whose only other fault is that it may easily jump out of the water.

Aplocheilichthys lineatus are pronounced surface dwellers. In order to put them at their ease, it is advisable to place some floating plants at the surface. They are fond of spawning among the roots of these plants. I will not give a description of their lovely colors, letting the pictures speak for themselves.

For breeding, a medium-sized tank is sufficient, with normal tap water in which the temperature can go as low as 70° F., but when spawning is desired

Continued on Page 37

Continued from Page 11

sometimes not be compatible in the care of their progeny and will end up fighting over them, resulting at times in the loss of one or both of the parents.

I have found that the only sure way to achieve success in hatching the eggs is to remove the eggs from the parents. A 1- or 2-gallon wide mouth jar is used to receive the slate or leaf with the eggs. If one can get electric battery jars, these are by far the best, as they are heavy glass (less likely to be broken), and the opening is as wide as the jar (ideal for accepting pieces of slate). The jar is cleaned very thoroughly, and at this point I vary from the accepted method of taking water from the breeding tank for the hatching jar; I use fresh tap water of the same temperature as the water in the breeding tank. This use of fresh tap water will probably shock most people, but after 3 years of fighting the battle of egg fungus using the many different preparations that are on the market, I tried fresh tap water. The results as

A black-lace female angel lays her eggs as her normally colored male watches.
Photo by Rudolf Zukal.



The female backs away from her eggs, and the male moves in to fertilize them.
Photo by Rudolf Zukal.

far as I am concerned are fabulous; almost 100 percent hatch in all cases with proven fertile pairs. It would seem that the chlorine present in the water is enough to prevent harmful accumulation of bacteria. The chlorine stays in the water for about 24 hours in traces, but by this time the eggs are developing and probably have a natural resistance to fungus to a small degree which is enough to get them through to hatching.

As when they are cared for by the parents, the eggs hatch in 2 days, and the young hang from the slate or leaf, or fall to the bottom of the hatching container. They will be non-swimmers for about 5 more days, after which they will rise in a swarm looking for food. Now the young should be transferred to an aquarium of sufficient size for the large brood to prevent future stunting of growth.

Another critical point where I differ from the accepted procedure is in the



Spawning is over, the female is fanning and mashing the eggs. When she tires, the male will take over the job. Photo by Rudolf Zukal.

first important food. Many books recommend that infusoria should be used as the first food for the fry, but angelfish young are large enough for live baby brine shrimp, and feeding infusoria will not result in maximum early growth. I start the young on newly hatched brine shrimp three times a day, enough at each feeding so that the young are literally surrounded by shrimp at first. This is continued for 2 weeks, and then beef liver which has been liquefied in a blender is fed in small quantities, watching to make sure that all the liver is consumed. Liquefied haddock is also fed, and with this diet the young do nicely. Caution is necessary with all this heavy feeding so as to prevent pollution of the water with uncaten food. A syphon is a handy device to clean the bottom of the tank. Also start partial changing of water with fresh tap water, about 20 percent of the total volume per week when the fry are 3 weeks old, gradually increased to 50 percent per week when the fry are 8 weeks old. With these water changes and proper feeding the young angels will grow rapidly, and at 3 weeks of age they take on the appearance of their parents. At 10 weeks old they will have a body size of a quarter and be well on their way to adulthood.

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YOUR FISHES' HEALTH

BY MIKE REED

Anchor Worms

Although anchor worms are fairly uncommon in aquariums, when they do occur, they are very dangerous. Large fishes sometimes survive attacks by these parasites, but small and average-size fishes rarely do. For this reason aquarists should be able to identify the anchor worm and know how to deal with it effectively.

The anchor worm, *Lernaeocera cyprinacea*, is really not a worm; it only looks like one. It is actually a crustacean, more exactly . . . a copepod. It is closely related to the well known live food of the genus *Cyclops*.

The only two cases of anchor worm that I have ever actually seen were both on fishes that had just been brought in after summering in an outdoor pool. Only two such cases, of course, do not prove that fishes in outdoor pools are more likely to be exposed to the parasite than are fishes kept inside, in aquariums. One thing is for sure though: it's a heck of a lot easier to spot the offending organisms in the aquarium than in a pool.

The female anchor worm has a long body at the head end of which are anchor-like appendages. She reaches a length of almost an inch and, so, is usually quite easily seen in the aquarium. The male anchor worm is shaped differently and does not attack fishes. The adult female attacks by sinking her anchor through a fish's skin and into its muscles. The cut that is made is quite deep and, therefore, very injurious.

A quick and easy way to get an anchor worm off a large, strong fish such as a goldfish or a large cichlid is to pull it off with a tweezers. Such treatment is sure death for small fishes. Even big fishes will be left with serious wounds that can be attacked by fungus and/or bacteria. Such secondary infections could create problems that are bigger than those caused by the parasite itself.

The best cure, if there are not great numbers of anchor worms to be dealt with, is to catch the infected fishes, take them out of the water, and touch the parasites with a brush that has been dipped in a 0.1 percent (or more) solution of potassium permanganate. Be sure to touch only the parasites, for the chemical can injure the fishes. Then, put the fishes back in the water. The anchor worms will

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drop off soon after this treatment. Those that do not can be dislodged quite easily with a tweezers. Where large wounds are left, they should be disinfected by a brief touch with mercurochrome.

There is one thing that you must be careful to check if there are anchor worms in your aquarium: look at the end of the parasite opposite the anchors. You are looking for egg sacs. These egg sacs will be about one seventh as long as the rest of the organism. When they are present, there are usually two of the sacs, but one may have been dislodged. If you see the sacs, there may be serious trouble ahead, for they indicate that the parasites are in their breeding season. The usual breeding season is during May, but in the aquarium it could be during another month.

From the eggs are hatched tiny larvae which swim through the water for some time in search of a host-fish. When they find a host, they penetrate its skin and muscle and begin feeding and growing. For 4 or 5 months, the young anchor worms remain too small to be seen easily, but they may still cause their hosts much discomfort. At any rate, get rid of the new anchor worms just as soon as you can. Use the potassium permanganate treatment, and use it before a new breeding season begins for the parasites.

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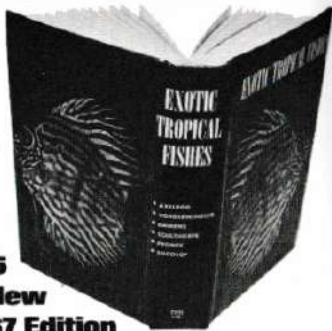
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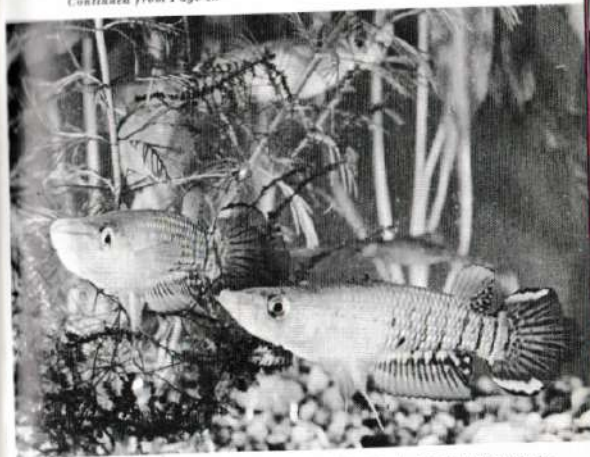
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Continued from Page 13



Two male *Aplechailus lineatus* engage in battle for the attention of the female in the background. The battles are usually a lot of bluff and bluster, with very little harm done. Photo by Rudolf Zukal.

Driving is often vigorous. Photo by Rudolf Zukal.





The bodies rub together as the female expels an egg. Photo by Rudolf Zukal.



Egg laying takes place in varying positions. Photo by Rudolf Zukal.

The excited female sometimes swims over the male among the plant roots. Photo by Rudolf Zukal.

The male quickly changes course in order to be close to the female. Photo by Rudolf Zukal.



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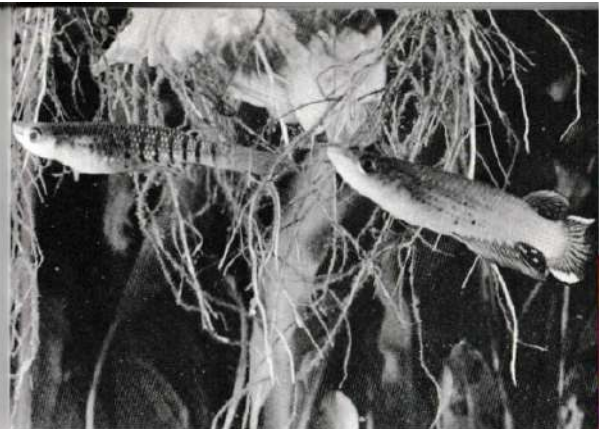
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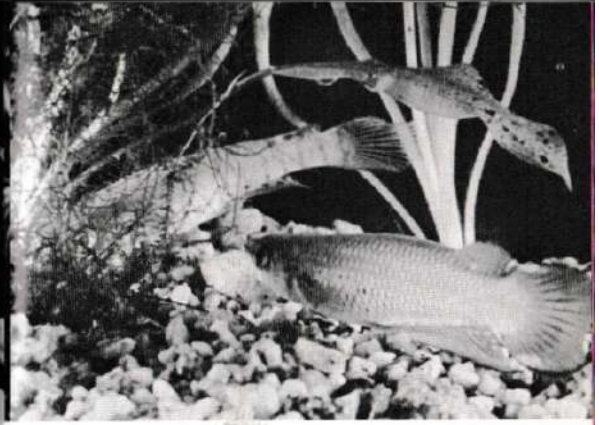
The female looks for a spot to lay another of her eggs, with the male following closely. Photo by Rudolf Zukal.

Swimming beside the female, the male tries to excite her into spawning further. Photo by Rudolf Zukal.



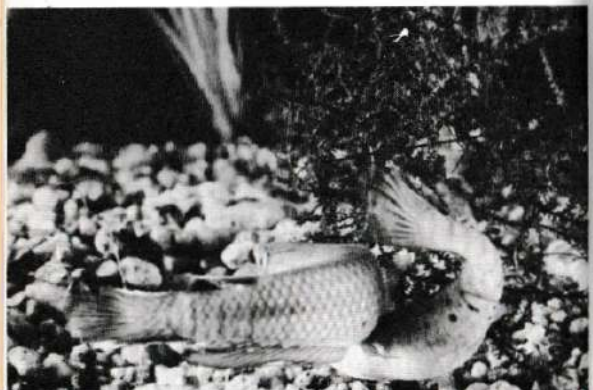


Sometimes the female avoids the male and swims away. Photo by Rudolf Zukal.

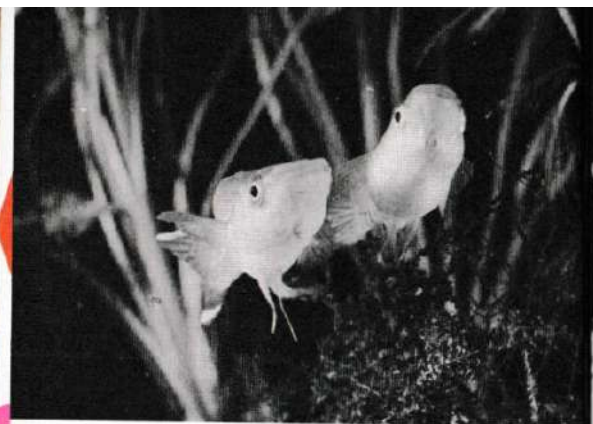


The female leads the way into the plants. An egg can be seen on the *Nitella* just above the male's dorsal fin. Photo by Rudolf Zukal.

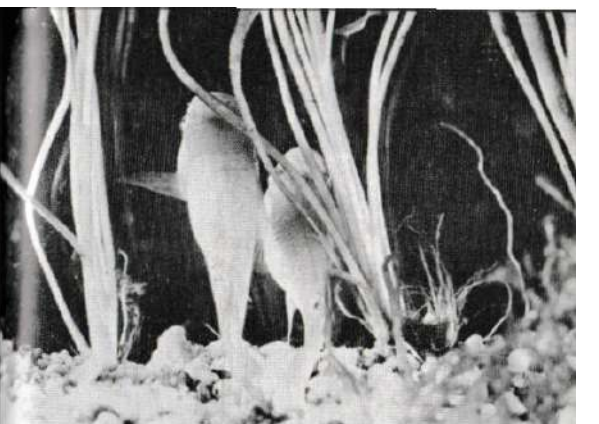
Even on the bottom, the male keeps on trying. Photo by Rudolf Zukal.



Eggs are often laid right at the bottom. Photo by Rudolf Zukal.



A head-on view of a spawning *A. lineatus* pair. Photo by Rudolf Zukal.



A rear view of a spawning pair. Photo by Rudolf Zukal.

A pair, seen a bit more from the side. Photo by Rudolf Zukal.



it should be brought to 74-78° F. The aquarium should have normal planting on the bottom, with the floating plants on top as already suggested. All living foods are eagerly eaten, but great reluctance is shown in picking them from the bottom.

In the course of many years, this fish has had its name changed several times, and old books may refer to it as *Haplocheilichthys rubrostigma*, *Haplocheilichthys lineatus*, or *Panchax lineatus*.

TRANSLATOR'S NOTE: I have observed that *Aplocheilichthys lineatus* are not particularly aggressive toward any fish they cannot swallow. If, however, they can perform this feat it is an entirely different story. Their large mouth makes quite a feat of swallowing possible, and I have seen them swimming about trying to choke down smaller fishes whose tails were still protruding from their mouths.

The eggs are lightly amber-colored and can be easily removed from plants with the fingers. They withstand a light pressure and feel almost hard to the touch. Hatching time is 12 to 15 days, and the youngsters can grab and swallow newly hatched brine shrimp almost at once. To prevent the bigger ones from swallowing their smaller brethren, they should be sorted for size and separated frequently.

W.V.

of the same species, at elevations varying from 50 to 700 feet above sea level, with water temperatures as low as 62° F. and a pH ranging from 8.2 at the highest elevation to 5.4 in a pool filled with decaying guava fruit at 300 feet. Approximately two thirds of the shrimp collected were adult. Half the adult shrimp were females carrying eggs in various stages of development.

The shrimp were easy to establish in my home tanks. Immediately after being introduced into a tank, they swim to the filter and rest in the current formed by the outlet. After a few days they lose their fear of the other inhabitants and actively browse at the bottom of the tank for decaying organic matter. (The tufted pincers appear to be especially suited for this kind of food gathering.) The shrimp also browse on any plants or rocks in the tank that may have algae growth, but they do not damage the plants the way crayfish do. Neither do the shrimp dig or uproot plants.

Research performed on *Atya hialeana* by Edmondson¹ indicates that the conditions under which the shrimp conduct normal processes of molting and regeneration are bounded by a temperature range of 68 to 78.8° F. and a pH of 8 to 9 in either fresh water or a mixture not exceeding one part salt water to three parts fresh water. He also states that the adult shrimp exhibit negative phototropism (a tendency to move away from light).

My own observations, after more than a year of keeping the shrimp under aquarium conditions, place the temperature range from 60 to 85° F. the pH at 6.5 to 9 with little noticeable change in activity. Acclimated individuals show no specific reaction to light; their activity tends to match the activity period of the majority group in the tank. One interesting characteristic of the shrimp not mentioned by Edmondson is the tendency of wild specimens to change color or pattern to match their new environment.

All my attempts to breed the shrimp in the aquarium have been unsuccessful. Wild specimens carrying eggs were introduced into individual tanks set up with high-speed filters to simulate the natural conditions of their environment. The young from these eggs die during the free-swimming zoea stage. Edmondson reports breeding the shrimp, but he does not present his methods in sufficient detail for me to follow. It would seem to me, however, that the shrimp might be bred in an outdoor pond with recirculating water during the cooler spring and fall months.

Atya hialeana, or the Hawaiian freshwater shrimp, is an attractive and interesting addition to the freshwater community tank who comes to you with no bad habits. The shrimp are not molested by community type fishes, and even small cichlids leave the adult shrimp alone. On the other hand, the shrimp are peaceful enough to be trusted with livebearer fry. Other shrimp in this group exhibit many of the characteristics of the Hawaiian species. So go collecting and find your own happy scavenger.

¹ Edmondson, Charles Howard, 1929, *Hawaiian Atyidae*, Bernice P. Bishop, Museum Bulletin 66.

Raising Brine Shrimp, *Artemia salina*

BY OLDRICH KAPLER
OPAVA, CZECHOSLOVAKIA

I will not repeat the importance of *Artemia salina* to the aquarist because all of this is known to him both from aquarium literature and from his own experience. Much of the information available on brine shrimp, particularly the illustrations, is erroneous. These errors are often the result of copying from older works or from observation of dead shrimp. I am always discouraged when I read that *Artemia salina* can be raised easily in water to which table salt has been added, or when I see an illustration in which a shrimp is standing on its tail like a mermaid, or when it is walking on its legs like a lizard.

I have found a way that every aquarist can raise brine shrimp to adulthood with little difficulty. If one knows how, it is very simple to raise them. There is no need for anything but a container, water, food, and eggs. The container can be a simple fruit jar or similar container. Eggs are easily obtained from aquarium shops. Food is easily supplied by the algae we scrape from the sides of aquariums.

Water is the most important item in the raising of brine shrimp. Water to which table salt has been added is simply not suitable because, although the eggs hatch, the shrimps die within a few days. Aquarists can acquire sea salts from their petshops. I have experimented with many such salts, however, only to destroy large numbers of *Artemia* fry.

Once I accidentally got my hands on a bottle of mineral water from Luhačovice mineral spring, and on the label I read an analysis of it. I am not a chemist, but I thought the components of this water might be used in raising *Artemia* if to it was added salt, calcium, and sodium. I felt that the Luhačovice water contained small quantities of chemicals that would not be present in artificial sea water. Luhačovice chemicals are sold in powder form in drug stores throughout Czechoslovakia and are packed in quantities that can be used for the preparation of 1 quart of Luhačovice water by simply adding the chemicals to 1 quart of tap water.

I know that such chemicals are available in other countries, chemicals derived from the mineral springs located in these countries. These chemicals are inexpensive and are probably just as good for the purpose of raising brine shrimp as are the chemicals from Luhačovice.

I mix a package of Luhačovice chemicals, 1 heaping teaspoon of table salt, 1 leveled teaspoon of epsom salts, and about a quart of water. The resulting

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solution appears white, but the next day the cloudiness disappears. This solution proves very suitable for brine shrimp. I have used it four times in 1 year, and each time I have had success. For this reason, I am sure I have found a reliable way of raising the shrimp. When necessary to compensate for evaporated water, I add well water. I have attempted adding other chemicals to this solution, but with no positive results.

I recommend the following procedure for raising brine shrimp. Make the solution as outlined above and let it stand for 24 hours. Pour the clear solution into 1-quart containers and add the brine shrimp eggs. Because you will keep the *Artemia* till they are fully grown, you must not overcrowd the container. About 100 eggs are all that is necessary to raise about 30 adults in a 1-quart container. Because the eggs are so small, it is difficult to measure 100 eggs. I do it as follows. With the tip of my tongue, I wet the tip of my index finger. When I put the moistened tip in a pile of eggs, approximately 100 eggs stick to it. Then I dip the finger into the hatching and raising container and put the container in a sunny place. Brine shrimp are "children of the sun". They do best at 77° F. and can endure temperatures to 95° F. Temperatures below 56° F. result in very small hatches.

At first the eggs float on the surface, but by the second day, with most types of brine shrimp eggs, some are on the bottom. In these, the *Artemia* are developing. It is time to prepare to feed the tiny shrimp which will soon be hatching.

To prepare food for the shrimp, one need only scrape algae from the sides of an aquarium. This is taken between thumb and forefinger and minced into the brine shrimp container. At first the algae floats, but as its density adjusts to that of the salt solution, it will sink to the bottom. Much of the algae will not be able to adjust to this salt solution and will die. Their decomposition will enrich the hatching solution. Other algae will grow rapidly providing food for the shrimp.

Much has been written about the development of *Artemia* and it would serve no purpose to review this material. Every good aquarist is also a hydrobiologist and can verify for himself how the nauplii swim using their antennae. As they develop, however, they start swimming on their backs with 12 pairs of legs acting like oars. This entire metamorphosis in swimming technique takes about 2 weeks. It takes 6 to 8 weeks, depending on temperature and food supply, to attain the full size of 18 mm. At the end of this time, the egg sacs of the females have become filled with eggs and the second antennae of the males have become modified into claspers for holding the females during copulation.

Brine shrimp live about 4 months and are eagerly eaten by most aquarium fishes. In theory, the shrimp should live about 2 hours in fresh water, but in fact the fishes make short work of them.



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MAIL CALL

By William Vorderwinkler

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White clouds

Q. I have a number of questions to ask about the spawning of white clouds (*Tanichthys albonubes*):

1. What is the best size tank and what should it be planted with?
2. What should the pH be?
3. What should the hardness be?
4. With what foods should I condition them for spawning?
5. What should the temperature be?
6. After they have spawned what temperature do the eggs and fry need?
7. At what time can I start to feed the fry baby brine shrimp?
8. After the fry can swim, should I move them to a bigger tank?

Michael T. Walczyk,
Jamaica, N.Y.

A. The nicest thing about spawning white clouds is that the only thing really essential is that they have a tank to

themselves, and that you have a male and a female.

1. One of the nicest setups I have seen is a 30-gallon tank with many white

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Photo by John W. Hines, Media, W. Carolina



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October, 1967

clouds of all sizes swimming in it. The size of the tank you use would, of course, depend on the number of fish you plan to keep.

2. It is not important, as long as you do not deviate too far from neutral.

3. This also is not too important, but I would try to stay below 10 D.H.

4. I once heard a man say that his white clouds would not spawn properly until he fed them live daphnia, and then he could spawn them at will. Live brine shrimp would probably work as well.

5. As they come from comparatively cool mountain streams, temperature re-

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requirements are not as high as with most tropical species. 72 to 75° F. is enough.

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8. As soon as they begin to get crowded in the smaller tank, by all means move them to larger quarters.

Timid Monodactylus

Q. I have a *Monodactylus* that I purchased a while ago. When I first had it, I left it in a tank by itself, but later I put a chocolate gourami in with it. I have discovered that the mono is now frightened and is always hiding from view. How would I overcome this problem without leaving the mono alone in the tank?

2. Every so often, I notice that my guppies have their caudal fins closed. Is this a disease or is it natural?

Steve Lennon,
Victoria, B.C., Canada

A. 1. Unless a fish is a downright roughneck like a betta, your fishes should be kept in pairs or more. A fish which does not have the company of one or more of its own kind is a sort of outcast and bound to be timid. Try to keep pairs rather than single fish.

2. It is not in itself a disease, but it is a symptom which should not be disregarded. Make sure your tank is not overcrowded and change about 1/4 of the tank's water. Feed sensibly, giving the fish only what they can clean up completely in 10 minutes.

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Q. While recently setting up my 30-gallon tank, I noticed that there were some birdseeds in the colored gravel. It being impractical to remove them, I put the gravel and seeds in the tank. About

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2 weeks later I found a few green sprouts in various corners of the tank. My question is, will these tiny plants harm the fishes, and if not, will they be good for them? The water conditions have remained the same. At present there are no fishes in the tank, so I cannot tell what effect these plants would have on them, and I do not wish to experiment on expensive discs.

Harry Yontov,
Bronx, N.Y.

A. I wouldn't worry about the plants which have sprouted. They can be easily removed. Your biggest worry, I think, is the seeds that did not sprout. You have no way of knowing how many of these there were, and the dead ones will lie there in the gravel and decompose, fouling your water. Better start all over with clean gravel, and you will be sure.

"Freaks"

Q. I have been a tropical fish hobbyist for about 14 years, and during this time I have had several pairs of angelfish from which I have raised many thousands of young. Until this past summer, however, I had never produced an angel that was significantly different from the parents. Then there turned up five sports of a single type from a common silver male and a black-lace female. Now I have several sports of another type from a pair of silver veils. I have in mind trying to fix the characteristics of these sports and starting a new strain of each type. This, naturally, will probably be quite a task, and so before beginning I want to make sure that such strains do not already exist.

Since the sports from the silver veil pair are easier to describe, I will start with them. They have double anal fins

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and some of them are "faintailed," that is, with a double tail fused at the top. These fish vary from perfectly matched anal fins to one large and one small. The fins on the ones with perfect proportions do not extend directly down from the body but are spread at approximately four and eight o'clock angles and curve gently downward toward the tips. These fish are between 6 and 7 weeks old at this time.

The sports from the other pair are so different from anything I have ever seen that I hardly know where to begin to describe them. They have bulkier bodies than other angels and have very short fins. The "hump" some normal angels develop is exaggerated in my strain and the mouth juts upward giving the appearance of a turned-up nose.

They appear to have an extra stripe, and they are gluttonous eaters, stuffing so that they appear to have pot bellies. These fish are not what one would call beautiful, but they are cute in the way that puffins are cute. At 4 months old, they show no signs of the extended rays in the tail that other angels have. In fact, they are so un-angelic in appearance that I have been calling them "cherubs".

I know that it will be difficult to tell much from the above descriptions, but if you do have any information on the subject, I would certainly appreciate hearing it.

J. D. LaFlam,
Belie Glade, Fla.

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A. I have heard of sports with double anal fins, and some with double dorsal fins. These seem to create a slight furor for a short time, and then the old-fashioned silver angels take over again. The other sports that you call "cherubs" are to my mind just plain freaks and might be interesting as such, but few hobbyists would be inclined to take them to their hearts. Personally, I consider the shape and proportions of the old-fashioned silver angelfish as just about perfect, and, while the others may be interesting as oddities, that is just what they are: oddities. There may be some who want to "gild the lily" and produce what they feel will be superior to the standard article, but to my mind there are some things which come by their good looks naturally, and

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taking them and "improving" their appearance is like taking a strikingly beautiful flower and spraying it with gold paint. Some might like its appearance better this way, but I'm not one of them!

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I realize that such a project will take a great deal of time and energy, but I also know that the sooner such a program gets started the sooner we will all be able to enjoy and benefit from it. I will handle all correspondence

personally and forward it to a producer as soon as I receive a sufficient quantity.
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2. Of course I can only guess: your female might have been brooded, but not with eggs. She could have been consipated, or have contracted drapery. Or she could have been filled with eggs and unable to get them out.

3. Most people who have trouble keeping guppies make the mistake of keeping them in a community tank where they are harassed by bigger fish. Guppies do much better when they are kept in their own quarters.

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	Average No. Copies Each Issue During Preceding 12 Months	Single Issue Next To Filing Date
10A. Total No. Copies Printed (Net Press Run)	87,001	88,200
B. Paid Circulation —		
1. Sales through dealers, agents, etc.	43,835	42,740
2. To term subscribers by mail carrier delivery or by other means	41,718	44,701
C. Total paid circulation	85,554	87,441
D. Free distribution	295	295
E. Total distribution	85,849	87,736
F. Other use	1,332	464
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A. I. Doctors tell us that hormones are potentially dangerous if handled by untrained people. I suggest you do not try using them on your guppies. I don't. ... 3. All the crossing that has been done between the guppy and different species

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Q. I have been reading your column and enjoy it very much. Can you answer these questions for me? 1. How do you keep water in the tank from getting too hot in the summer? ... Jo Ann White, Bethlehem, Pa.

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Julidochromis ornatus prefers and will spawn in a well planted tank in which there are many caves formed from an abundance of rock-work. Photo by Hansen.

Observations and Experiences with *Julidochromis ornatus* and *Julidochromis marlieri*

BY WALTER ZAHN

When I visited a convention in Dortmund I stopped in at the "Aquarium am Kreuzberg" and saw there a large number of both of the *Julidochromis* species in several tanks. What impressed me most of all was a large 7-foot-long aquarium with a background that consisted of a number of stones which formed many caves and other hiding places. In these surroundings a number of both species were having a fine time. They rushed through the open parts of the tank and slid their bellies over the stones, as if drawn by a magnet. It seemed to cause them very little trouble to turn on their backs and rub their bellies against overhanging rocks in an upside-down position when they chose to. Besides mating with their own kind they sometimes partook in mixed matings and, on occasion, even brought up the young.

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The fry could be seen in various stages of growth swimming in and out of the caves. Looking at this peaceful picture, I could not believe that these fishes are said by some authors to be very quarrelsome among themselves.

Through a chance meeting with Herr Dohse, some *Julidochromis ornatus* and *J. marlieri* came into my possession. The fishes were in a plastic bag during the time I was at the convention. But after my return I placed them in a 75-gallon tank filled with water from a nearby lake. The tank was quite heavily planted with several *Cryptocoryne* species, two Amazon swordplants, and *Nomophila striata*. Hardness tested at 14 DH, pH was 6.8, and the water temperature varied from 72 to 77° F.

I did not want to believe what happened in a few hours: the largest of eight fish, a *J. ornatus*, took over the role of "boss" and pursued the three smaller females constantly. Although there were enough retreats available, he kept chasing them out, pursuing them and ramming them in the belly region. The *J. marlieri* were not spared either, but he chased them only on occasion. They escaped these attacks by swimming to the upper reaches and taking refuge just on top of the leaves of floating plants. With the picture of the large, peaceful, beautiful dealer's tank still in my mind, I found it difficult to believe that the fishes could be so pugnacious toward each other, and for this reason I left them together for the first night. This mistake cost a *J. ornatus* her life. The *J. marlieri*, which seemed to be more at home and have found better retreats, were not so vigorously attacked in the days that followed. What is more, the "boss" became friendly with a *J. marlieri*. This *marlieri* was a female.

The little female moved tirelessly through the tank and examined all possible hiding places, at times swimming in an upside-down position. The male accompanied and watched the female and then swam into a previously examined split under a stone. I could not determine if they went to this spot to find food. They ate daphnia, cyclops, and various kinds of mosquito larvae that I kept swimming in the tank at most times. Gravid worms and tubifex worms were also gobbled up, usually before they hit the bottom.

Since this large *J. ornatus* had found a mate, I assumed that he would leave the other females alone and left them in the aquarium. This was another mistake: after about a week there were no other *J. ornatus* left. So I contented myself with the hope that there would soon be a spawning.

I had the impression that the hiding places in my aquarium were not satisfactory for the *ornatus* male and the *marlieri* female, so I set a half coconut shell, from the edge of which I had broken a small nick, on top of a flat rock. As soon as they discovered this place, either one or the other was constantly inside it. When both stayed inside this "home", I assumed that they were getting ready to spawn. This assumption was confirmed by the fact that the other three *J. marlieri*, which were still in the tank, were constantly driven away from the coconut shell. So I took the three "extras"

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out and put them into a smaller tank of about 17 gallons capacity. No sooner had I done this than an unbelievable thing happened. The largest of the three set himself up as head man in the new tank and began to drive the two smaller fish. In spite of the fact that there were many hiding places one fish was so beaten up that it lay belly up on a cryptocoryne leaf the next morning, more dead than alive. In spite of its immediate removal, it was too late to save its life. It must have gotten so many ramblings in its belly region that it was no longer possible to heal the resultant injuries. From this time on, the two surviving *J. marlieri* no longer fought. I could only assume that they were a pair, because they behaved exactly like the two in the big tank.

Both pairs had occasional differences of opinion which were settled, as a rule, by the female hiding under a rock. Sometimes the female was the aggressor, however. They locked jaws and pulled each other back and forth.

As they grew bigger, both pairs put me to a difficult test. The mixed pair definitely took possession of the coconut shell and drove away any other fishes that ventured within 10 inches of their domain. Apple snails were also attacked and driven away. If other snails came too close to the shell or even attempted to crawl over it, they were seized by the fishes and carried away. This behavior led me to believe that something had taken place in the

The coloring of *Jelidochromis ornatus* is very much like that of the relatively newly discovered *Pseudotropheus auratus* from Lake Nyasa. Photo by Hansen.



Jelidochromis marlieri rivals many marine species in the color department. Photo by Hansen.

coconut shell. November had arrived, and the adults were now about a year old. My guess was confirmed when one day I saw a tiny black fish flit out of the coconut shell. It was picked up immediately by its mother and taken back. Then I had the intention of taking the nutshell with the brood and transferring it to another tank in order to protect the young from possible damage by the parents. When my wife made a strong protest, I thought better of it. (I was glad later when I could witness the adults' parental care.)

Four days later, about 15 youngsters gathered atop the coconut shell and slid about on it in a manner similar to that of their parents. The little ones were closely guarded by both parents. As soon as one left the shell he was brought back immediately. Other fishes were driven away vigorously. I tried to feed the youngsters with brine shrimp, but, their home being a high tank, practically no food reached the bottom because the tankmates got to it first. I solved this problem by letting the brine shrimp (and later on microworms and Grindal worms) sink to the nutshell inside a glass tube. The little fellows soon got used to this manner of feeding, and after a while they got impatient for the food to be released and picked at the glass tube as the goodies sank through it.

While they were still young, the little fish were "put to bed" every night at about 8 p.m. Both the father and mother brought them into the shell, and then father *ornatus* took a protective position like a watchdog just inside the

93

Tropical Fish Hobbyist

entrance. During the daylight hours, the youngsters came out of the shell very seldom, usually only when I fed them.

About 4 weeks later, the parents were again very much excited and took turns swimming into the nutshell. The following day I saw that the female remained in the shell, fanning something. This time I wanted to know what was what: I lifted the shell from the rock and discovered on the inside about 25 yellowish brown eggs, each the size of a pinhead. Four days later I examined the shell again. This time I saw the hatched fry hanging to the inner surface by a fine thread. Two days later they were free swimming. They were not yet permitted, however, to leave the "nest". Because I did not want to disturb the parents any more (so far, they did not seem to mind my lifting out the shell), I waited for the youngsters to come out again. This took a few more days. By this time I figured they would be needing food, so the parents must be providing it. So now there were two broods in the same tank. The father did not take his guarding duties at night so seriously now, but no other fish dared come near the coconut shell as yet.

I have had the fishes for 2 years now, and spawnings are produced at regular intervals. Of the resulting hybrids, I kept many pairs together to determine if they were fertile. In spite of the fact that both species have the same spawning habits and together defend their chosen territory from all other intruders, I have never gotten a spawning from the hybrids. Other hobbyists, to whom I have given pairs, have been unsuccessful as well. It can be assumed that the hybrids are "mules" (sterile). The basic color of the father (*J. ornatus*) is dominant in the hybrids. The three dark horizontal stripes are variably broken up, in contrast. This is particularly true of the lowest stripe.

I had no luck breeding the pair of *J. marlieri*. Once, during May, 1965, I saw one youngster sliding over a stone. Then I never saw it again. There were no further spawnings, because a short time later, without any visible reason, the pair died.

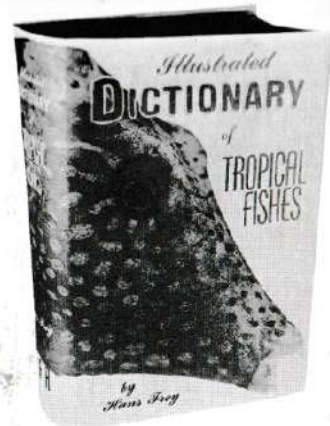
From my observations I think that the *Jelidochromis* species feel best at temperatures from 72 to 77° F. The young fish do not require warmer water either. I proved this to myself when I took a batch of eggs with the coconut shell and put them in a small tank and tried to get them to hatch there. The temperature was over 77° F. Despite the fact that the tank was well aerated, the eggs all fungused. In another case, I kept the temperature at 72° F, and practically all the eggs hatched. Recently hatched fry do not respond very well to being transferred. One must be particularly careful in such instances to keep the temperature equal to the one they come from.

From my own experiences, these cichlids from Lake Tanganyika are interesting and hardy pets which can be kept very well in a community aquarium. It is a pity that both species, especially *J. marlieri*, are so difficult to purchase.

98

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