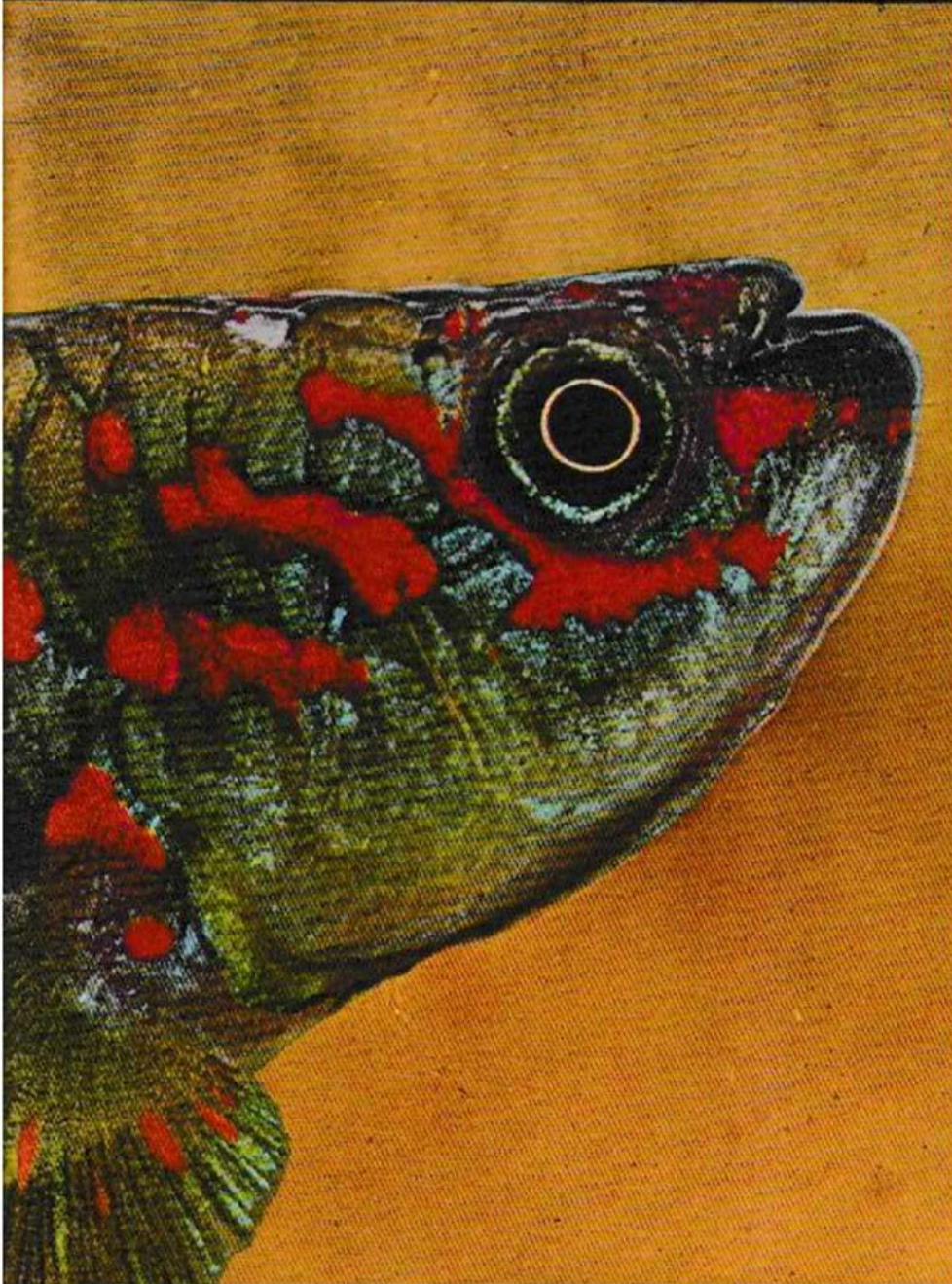


August, 1969

# tropical fish hobbyist

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## cover

Although they've long taken a back seat to the livebearers as species that hobbyists use to develop new hybrid aquarium fishes, the killies as a group are remarkably versatile and provide a fertile field for experimentation. *Aphyosemion gardneri*, formerly known as *Aphyosemion nigerianum*, has been especially productive . . . and its history as a hybridizer is especially well summarized by Dr. Cahalan in his article beginning on page 4. The *Aphyosemion* head study on the cover is by Dr. Walter Foersch.

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## editorial

The natural inclination of the beginning tropical fish hobbyist is to go for as great a variety of different species as he thinks he can comfortably house in his tank(s). He'll mix and match, getting tired of some species and adding new species to replace them as they either die off or are otherwise disposed of. He experiments. He makes new combinations. He fiddles with the tank and everything in it. And he thereby makes trouble for himself, the kind of trouble that, since it is primarily the result of his own attitude and actions, cannot be permanently cured by the simple application of an aquarium remedy.

People being people, it is also the natural inclination of many a beginner who causes trouble for himself to put the blame for his aquaristic woes everywhere but where it belongs: on himself. Unfortunately, in some cases he'll be right; he got off on the wrong foot because of someone else's fault, not his own. But in general the troubles beginners run into are troubles caused strictly by lack of the common sense born of experience in the hobby; they are the result of trying to do too much too soon.

I think that hobbyists new to the field can do themselves no greater favor than to go slow. Regardless of how large their first aquarium is or how many fishes they are advised it can house comfortably, they'll be helping themselves greatly by resisting that maddening itch to get in as much variety as they can. If they start off with just a pair or two of tropicals instead of five or six different species, they'll make it a lot easier on themselves to maintain their first fishes in good health, and they'll enjoy them much more. Then in a month or so, after they've gotten a little practical experience under their belts, they'll be ready to take on the bigger job of trying to keep a much larger assortment of different species over a longer period of time.

*Neal Proxer*



## The Hybrids of *Aphyosemion gardneri*

BY THOMAS L. CAHALAN, Ph.D.

Facing, top and bottom: *A. gardneri* males resulting from intra-specific crossings between males and females from different populations. Above: a large male collected by Col. Jorgen Scheel in eastern Nigeria in 1961. Photos by Col. J. J. Scheel.

Certainly *A. gardneri*, formerly called *A. nigerianum*, is one of the most commonly kept killies, and it seems to have been used in more crosses than most other species. Its greater interfertility is demonstrated from the list of crosses given below, in which it is shown in combinations with eleven other species. Despite this record, it does not seem to have produced any offspring with fertile males, with the possible exception noted as #18 of the list below. In view of this, the fears frequently expressed that the stocks will be "contaminated" with

hybrid blood seem not to be justified, even though the possibility of occasional instances in which hybrids may come into dealers' hands must be admitted. I dare say such occurrences are most infrequent.

The most intelligent way to approach this problem seems to be to find out what the hybrids look like, and which ones are possible, so that we can buy with greater sureness of what we are getting. Here is the list of hybrids of this species which I have been able to locate (males are listed first):

1. *australe* × *gardneri* Scheel 1959-1963, Cahalan 1967, Neckercuk 1968, made the cross using a gold *australe*.
2. *christyi* × *gardneri* Scheel 1959.

3. *cognatum* × *gardneri* Scheel 1958. A reciprocal cross.

4. *gulare* × *gardneri* Scheel 1960.

5. ND1 (unidentified *Aphyosemion*) × *gardneri* Scheel 1962-3.

6. *gardneri* × *cinnamomeum* Scheel 1961, Wineberg 1968, Cahalan 1968.

7. *gardneri* × *cognatum* Scheel 1957, all females.

8. *gardneri* × *labarrei* Scheel 1957.

9. *gardneri* × *sjoestedti* (*coeruleum*) Scheel 1958, Cahalan 1967.

10. *gardneri* × *spurrelli* Scheel 1964-5, Cahalan 1967. Another reciprocal cross.

11. *gardneri* × *vexillifer* Cahalan 1967, Marston 1968. Also reciprocal.

12. *gardneri* × *stratum* Cahalan 1967.

A cross between a male *A. gardneri* and female *A. cinnamomeum* produced this colorful hybrid male. Photo by Col. J. J. Scheel.



Hybrid male produced by mating between male *A. gardneri* and female *A. spurrelli*. Photo by Col. J. J. Scheel.

anal fins, and the yellow streaks on the outer edges of the caudal fin.

Of the eighteen crosses listed, I have seen specimens or photos of all but 3, 4, and 7. As in the form for which photos are not given here but which are among Scheel's pictures, here are some brief descriptions:

(a) #2 *christyi* × *gardneri* The distinctive feature of this cross is the suffusion of yellow over the entire outer halves of dorsal and anal fins and red throughout the entire caudal fin. There are no contrasting streaks in the tail.

(b) #3 ND1 × *gardneri* Red spots very large, most in a checkerboard pattern than in rows. Red strong in all fins with pale whitish edges, giving little contrast.

(c) #8 *gardneri* × *labarrei* This is a bit of a surprise. From such a cross one would expect a very showy result, but the hybrid is much inferior in appearance to either parent. It is brilliant blue, with rows of red dots, and fins and tail transparent greenish with rows of red dots. There is none of the brilliant contrast of either parent.

(d) #10 *gardneri* × *spurrelli* A brilliant hybrid. Very strong blue throughout. Red dotting rather



This adult male resulted from a cross between a male *A. gardneri* and female *A. obscurum*. Photo by Col. J. J. Scheel.

13. *spurrelli* × *gardneri* Cahalan 1967.

14. *vexillifer* × *gardneri* Cahalan 1967.

**Backcrosses**

15. *gardneri* ♂ × (*gardneri* ♂ × *sjoestedti*) ♀ Cahalan 1967.

16. *gardneri* ♂ × (*gardneri* ♂ × *vexillifer*) Cahalan 1967.

17. *gardneri* ♂ × (*vexillifer* ♂ × *gardneri*) Cahalan 1967.

18. A hybrid, reportedly fertile, which I saw in the tanks of Joe Siksay in Fairfield, Conn.; may be 16 or 17.

The fertility of the females of the hybrids seems greater than that of the males, and in two cases the females can produce young bred against males of one of the parent species. Of the hybrids listed three

are known to be reciprocal; that is, the combination of species I male with species II female will also work in reverse—species I female and species II male. These three species are *cognatum*, *spurrelli* and *vexillifer*. Of course, further work will undoubtedly lengthen this list considerably, and here is a wide field for the hobbyist. As much of hybridizing depends upon the happy chance of compatible pairs, one investigator may fail dismally where another succeeds with contemptuous ease.

The differences in appearance among the hybrids are likely less pronounced than the basic similarities. Almost all have the "worm markings," the rows of red dots, the yellow edgings to the dorsal and



In the cross that produced this brilliant hybrid, a male *A. australe* was mated with a female *A. gardneri*. Photo by Col. J. J. Scheel.

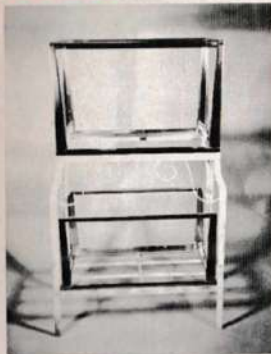
cases the hybrids resemble *gardneri* more than they do the other parent. Size appears to follow the female parent, partly, one supposes, because it is "built-in" to the previously formed egg. A good example is the cross with *sjoestedti*. Here the fish, while not so large as *sjoestedti*, is much larger than *gardneri*. The lighter phases of one parent seem likely to be retained in the hybrid, as seen in the cross with *australe* of the gold strain.

In the crosses involving the form that circulates under the name *vexillifer*, a name we are told is invalid, but for which no valid substitute has been agreed upon, the peculiar squarish black patch in the caudal fin which is seen in several other species such as *roloffi*

irregular. Dorsal and anal with green inner half spotted strongly with red. The outer half broadly yellow with red edging to outside of fin. The caudal fin has the blue of the body extended to its end. The outer edges are strongly marked with yellow. A slight white line comes between the yellow and a strong edging of red that separates the yellow from the blue interior portions.

One might safely say that in most

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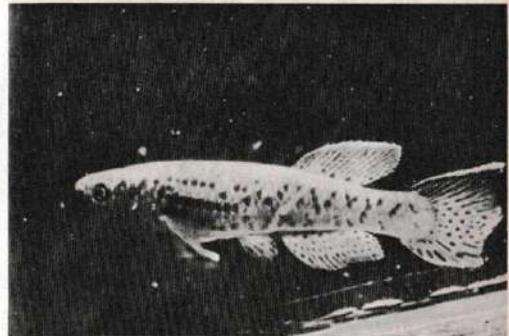
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A secondary hybrid produced from a crossing between a male *A. gardneri* and female hybrid *A. gardneri* x *A. coeruleum*. Photo by the author.

and other close species seems  
persistent.

One should note finally that  
likely a good many crosses in-  
volving this species have been  
made by inquisitive aquarists, but  
have not been recorded in any  
suitable way. This loss of in-  
formation, secured with some  
effort and care, is to be regretted.  
Such results should at least be  
photographed, and the information  
sent to friends and deposited with  
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Frederick J. Kerr

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last answer.  
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Q. Recently I was presented with a  
betta whose body is bluish brown with  
an orange-pink tail. I was quite satis-  
fied with the fish until I noticed that it  
had no ventral fins, just two short stubs.  
When I called the shop I had gotten the  
fish from, the dealer said that the missing  
ventrals were due to close breeding that  
had been necessary to obtain that color  
combination. The breed is local and the  
dealer said that all the unusual breeds  
from that hatchery have missing ventrals.

1. Have you ever heard of this color  
combination?
2. Would this male be badly penalized  
in a show for the missing fins?

**Betta Development**

Q. I have recently purchased a betta  
which is one inch long.

1. Under normal growing condi-  
tions, how old would this fish be?
2. This fish has two dark lines run-  
ning the length of the body. Will these  
disappear with age?
3. Is it normal for a young betta's  
fins to be lightly colored and to deepen  
with age, or do I have a poor quality  
fish?
4. Can this fish be raised to full size  
in a two and a half gallon aquarium?

Mary Rudmann,  
Floral Park, New York

A. 1. The fish could be anywhere  
between 10 and 20 weeks old.  
2. They will not necessarily disap-  
pear with age. The fish is either too cold or is  
frightened. The temperature should be  
in the high 70's or low 80's. If there are  
fish in the tank which bully the betta, this  
pattern will also appear.

3. The pale color of the fins is probably

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3. Since the over-all color resembles that of a wild betta, should I try breeding him to such a female in order to obtain fish with ventrals?  
4. Do you think fins will ever grow from the stubs?

**Luis F. Sosa, Gretna, Louisiana**  
A. 1. I have had fish with blue bodies and yellow fins, but I have not seen anything I would call orange-pink.

2. Under the standards of the International Betta Congress the fish would be disqualified.

3. Unless you value the color highly, the male should not be bred because the missing ventral characteristic can show up generations later. A female yellow or gold would be a better mating choice to preserve the orange-pink coloration.

4. No, I do not think the stubs will grow fins.



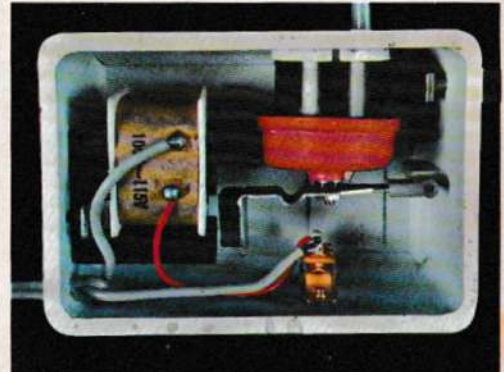
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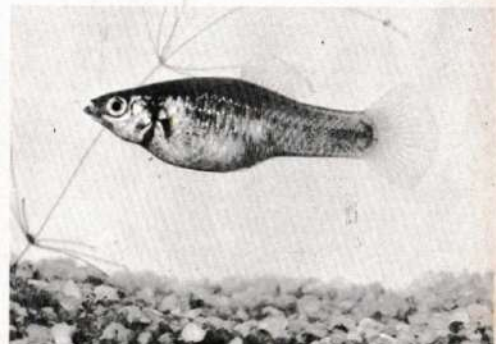
August, 1969

## The Amazon Molly, *Poecilia formosa*, and Its Peculiar Mode of Reproduction

BY KLAUS D. KALLMAN

Mollies are popular aquarium fishes bred by millions of people all over the world. However, very few home aquarists know that one type of molly apparently has done away with males, and therein lies our story. Mollies belong to the family Poeciliidae, which also includes platies, swordtails, mosquitofish, and guppies. In these fishes the anal fin of maturing males develops into a copulatory organ, the gonopodium, with which the sperm is transferred into the oviduct of the female. Fertilization is internal, with the eggs developing inside the female for about three weeks, at which time live, free-swimming young are born. The females can store sperm for prolonged periods of time—one fertilization is sufficient for several broods. Mollies are one of the largest poeciliid fishes, growing four to five inches

Fig. 1. *Poecilia formosa*, the Amazon Molly. Note that body shape, and especially size of dorsal fin, is intermediate between sailfin molly (Fig. 6) and aphenops molly (Fig. 2).



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Fig. 2. Sphenops molly of solid black variety, male.

of the hybrids turned into males, and the female hybrids, when mated, did not reproduce by gynogenesis but reproduced sexually. Thus the origin of *P. formosa* remains a mystery.

Laboratory tests have also shown that the *formosa* molly will breed readily by gynogenesis when mated to males of other species of *Poecilia* with which it would normally not come into contact. The males of *P. (Limia) nigrofasciata*, native to Haiti, and *P. (Limia) vittata* from Cuba proved just as effective as *latipinna* and *mexicana* males. Some offspring were also obtained after mating *formosa* with the guppy, *P. reticulata* and *P. parva*, species native to northern South America and Trinidad. But when males belonged to other poeciliid genera such as *Xiphophorus* (platies and swordtails), *Gambusia* (mosquitofish), or *Poeciliopsis*, no young were obtained.

I first heard of *formosa* mollies in 1957 when I was a graduate student at the genetics laboratory of the New York Zoological Society. I admittedly took a rather dim view of such an unorthodox reproductive mechanism, which at that time seemed virtually unique for vertebrates. Dr. Caryl P. Haskins of the Carnegie Institution of Washington happened to visit the laboratory and mentioned that he had a colony of *formosa* mollies which he maintained by breeding them to *vittata* males. Most of the broods he raised consisted entirely of females showing no trace of paternal inheritance. But sometimes offspring were produced that were intermediate and unmistak-

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- between the offspring of different parents known to be unrelated
- from offspring to male parent

The results were unequivocal. In the first three combinations all transplants survived, while in the other combinations the fins disintegrated rapidly.

The demonstration in the laboratory of the existence of clones raised interesting questions for us. We wondered: do natural populations of clones also exist, and if so, what is their geographical distribution? Perhaps populations numbering tens of thousands of fish are composed of single clones, a situation similar to that of the futuristic society predicted by science fiction authors, in which each individual has the same "ideal" genotype. On the other extreme we might find that each clone is represented by but a single fish. And if natural clones exist, we asked ourselves, how do they arise?

The decision to collect *P. formosa* in Texas and ship them alive to New York was quickly made. However, I first had to find a suitable locality to catch the fish. Fortunately I enjoyed the close cooperation of Dr. Clark



The author, Dr. Klaus Kallman, examines one of his specimens in his laboratory at the Osborn Laboratories of Marine Sciences.

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Hubbs, the son of Dr. Carl Hubbs, of the University of Texas, Austin, who was also interested in the *formosa* problem. The Rio Grande Valley near Brownsville is dishpan-flat country crisscrossed by water courses. Most obvious are the many winding arms of the Rio Grande, locally called *resacas*, through which the river emptied its water into the Gulf of Mexico before its main channel became diked. In the area's picturesque towns some *resacas* are now beautifully landscaped lagoons. Others are used to drain flood basins, and some are just weed-choked dead waters surrounded by cotton fields. There are also drainage ditches with steep banks, five to nine feet deep, overgrown with mesquite and prickly pear cactus. Only during rainy periods is the water in these ditches more than a foot deep. Third, there are elevated irrigation ditches which cross over both *resacas* and drainage channels on little aqueducts. Heavy rains turn the entire area into one huge lake. Eventually we learned that mollies are found particularly in the weedy areas of the *resacas* and that vast hordes inhabit the drainage ditches.

Dr. Hubbs knew that in San Marcos, near Austin, a closed population of *P. formosa* had become established by the accidental introduction of 20 females in 1955. Since sailfin mollies had also been released in the San Marcos River several years earlier, *P. formosa* found the right type of male

Fig. 5. A *formosa* female with a black scale graft from a mottled hybrid.

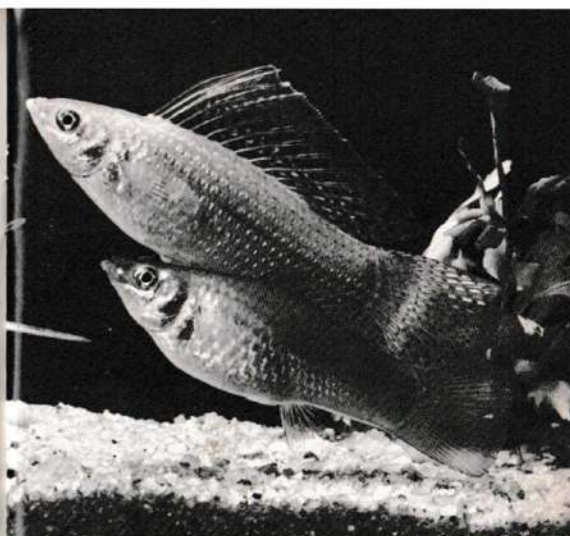
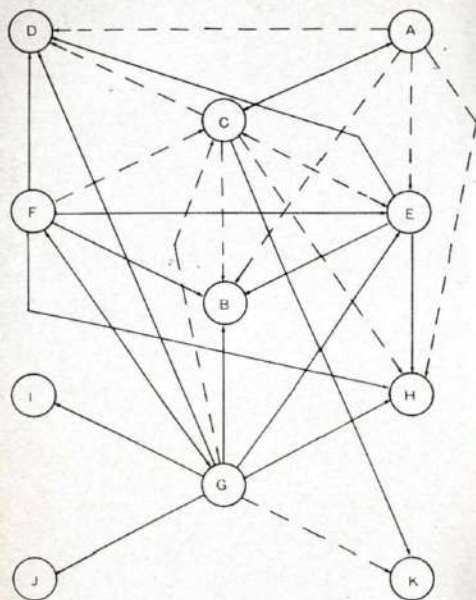


Fig. 6. *Poecilia latipinna*, the sailfin molly. Female in front, male behind. Note large dorsal fin.

and was able to maintain itself far north of its normal range. Both species can survive in the San Marcos River because it originates from a series of large springs that maintain a constant temperature of 74° F. throughout the year and prevent the fish from becoming killed off during the winter. Having been derived from 20 individuals, the San Marcos population could at best consist of 20 clones, but most likely fewer, since some fish may have died before reproducing and some of the original fish may have belonged to the same clone. On July 23, 1960, I caught 11 *P. formosa* in the San Marcos River. But since this population was somewhat artificial, I went overnight to the Rio Grande Valley and collected on the next day 10 fish from a ditch near the Lula Sams State Fish Hatchery at Brownsville. At 10 A.M. the fish and I were already on a plane speeding back to New York. At 7 in

Tropical Fish Hobbyist



Tissue transplants among 11 *P. formosa* females (A-K) collected at San Marcos, Texas. Arrows point from graft donor to recipient. Broken arrows indicate graft is destroyed, solid arrows indicate graft survival. A, C and K form one compatible group (clone V) and B, D, E, F, G, H, I and J another (clone VII). Grafts between clones are not successful.

the evening the fish were swimming in specially prepared tanks at the genetics laboratory. The first brood was born the next morning.

The next step was to exchange tissue transplants among the fish to find out which fish accepted grafts and how many clones were present in the sample. Each fish, however, represented a certain investment of time, effort, and money and we did not dare to jeopardize their survival by operating on them directly. Rather we experimented on their offspring; after all, the precise genotype of the wild-caught individuals was multiplied many times over in their descendants. Since the offspring of each of the 11 wild-caught fish from San Marcos (A to K on the accompanying diagram) could serve both as hosts and donors of tissue transplants, altogether 110 host-donor combinations were possible. Only about half of them were tried, but they were sufficient to show without doubt that the 11 San Marcos fish were of two clones. From the accompanying diagram it is apparent that A, C, and K belong to one clone (arbitrarily denoted as clone V) and the remaining eight fish to another (clone VII). All grafts within a clone were accepted, but those made between clones were destroyed in less than two weeks.

The 10 *P. formosa* from Brownsville were similarly analyzed and could be arranged into three clones—one consisting of six fish and a second of three fish and one molly representing the sole member of the third. We did not expect any fin grafts from San Marcos fish (clones V and VII) to survive in those from Brownsville. These transplants were made because we were interested in determining how fast fin grafts between "obviously" unrelated fish are destroyed. But to our utter amazement the transplants survived. Could it be possible that the clones of San Marcos also exist in Brownsville? We checked and rechecked our records to make sure that no fish were accidentally mixed up. But there was no doubt that clones V and VII were also present in Brownsville. It became imperative for us to establish the origin of the San Marcos fish.

Then the following story came to light. In 1953 the Texas Game and Fish Commission had a mobile exhibition of Texas fish, including *P. formosa*, touring the different counties. Near San Marcos the vehicle broke down and the fish were dumped in a nearby fish hatchery from which they soon escaped into the San Marcos River. By a mere coincidence the *formosa* mollies for the exhibition had been collected in the same ditch at the Lula Sams State Fish Hatchery as our fish taken in 1960.

Thus the transplantation experiment not only tested a sample of the Brownsville population in 1960 but one from 1953 as well. The fact that both clones V and VII were present both times indicates that the clonal structure of the population is rather stable. Since then about 250 *P. formosa* from different areas in Brownsville have been analyzed over a period of five years. Clones V and VII were always represented and often made up more than half the samples. Several other clones were repeatedly identified.

Tubifex, white worms and adult brine shrimp all are taken with gusto by the chameleon fish, as this attractive little species is sometimes popularly called.

Many aquarists, upon seeing the badis for the first time, are under the impression that it is a species of cichlid because of its resemblance to the various species of dwarf cichlids in the genera *Apistogramma* and *Nannacara*. Ichthyologists, although they know the badis is not a cichlid, are not quite sure whether to assign the badis to its own family, Badidae, or to place it in the family Nandidae with the leaf fishes. Those favoring the latter classification might note that all the species of nandids, just like *Badis badis*, refuse to take any but live foods.

The badis is widely distributed through India and Burma. There are three named subspecies: *Badis badis badis* (Hamilton-Buchanan 1822) from India; *Badis badis burmanicus* (Ahl 1936) from Inle Lake, Burma; and *Badis badis siamensis* (Klausewitz 1957) from Phuket Island. Wherever the fish is found, the environment is almost always the same. Ponds and small lakes form the major habitat. These are generally heavily grown with aquatic plants and the bottoms are covered with decaying plant parts. The water has about five degrees of hardness (85 ppm.) and the temperature ranges from 68 to 86 degrees. The water is generally clear and slightly acid in pH.

Any attempt at describing the

Male *Badis badis burmanicus* showing non-breeding, non-hiding coloration. This species has much more red in its color pattern and is generally a good deal lighter than *B. b. badis*. Photo by Dr. Herbert R. Axelrod.



Another color phase of *Badis badis burmanicus*. Photo by H. Hansen.

color of the badis is a study in frustration. The color pattern is not only complex; it can also change with startling rapidity. There is a pale phase seen when the fish is frightened. The body is a pale clay brown and the fins are transparent. Usually this is the coloration of the fish when seen in the dealer's aquariums. There is a barred phase generally seen when

the fish is content. The bars are irregular and composed of spots of color, shades of brown, orange and red flecked with blue. The breeding male is nearly coal black with scales and fins marked bright blue. Some authors advocate putting the badis in the community tank, but I feel the fish is more at home and is more enjoyed in an aquarium of its own. Because they reach only



Male *Badis badis*, in pre-spawning colors.

two to three inches in length, a pair can be housed nicely in a five-gallon aquarium and two or three pairs in a ten-gallon. The aquarium should be planted rather heavily. Even with heavy planting, the badis will not be comfortable unless a dark hiding place is available for each male. This cave can be constructed with stones or a small flower pot can be used. The cave should be positioned so that the inside is dark or the badis will avoid it.

Breeding the badis is not difficult. Males are more colorful than females and tend to look slightly hollow-bellied when compared with the females. In fact, a female in good condition is definitely fat, whereas a male never is. The dorsal fin on many males is noticeably bigger. Males are more or less



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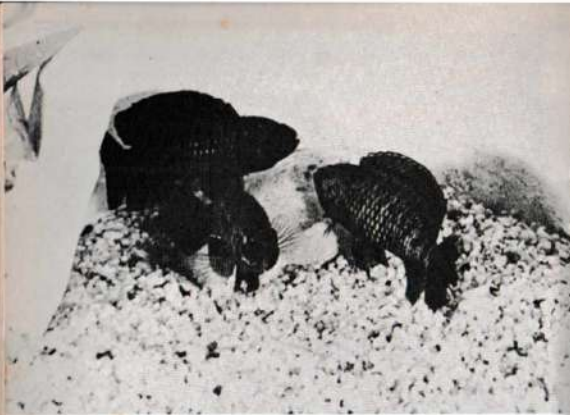
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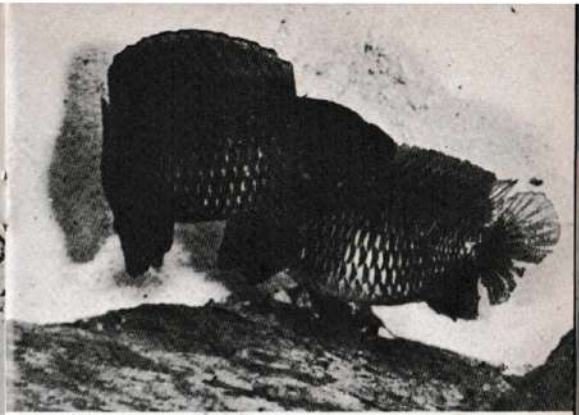
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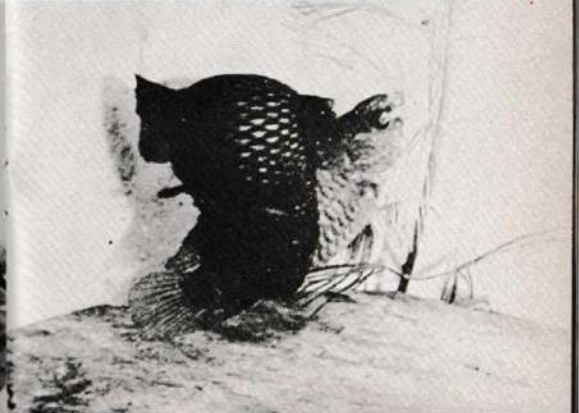
Two males (left and right; center fish is female) spar with each other to determine which one will be allowed to spawn.

Male and female prepare to lock jaws in pre-spawning contest of strength.



Quivering in head-to-tail position, the parent fish are about to perform the spawning embrace.

During the spawning embrace, the female is nestled within the arched body of the male.



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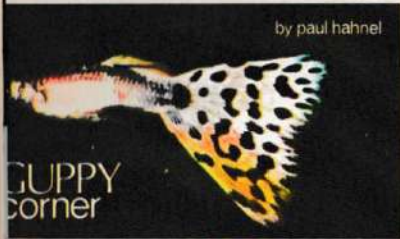
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The female turns belly-up to deposit her eggs on the surface of the flower pot in which the spawning occurred. After the eggs were laid, the male chased the female away and took sole charge of the eggs, which hatched within two days at a temperature of 80°.

permanently in the breeding mood and they keep their caves clean of algae in preparation for any chance to mate. Females are a good deal less interested in caves than the males and are usually to be found poking about the aquarium looking for food. When she approaches breeding condition, the female shows more and more interest in the male's cave. Her first intrusions are resented and she is driven away. Finally the male allows the female to enter his cave. Here the pair spawn by embracing very much as anabantids do. Rather than the female positioning her head near the male's head, however, the female batis places her head much nearer the male's caudal peduncle. The male wraps around the female

and the eggs are expelled. During the embrace the pair may tumble in various directions, scattering the eggs. The eggs are adhesive and stick to anything they touch. As a result, the eggs will be deposited on all surfaces of the cave. The male may, after spawning is completed, move all the eggs to one place. The female is driven out after spawning and the male guards the eggs. They hatch in about 60 hours and the male may be left with the fry for two or three days longer. The fry stay near the bottom and are easily raised on *live* baby brine shrimp. At about one quarter of an inch long, they are transparent with black blotches, the first of their incredible feats of coloration.



by paul hahnel

**Water replacement**

Q. 1. If water is added to a tank too often will the guppies experience any stunted growth?

2. Is it necessary to replace water in the tank at all?

3. How old are guppies when they reach adult size?

4. Can smaller fish stunt the growth of larger ones?

Terry Holt,  
Maumee, Ohio

A. 1. Adding water to a tank is never harmful. Make sure that the water you add is close to what is already in the tank as far as temperature and composition are concerned.

2. A 10 to 15% water change weekly is the plan I use and find very satisfactory.

3. Guppies are about six or seven months old when they reach adult size.

4. Such a prospect would be highly unlikely.

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**Changing colors**

Q. I have a 10-gallon tank with 12 pairs of fancy guppies in it. Every morning when I put the tank light on, the colors of the males are very deep. In a little while though the colors become less intense. Why does this happen?

Gus Klerstadt,  
Carbondale, Illinois

A. This is a natural protective device. At night, when they are resting, fish will take on darker colors to better blend in with their surroundings. When it becomes light again the fishes' normal color returns.

**Number of guppies born**

Q. 1. How many adult guppies can be kept in a 21-gallon tank?

2. How can I keep my tank free of algae and dirt?

3. How many babies can I expect per brood from my guppies?

Sheila Goldman,  
Dallas, Texas

A. 1. In my opinion a 21-gallon tank is far too small to comfortably house a number of guppies. My smallest tanks are of 10-gallon capacity.

2. Algae forms as the result of too much light coming into the aquarium. Check the conditions of your tank, and if it is getting too much light, adjust the conditions accordingly. The use of a dip tube, proper aeration and filtration and regular replacement of a portion of the water will help keep your tank clean.

3. A female guppy's first brood is usually her smallest. A first brood will number about 15 or 20 babies. Successive births will be larger. The greatest number of young ever born in any of my tanks was almost 200.

**Tail Clipping**

Q. A friend of mine says that if you cut off an eighth of an inch from a guppy's tail, the tail will grow longer. Is this true?

Dan Schultz,  
Sturtevant, Wisconsin

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A. Such treatment will have little effect on the tail of a mature guppy. It may even make it smaller.

**Inactive male**

Q. I have a beautiful red-tailed male guppy who shows no interest in breeding. He is about a year and a half old, has a good appetite and seems healthy. What can be done to encourage him?

Anne Marie Carazello,  
Clifton, New Jersey

A. The fish you speak about is past breeding age. You should try to use younger males for breeding purposes.

Q. 1. I try to grow algae in my tank, but when I leave the light on the temperature gets much too high. I have been using a 15-watt bulb and I turn off the heater every time I try. Is there any other way to grow algae?

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2. How many baby guppies can I put in a 5-gallon tank?

**Stephen Gerstenberg**  
Fresh Meadows, New York

**A.** 1. Algae will only grow where the light is strong, but I can't imagine why you want to encourage its growth in your tank, unless you feel that it will be good food for the fish. Green algae, which is the only type suitable as a food for your guppies, will not grow without sufficient light. Try lowering the depth of the water in your tank; in this way the chances of overheating the water will be lessened.

2. You can put at least 25 to 30 babies in a 5-gallon tank.

**Q.** As a new subscriber to *Tropical Fish Hobbyist* I would like to say that I enjoy the magazine very much and was especially pleased to get the November '68 issue. Those color shots of guppies were truly lovely.

In addition to getting your magazine I have read several small books on guppies, and after all my reading I still don't know what a guppy's life span should be.

I don't know if you've ever answered this question before, but would appreciate your doing this for me.

**Susan Denis**  
Milialla, Oregon

**A.** A good show fish will be at its best between eight and ten months of age. This

will, of course depend on the strain. Some will show perfect finnage at six months, but by the time he is a year old the average guppy will be slightly bent and show an uneven tail. I know of breeders who claim to keep fishes of a year and a half and two years of age in perfect health and shape. One breeder claims to keep guppies to the age of four.

**Q.** I recently purchased a pair of supposedly true-breeding, well-established veiltails. What I would like to know is what sort of practical breeding scheme should be used if any?

**John McNally**

Bay Village, Ohio

**A.** Hopefully your fish are what the seller had represented them to be. From there on it depends on you. How you care for your fish is of paramount importance. This will depend on how far advanced you are in the hobby itself. The best possible tank environment is of prime importance. Water condition, planting, population all play a part in this. Many breeders rely on brother/sister matings in their programmes. I do not use this breeding method. Also, you should not underestimate the importance of a large variety of foods. There are many other factors of importance with this, and they are too numerous to be taken up in this column. Arm yourself with some good books on the subject and proceed from there.

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**salts FROM THE seven seas**

BY **ALFRED A. SCHULTZ**

**Q.** Feeding my marine tropicals has become a problem for me. I have a 50-gallon tank and it houses clownfish, blue devils, *Dascyllus* and sergeant majors. They will take everything but what is good for them. What should I try to encourage my fish to eat?

**John Giordano,**  
New Haven, Connecticut

**A.** The best food for marine fishes is adult brine shrimp, but is not always easy to get and is difficult to raise. Frozen brine shrimp or tubifex are both good. Some of the new freeze-dried foods, especially those that include algae, are also worth including in the diet.

**Q.** Is it possible to keep jellyfish in the marine aquarium? If so, what do they

eat and what special care do they need?

**Joyce McCauley**  
Tyler, Texas

**A.** Jellyfish are neither adaptable to or desirable for the closed-water aquarium. They characteristically secrete a solution which will rapidly foul the water.

**Q. 1.** What marine invertebrates, if any, can be kept in pure synthetic salt water?

**2.** What is the best diet for the surgeon fish? Does it get along in a community tank? Can it live in synthetic salt water?

**3.** How many gallons of water is needed for an anemone living in a marine aquarium.

**Louis Gebhardt**  
Akron, Ohio

**A.** All types of marine invertebrates may be successfully maintained in this medium.

2. Surgefish will take small fish and washed, raw shrimp. They get on well with other species of the same size and will live in a synthetic salt medium.

3. An anemone living in the aquarium requires five gallons of water in order to be comfortable.

**Q.** I have recently noticed a strange "white" algae growing in my marine aquarium. It is small and has spread all over my tank. Could this be harmful to my fishes? What should I do about it?

**Charles Leeds**  
Dover, Delaware

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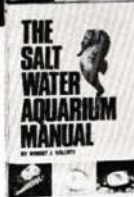
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**A.** What you describe is definitely not algae. In all probability it is a fungus, and most likely the result of unclean food you neglected to siphon out of your tank. The best thing to do is to break down the tank completely and change it all over. Afterward do not feed as heavily and remember to remove all unclean food right away.

**Q.** How many lionfish can I safely put into a tank of about 29 gallons capacity, and what are my chances of keeping them alive in the aquarium?

**Samuel Kraft, Jr., San Mateo, California**  
**A.** An answer to your question would depend on the size of your fish. Usually you can safely allot about five gallons of water per fish, if your fish are about three inches long. Employing the above figures you can put five lionfish in your tank.

This is a hardy species and, with the proper care, can live up to five years in the home aquarium.

**Q.** Why do you recommend changing a portion of the water in the aquarium at regular intervals?

**Arnold Furman Lake Grove, New York**  
**A.** By changing about one gallon of the water in your aquarium monthly (depending on the size of the tank) you will accomplish two things: (1) siphoning off dirt and waste will make room for new water and (2) will help to reduce any toxic conditions that may be building up in your tank without your knowledge.

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**Paul Stein Battle Creek, Michigan**

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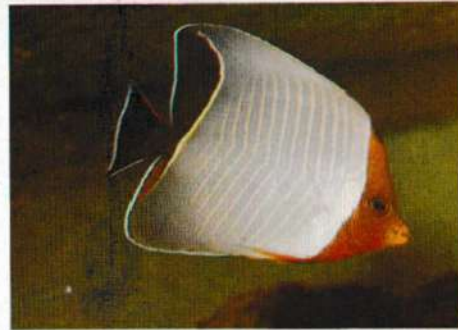
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Chaetodon larvatus. Photo by Marcuse.

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**Tropical Fish Hobbyist**

**A.** Definitely not! This method can do no good and quite conceivably can do a great deal of harm by dangerously altering the pH and specific gravity. A better method would be to add as many airstones as possible. Constant aeration helps bring down temperature.

**Q.** I have a salt-water tank containing clownfish, Amphiprion percula. If I add a sea anemone to this set-up will it be dangerous to my fish?

**Brian Fisher Clearwater, Florida**  
**A.** No. Clownfish and sea anemones are cohabitants in nature, the fish living among the tentacles of the invertebrate.

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# MAIL CALL

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

### Barb Hybrids

**Q.** I would like to know if there is any value in a cross between the ruby barb, *Pratius nigrofasciatus*, and the rosy barb, *P. conchomus*, and if this cross has yet been made.

**Joseph Di Pietro**

**Jackson Heights, New York**  
**A.** This cross has been accomplished in Europe, and the result was a very handsome fish. The difficulty in raising the hybrids and their fertility is not known to me.

### Dolphin Cichlid

**Q.** I have a pair of dolphin cichlids, *Aequidens itanyi*, and I can find little information about them.

1. What are its breeding habits?
2. Is a 10-gallon aquarium large enough to spawn them in?
3. How long can they be kept with their free-swimming fry?

**Mike Tompkins**  
**Munster, Indiana**

**A. J. A. itanyi** is a typical rock-spawning cichlid. Breeding Aquarium Fishes, by Dr. Herbert R. Axelrod, contains a pictorial sequence of the spawning of this species.

2. The size depends on the compatibility of the pair. Because this species reaches five and a half inches, I would favor a 15- or 20-gallon aquarium.

### Aequidens itanyi



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## Tropical Fish Hobbyist

3. This again depends on the individual fish involved. Certainly in a 10-gallon aquarium the fry could not be kept with the parents for more than a week or two because of crowding.

### Cichlid Hybrids

**Q.** We have a pink convict male courting a firemouth female. The male is constantly courting and digging holes in the gravel, and the female is constantly swimming up to the male and turning her belly toward him and swimming off slowly. She frequently follows the male into an upended flower pot. From what I have described, do you think there is a chance for a cross?

**John F. Kuhns**  
**Kansas City, Missouri**

**A.** There is a good chance for a spawning, since these fish are members of the genus *Cichlasoma*. Whether the eggs will hatch or the fry grow to maturity is problematical. Other crosses in this genus have not lived beyond the fry stage.

### California Killifish

**Q.** I have a pair of what the dealer called California killifish. No other name was available, and I can find nothing about it in the material available to me. Its general configuration and finnage are quite similar to the Florida flagfish. The color is silver with fine yellowish vertical stripes. The female is silver with less distinct markings. What is the scientific name, and can it be bred in the aquarium?

**J. H. Keil**  
**Fresno, California**

**A.** The California killifish is *Fundulus parvipinnis* and is found in the brackish water of southern California. This fish reaches a length of about four inches. Other members of the genus have been bred in the aquarium. An addition of salt to the water seems advisable. The eggs are laid in and on plants and may require up to 21 days to hatch. Fry should be able to accept newly hatched brine shrimp.

### Reversion

**Q.** Recently in a batch of gold crescent platies I found one with a grayish cast and a hint of vertical black stripes. Could you tell me whether her color comes from a mutation or from a congenital deformity.

**Chris Young**  
**Groton, Massachusetts**

**A.** Color is never a congenital deformity. Neither does your platy seem to be a mutation. It is probably the result of a cross between your female gold crescent and some other color, probably blue. The result was a fish exhibiting reversion, or a throwback to the wild type.

### Name Problem

**Q.** I have noticed that the dwarf Egyptian mouthbreeders has been called *Haplochromis multicolor* and *Hemihaplochromis multicolor*. Which name is correct, or are they referring to different fishes?

**Malcolm Blanchard**  
**Arcata, California**

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### Egyptian mouthbreeders

**A.** *Haplochromis multicolor* is an older name and is still used by many authors. There are some ichthyologists, however, who feel that the fish in question is sufficiently unlike other members of the genus *Haplochromis* to rate its own genus.

### Moving Fishes

**Q.** We will be moving this summer and I would appreciate some information on transporting my fishes.

1. What size containers should be used?
2. How many fishes per container?
3. Should I use glass containers or plastic bags?

**Theus D. Ferrell**  
**Goose Creek, South Carolina**

**A.** Containers should be selected not on the basis of capacity, but on the basis of air surface they will provide. The containers should be as large as is consistent with the space you can give them in moving.

2. It is extremely important not to overcrowd on a summer move because there is an excellent chance that the fish will be overheated. Put about half the number of fish in each container that you would put in an aquarium with a similar air surface.

3. Plastic bags are to be recommended because they do not break and they do allow a certain amount of oxygen to pass through the plastic directly into the



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water. Put the bags in styrofoam boxes if at all possible. These can usually be bought from fish dealers cheaply.

**Bumblebee**  
**Q.** Recently I bought a fish called a bumblebee and I would like to know what group of fish it belongs to.

**Byron Trebilcock**  
**Mt. Clemens, Michigan**  
**A.** There are two possibilities. Probably you have a bumblebee goby. The fish



*Leiocassis siamensis*

would then be a member of the genus *Brachyogobius* of the family *Gobiidae*. The other possibility is the bumblebee catfish, *Leiocassis siamensis*, of the family *Bagridae*.

**Spawning Black Tetras**  
**Q.** I have bred a pair of black tetras four times now and have only been able to save two from all the spawnings. Two of the spawnings failed because the eggs were infertile. The other two produced many fry. I fed the fry on infusoria and egg yolk, yet they decreased in numbers until only two were left. What went wrong?

**John W. Wadden**  
**New Glasgow, Canada**

**A.** I believe that the outstanding cause of failure with newly hatched fry is poor diet. This is particularly likely to be true when



*Brachyogobius xanthozona*

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infusoria is given as a first food. Infusoria is difficult to culture, and the vast majority of aquarists are merely putting stinking water in with the fry. There is an easy way around this with black tetras. They are large enough to accept newly hatched brine shrimp, and this should be offered as a first food.

**Annals**  
**Q.** My friend and I have been arguing over whether or not the blue gularis is an annual killifish or not. Would you please settle the disagreement.

**Michael Graziano III**  
**Corona, New York**

**A.** It very much depends on how you define annual. If you mean a fish adapted to life in pools which dry up completely each year, I do not believe the blue gularis qualifies as well as the *Nothobranchius* do because the blue gularis is usually found in permanent waters. If, on the other hand, you define

an annual as a fish whose eggs will hatch when the moist peat technique is used, then the blue clearly qualifies.

**Dropsy**  
**Q.** During the last month or so I lost a betta and a tiger barb to dropsy and now it looks like my waga tail platy is also getting it. It is my understanding that this disease is not epidemic, so what is happening to my fish? Is there any way of controlling this disease?

**Ken Dykema**

**Bellflower, California**  
**A.** As with most so-called fish diseases, dropsy is a symptom, not a disease. This symptom may be caused by several agents which interfere with the functioning of the kidneys such as viruses, bacteria or some other parasite. It may also be caused by some sort of chemical imbalance. If the latter is the case, the disease is not epidemic. If one of the biological agents is the cause, the disease may be epidemic in a mild way. No specific cure has been shown to be effective. The best bet, however, is to experiment with some of the antibiotics.

**Xenomystus Nigri**  
**Q.** I have two *Xenomystus nigri*, the African knife fish, which have displayed what I assume to be breeding tubes. I believe they are a pair and I would like to breed them. Could you give me any information about this?

**Ken Burnham**  
**North Kingstown, Rhode Island**

*Xenomystus nigri*



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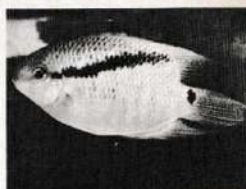
**A.** There are no recorded spawnings of this species. A closely related species, *Notopterus ateri*, has been spawned. This was reported in the October, 1965 issue of TFH. The rather large eggs were deposited on the aquarium bottom and on stones. The fry were easily raised.

**Flag Cichlid**  
**Q.** I have recently purchased some flag cichlids, *Cichlasoma festuivum*, and I have several questions concerning this fish:

1. What pH and hardness are desirable?
2. What temperature range is suitable?
3. What foods are preferred?
4. What are some distinguishing sex characteristics?

**H. William Cook**  
**Salisbury, Pennsylvania**

**A.** 1. Don't worry about pH and hardness if your other fish are doing well. Yours are probably domestically raised and very adaptable to water conditions.



*Cichlasoma festuivum*

2. 72 to 85 degrees.
  3. Live foods are preferred, but they will eat anything an angelfish will.
  4. Sexes are difficult to distinguish. Females are plumper in breeding condition and males tend to be more boldly marked.
- Slime**  
**Q.** I have a tank of large cichlids which I feed flake foods and beef heart. I am

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constantly finding a gray film over the glass and plants. What causes this?

**Stephen Bogert**  
Pittsburgh, Pennsylvania

**A.** Your aquarium appears to be biologically unbalanced. Because of the large cichlids, you probably do not have plants. As a result much of the waste material that would normally be removed is allowed to build up to the point where bacteria and fungi grow in profusion. I would recommend that one fourth of the water in the aquarium be replaced weekly and that the sand be vacuumed at the same time to remove waste material.

**Monos**  
Q. 1. What are the food requirements of *Monodactylus argenteus*?

2. What should the water conditions be?

3. Would it be safe to keep them with discus in a community tank?

**John Fenty**  
Yonkers, New York

**A. 1.** Monos take live foods of all kinds including adult brine shrimp, daphnia, tubifex and white worms. They also can be trained to take dried foods.

2. Monos should be kept in brackish water. Artificial sea salts should be used



*Monodactylus argenteus*

to give a concentration between 25 and 50 per cent of sea water.

3. The water requirements for discus are just about the opposite of those for monos. I cannot recommend putting them together.

**Leopard Ctenopoma**  
Q. I have purchased a pair of leopard ctenopomas which are supposed to be a male and a female.

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*Leopard Ctenopoma*,  
*Ctenopoma acutirostre*

1. How do you tell the sexes of this species?

2. Have they ever been bred in captivity?

3. What is the proper spawning set up?

**Devin De Weese**

**A. 1.** Sex distinctions are not known for certain. It is thought that the female may have fewer spots on the fins than the male.

2. Their breeding has not been recorded.

3. This fish gets to be six inches long in nature, so a 15-gallon aquarium or larger is needed. The temperature should be between 75 and 85 degrees and the water soft. The aquarium should be well planted.

**Distichodus Affinis**

Q. I have just purchased a *Distichodus affinis* and I would like to know where it

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*Distichodus affinis*

comes from and what its food requirements are.

**Dan Skabeikis**  
New York, New York

**A.** The silver *distichodus* comes from the lower Congo and requires large amounts of lettuce and spinach supplemented with liver or frozen animal foods such as brine shrimp and tubifex.

**Plants**

Q. 1. Is it better to have live plants or fake plants in an aquarium?

2. Can live plants take root in an all-glass gravel?

**Steve Petra**  
North Babylon, New York

**A. 1.** This depends on the preferences of the aquarist and on the individual aquarium. Some aquarists wouldn't have a plastic plant in the house while others refuse to cater to the needs of plants. Some fishes which eat or uproot plants make it impossible to keep anything but plastic plants in the aquarium. Plants do help control algae and prevent the build-up of waste products in the water.

2. Yes, plants will root in glass gravel.

**Farlowella**

Q. I have a very odd fish which was called a farlowella. The dealer said it was a new fish. It is about seven inches long with a mouth like a plecostomus. It has a nose that is about an inch long. Any information you can give me would be appreciated.

**Ty French**  
Frostproof, Florida



*Farlowella acus*

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**A.** This fellow has been known to aquarists since the early 1930's. It is very closely related to the genus *Loricaria* and like other members of the *Loricariidae* it is an algae eater. There are a number of species, but imports have not been numerous enough for positive species identification.

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Q. About two years ago I was trying my luck with a large pair of tuxedo hi-top swords. I found that out of about 50 babies, six were freaks. Instead of having the tuxedo marking, they had beautiful fire-engine red bodies. They also fascinated me because they had pure red eyes. I hope you can furnish some information:  
1. How rare are these swordtails?  
2. What are the possibilities that they will breed true?

**Bruce Stengel**  
Baltimore, Maryland

**A. 1.** Rarity is a relative term (as is "freak") and depends on your personal experience with fishes. To me they are not rare, because I have seen them before offered on a commercial scale. They are not commonly offered for sale, however.

2. I would predict that these will breed 100%, true because they are the result of two recessive genes: albino and red.

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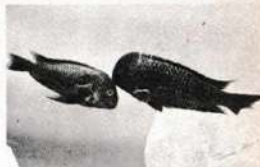
Q. I am interested in the blunt-headed cichlid, *Tropheus moorei*.

1. How can the sex of this species be determined?

2. What do they eat?

3. When was it first discovered and by whom?

**Jim Lockyer**  
Frankfort, Kentucky



*Tropheus moorei*

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A. 1. Males have slightly more pointed anal and dorsal fins.

2. They are adapted to scraping algae, but they will eat nearly anything offered.

3. The initial discoverer is not known to me. The fish was named by G. A. Boulenger about sixty years ago.

## Congo Tetra

Q. I can find no information on the Congo tetra, *Phenacogrammus interruptus*.

1. What are the proper water conditions?

2. What is the best food?

3. How are the sexes told apart?

4. How are they bred?

Robert Zwolinski  
Buffalo, New York

A. 1. Soft water with peat extract. Temperature about 75 degrees.

2. Frozen and live foods are all accepted.



*Phenacogrammus interruptus*

3. Fins of males are much larger than those of females.

4. Pairs spawn near the bottom in plants. Fry hatch six days and the fry are free swimming in 24 to 36 hours. Newly hatched brine shrimp are accepted at once.

## Botia Horae

Q. I have some loaches and five of them I cannot identify. They are all about two inches in length and all the fins are red. Just before the tail fin they have a dark spot. Is this *Botia modesta* or *Botia horae*?

Geldof Georges  
Assebroek, Belgium

A. Both *B. horae* and *B. modesta* seem to have local variations whose fin colors range from yellow to red. *B. horae* has a dorsal fin whose origin is directly opposite the ventral fins. In *B. modesta* the origin is anterior to the ventrals.

*Botia horae*



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## YOUR FISHES' HEALTH

## TUBERCULOSIS

By  
Roger  
Lee Herman

Tuberculosis was first reported in fish in 1897. A very interesting fact is that the fish were carp in a pond on the grounds of a tuberculosis sanatorium. This naturally led to the theory that the fish acquired the infection from the human patients. Research by many workers resulted in no clear answer. Some were able to infect frogs or guinea pigs with bacteria from fish but were then unable to reinfect the fish. Other workers were never able to infect animals other than fish. We do not know yet whether those carp in 1897 were infected by the human bacteria.

Tuberculosis-like diseases of fish are caused by several species of bacteria in the genus *Mycobacterium*. There have been at least six species named, but many authorities feel that there are only two or three species and that the others are varieties. The identification of species is further complicated by the fact that many cases reported in the past as *Mycobacterium* infections were really due to species of *Nocardia*, a related genus.

*Mycobacterium* is characterized as being Gram positive (stain blue with a special stain), acid-fast (retain a red stain when washed with acid), non-motile (have no flagella), and requiring oxygen from the air. Some bacteria, such as those causing food poisoning, can grow without air being present. *Mycobacterium* organisms grow slowly even under optimal conditions. At least one week is required for them to become visible on culture medium.

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The external symptoms of piscine tuberculosis are numerous, but seldom do many occur together in one fish. Certain symptoms are more common with particular fish species also. For example, emaciation is the common symptom of the poeciliid fishes while exophthalmos (protrusion of the eye) is more characteristic of the danios. In general, any of the following symptoms or combinations of them may indicate tuberculosis in your fish.

1. Emaciation, loss of weight, loss of appetite. These usually go together. The emaciation and loss of weight reflect not only the effect of the bacteria but also the fact the fish do not feed properly.

2. Loss of color. This seems to be particularly characteristic of neon tetras. The bright stripe becomes very pale.

3. Scale defects and loss, superficial ulcers, fin rot. Gouramis seem to suffer from this combination of symptoms.

4. Exophthalmos. As indicated above, this is characteristic of danios.

5. Listlessness and unusual swimming behavior. When the swim bladder is affected, maintenance

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ance of the normal swimming position may be impossible.

Nodules in the form of small whitish spots on the liver and kidney may also form. Other organs may also be involved. The nodules are the tubercles from which the disease gets its name. The tubercles are different when compared to those found in humans. The centers are solid and do not seem to deteriorate (caseate), as they do in humans. The giant cells (Langerhan's cells) so characteristic of human tuberculosis are not found in fish tubercles. There is also less inflammation associated with fish tuberculosis.

Positive diagnosis can be made only by the culture or demonstration in slides of the acid-fast bacteria. When the disease has been diagnosed or it is strongly suspected, the best treatment is to destroy all fish in the tank and disinfect. It is probable that new fish acquire the disease by eating the bacteria along with food from the bottom where it has been contaminated by the feces of infected fish. There is also evidence that it is possible for female livebearers to pass the disease on to their young before they are dropped.

Treatment with antibiotics has been reported to be effective sometimes. Streptomycin and para-aminosalicylic acid at 10 grains per gallon may be effective in the earlier stages. Kanamycin has been reported highly effective but must be given by injection. The recommended dose is 0.02 mg. per gram of fish intraperitoneally.



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## The Jackknife and Its Relatives

by Craig Barker

Favorite among salt water hobbyists are the three members of the genus *Equetus* of the family Sciaenidae. The three members from the western Atlantic which are found in marine aquariums include the highhat, *Equetus acuminatus*, also known as the cubbyu; the jackknife fish, *Equetus lanceolatus*; and the spotted jackknife fish, *Equetus punctatus*. Also included in the family Sciaenidae, but in a different genus, are the croakers, or drums. These fish are so named because of their ability to produce sounds which are audible to the skin diver. These sounds are produced by the muscles attached to the swim bladder. The swim bladder amplifies the sounds produced by the vibrating muscles. The exact purpose of these sounds is unknown, but the sounds are voluntary and occur in cycles.

All three species of the genus *Equetus* are similar in appearance and basic characteristics. They range from Bermuda to Brazil. They are not the world's best swimmers, and as a result are usual-

ly located under ledges with a sandy bottom. This provides them shelter from currents and a place of escape when threatened by predators.

The highhat is by far the most common of this genus. Found throughout South Florida and the Bahamas, it is one of the first specimens captured by a beginning hobbyist. In southern Florida it is found around rocks and reefs close to the shore, as well as in certain inhabitable inland bays and waterways. The name highhat comes

*Equetus lanceolatus* in a pose that catches very well the reason why the species bears the common name "jackknife." Photo by H. Hansen.



from its long dorsal fin. This fin is particularly elongated in the fish's youth and gradually recedes until maturity, at which time it is relatively little more than a stub of its original size. In specimens up to one inch in length, the dorsal fin is often as long as two-thirds of the fish's body. The highhat reaches a maximum size of between six and eight inches.

The jackknife fish has long been a personal favorite of the author. Its

graceful movements and statuesque features make it a prime attraction. My personal observations have shown that the jackknife fish is primarily a shallow-water species in the Florida Keys, found in less than fifteen feet of water and swimming in schools. In the Bahamas the habitat seems to be exactly the opposite. The author has never found the jackknife schooling in the Bahamas, and seldom was it found in less than forty feet of water. It

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should be mentioned here that little diving is done by the author in over fifty feet of water. This is because, first of all, the equipment has been set up only for dives up to this depth; and, secondly—except for certain deep-water species—there is little point in diving beyond this level. In the Bahamas the vast majority of species are in relative abundance in less than fifty feet of water, and to go beyond this level requires decompression stops and problems for both the diver and his catch. Böhlke and Chaplin, in *Fishes of the Bahamas and Adjacent Tropical Waters*, state that they have not observed this species in more than forty-five feet of water. This example points up the fact that the habitat of fish varies from location to location, and any attempt to establish definite boundaries will only meet with incongruities such as above.

The spotted jackknife fish is also known as the spotted drum and ribbon fish. The author favors the name spotted jackknife fish, as this puts it closer to the jackknife fish for novices to relate, and it is a more suitable name for such a majestic fish. The name ribbon fish should be abandoned, as this is also the name of a deep-water species which bears no similarity to the spotted jackknife fish in either anatomy, habitat or scientific classification.

Although occasionally found in the Florida Keys, the spotted jackknife fish is much more prevalent in the Bahamas. It is found at depths

from twenty-five to fifty feet. The spotted jackknife fish is similar to the pygmy angelfish in that it was relatively unknown to hobbyists until the late 1950's. It was not until 1959 that the Miami Seaquarium obtained one for its exhibit. By no means common now, both the spotted jackknife and the pygmy angelfish are usually available to marine hobbyists. These examples ask the question of whether or not these fish were always in these places or only recently showed up there. Perhaps they are being observed and captured more often now because of more collectors in the water and the increased quality and availability of diving and collecting gear. The author recently collected a five-inch

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specimen of the spotted jackknife fish in only ten feet of water on a reef in the northern part of the Florida Keys, and he finds it difficult to believe that such a striking fish could go unnoticed for years by divers.

The young of the highhat is readily identifiable because it exhibits more stripes than the young of either the jackknife or the spotted jackknife fish. It is the young of the two jackknife fishes that causes disagreement among hobbyists, skin divers and scientists. If one were to attempt to describe the young of these two species, the description would be quite similar except for the coloration. They both have the same general body accented by a high dorsal fin, they both have three stripes in the same locations, and they both have a dark spot on their noses. It is in the coloration that they differ. The young of the jackknife fish are a dirty white or cream color, while the young of the spotted jackknife fish are a clean white.

Some authorities believe the spotted jackknife fish to have a spotted dorsal at an early age, but the author believes this to be not always true.

All three members of this genus are very similar when it comes to diet requirements. They are all carnivorous and therefore rely heavily on brine shrimp and guppies. Smaller specimens relish freshly hatched brine shrimp, but larger specimens are bothered by too many baby brine shrimp in the water. This normally docile fish has been known to jump out of an aquarium too thickly populated with these crustaceans. The marine hobbyist will have very few problems in getting highhats to eat, but the spotted and regular jackknife fish may require a little more patience. They usually can be started on live adult brine shrimp, and gradually weaned to frozen brine shrimp of a good quality. Before feeding guppies to any fish it is wise to make sure that the guppy itself has had



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The highhat, or cubbyu, *Equetus acuminatus*. This specimen was captured in the Virgin Islands by Dr. John Randall. Photo by Dr. John Randall.

a good meal to make him nutritious. A well-acclimated highhat will eat dry food, but the others will seldom partake of it, especially as they grow older and larger.

Of the three fish species the highhat is the best candidate for a community aquarium. The spotted and regular jackknife fishes both do well in a community aquarium once they have been acclimated to the tank. Problems could develop if one had a slow eater and all the food had been consumed before the jackknife could get his share. Once acclimated, however, they will compete vigorously with tankmates for their share of the meal. If for no other reason than that the spotted and regular jackknife are relatively rare and expensive, they should not

be placed with more aggressive marines such as large damscis, angelfish and triggerfish.

The highhat, spotted jackknife fish and jackknife fish usually seem to be the first members of the aquarium to get ick or fungus. Ick and other parasites can be first observed on the transparent part of the soft dorsal fin. Members of this genus all seem to respond well to treatment with the standard marine cures of copper sulfate and sulfathiazole sodium. The trick to being successful with disease is early diagnosis and treatment. For this reason marines should be carefully checked daily for disorders and treated quickly. Parasites and fungus seldom go away on their own accord.

## Spawning *Mystus vittatus*

BY C. DANIEL DAVIDSON

*Mystus vittatus*, a native of Southeast Asia, is seldom seen in the home aquarium. The coloring is normally drab, with mahogany-brown stripes running lengthwise on a silvery-white background. A black spot is found right behind the gill plates. The fish has long barbels, some nasal and some of them extending from the corners of the mouth past the adipose fin. It is very active at night, preferring to hide during the daylight hours. It swims mostly in the lower half of the tank. Its mouth is large and so is its appetite, especially where smaller fishes are concerned. With fishes the size of large angelfish, however, it is quite peaceful.

I discovered two of these fish, each about 5½ inches long, in a local dealer's tank. I had an opportunity to observe them there over a period of several months, and noticed that one of them had periods of filling out with eggs, followed by deflating. At these times, both fish's colors would brighten to a marked degree, and shortly thereafter they would return to their normal appearance.

When I finally bought them, the pH of the water in the dealer's tank was 7.2. (I didn't check the hardness.) I placed the fish in a 15-gallon tank containing water with a pH of 7.3 and a DH of about 4. The water temperature was 80° F.

My fish were fed several different brands of pellet-type food intended for goldfish, large quantities of a pellet-type dried brine shrimp, and a flake food, composed mainly of meat, which is intended for marine fishes. Over a period of a week, I gradually changed the hardness to a DH of about 5½ with calcium carbonate.

When I had had them a few weeks, one of the fish again filled out to the extent that she looked as though she might have swallowed several marbles. This swelling with eggs is the only apparent difference between the male and the female. The extremely swollen state had lasted for a week.

On the eighth day, I could not resist buying a 5-inch butterfly fish (*Pantodon buchholzi*), which I would have to keep temporarily with the catfish until more suitable quarters were available. Because the pH of the water in the dealer's tank where the butterfly fish had been kept was so low, 3 gallons of the catfish tank's water was replaced, lowering the pH to neutral. This also lowered the hardness to 5 DH. Along with the butterfly fish, I added a medium-sized Amazon sword plant and a piece of petrified wood to the tank, which had previously contained only gravel, water, and the *Mystus vittatus*.



*Mystus vittatus*. Some authorities have questioned the placement of this species as a *Mystus* species, preferring to call it *Macrones vittatus*.

After feeding them that night, I did not again look in on the fish until 1½ hours after dawn the next morning. When I turned the lights on, I noticed that the female had a very deflated appearance, and I soon discovered why. Small, transparent eggs, about 1 mm in diameter, were scattered everywhere at one end of the tank; on the heaters, the new plant, the petrified wood, the filter stem, the airstone, the gravel, and the sides of the tank. Unperturbed by the lights, the fish resumed spawning after about 5 minutes. The normally silver stripes on their sides and back were now a blue color, nearly identical to the blue stripe on a cardinal or neon tetra. The male followed the female slowly, fertilizing the eggs more in the manner of the cichlids than in the haphazard "chasing" fashion of other catfish (i.e. *Corydoras*). Spawning continued to be confined to one end of the tank only. Within a half hour of the lights being turned on, the pair had completed spawning.

Whenever the butterfly fish would approach that end of the tank, one or both of the parent catfish would assume a threatening air toward it, even coming to the surface and chasing it away. The adults paid regular visits to the eggs, fanning them with their tail fins. This protective attitude continued for nearly 4 hours, after which the catfish started to eat their own eggs. It was, therefore, necessary to remove them and the butterfly fish to a much smaller tank, where they have got along very well ever since.

Twenty drops of 1-percent standard preparation of methylene blue solution was added to the tank containing the eggs. Then lights and filter were turned off. Probably as a result of these precautions, only a few eggs were lost because of fungus. By the next day, hatching was complete and fry were freeswimming (despite the presence of a yolk sac) for about 12 hours afterward. After this time they attached themselves to the sides of the tank and other objects for an additional period of about 24 hours. Then, with the yolk sac completely absorbed, they again became freeswimming.

One tablet of a standard brand infusoria medium was added the morning after hatching, while the fry still had the yolk sac attached. The second morning after hatching, I added a second infusoria tablet. That evening, newly hatched brine shrimp were added; some of the baby fish took it, but others did not. Another infusoria tablet was put in for those not ready to eat shrimp. On the third morning, shrimp was again fed and all the young fish ate it at this time. They were given feedings of the brine shrimp four times a day and grew very rapidly. On the fourth morning, I introduced a well known brand of dry food intended for the fry of egglayer species. The young fish readily accepted this food. This was fed at the same time as the brine shrimp, and by the sixth day they refused the shrimp in favor of the dry food. Since then, they have had an assortment of dry foods.

By the age of 8 days, the barbels were apparent on the fry and their fins were clearly visible. It was easy to tell if they were getting enough to eat, for they were so transparent that anything in their stomachs could be seen. At 10 days of age, their stripes were apparent. Up until this time they had been swimming at all different levels of the tank, but on the eleventh day they were all to be found at bottom, near the gravel, and they only ventured to the surface or mid-depth of the tank under cover of darkness. At this time the outside filter was turned on; before this the only aeration was from two airstones. The fry were 1/4 inch long and still growing rapidly at the age of 12 days.

At the time of this writing, the fish are 3 weeks old. They are thriving, but their growth rate has slowed considerably.

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### The Moonlight Gourami - *Trichogaster microlepis*

BY HANS JOACHIM RICHTER



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