

June 1967

# tropical fish hobbyist

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# tropical fish hobbyist

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### cover

Although there have long been a number of color varieties of platies available to hobbyists, it was not until recently that an albino strain was found. The first time this happened the event was covered in the January 1966 issue of this magazine. Now a second type of albino platy has come upon the scene. We think it's really a beauty. It has been named the pearl albino platy and is featured on our cover this month with the male on top, the female on bottom. Our own Dr. Axelrod brought some of these fish back from Hungary and gave them to Dr. Joanne Norton to work with. The fish are quite prolific, so it shouldn't be long before we start seeing them in our neighborhood pet-shops. For the complete story on these platies plus some terrific color shots, read the article that begins on page 5. Photos by Dr. Joanne Norton.

### exotic tropical fishes supplements

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

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June, 1967

## publisher's note

Writing for a hobbyist magazine, or any kind of writing for that matter, isn't the easiest thing in the world. You prepare a simple article which is intended to put the beginner on the right track, and right away the more advanced hobbyists ask what's the idea, can't you do anything but that ABC stuff? Give them something which is a little more scientific in content and of course you get a lot of indignant letters which tell you to stop showing off your superior (?) knowledge and write something they can understand. Give them a little humor and they want to know who you think you are, Red Skelton or somebody? Write something which contains a reference to yourself, and you're a conceited egotist. Write about somebody else and the person referred to is a "buddy," even though he (or she) lives a "fur piece" away and you've never met. You've got to be careful about something else, too: if you put a little extra effort into something about which you feel deeply and the result is pretty special, people will simply refuse to believe that this little brainchild, this symphony of words, is your work and yours alone. They'll ask you where you copied or translated it from. This is the surest way to wound an author: if you tell him his stuff smells to high heaven he'll either chuckle and tell you he worries about it all the way to the bank, or he'll get very serious and perhaps even ask for advice or suggestions. But even hint that he didn't write something over which he's sweated and slaved, and you'll hit a sensitive nerve every time!

*William Vorderwiesler*

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## Tropical Fish Hobbyist



Platies have been developed in scores of colors and color combinations. Above, golden platies with black caudal bases. Below, blue wagtail platies. Photos by Dr. Herbert R. Axelrod.



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Close observation distinguishes two types of pearl albino platies. The female on the right has a golden background. The female on the left has a white background. Photo by Dr. Joanne Norton.

## Pearl Albino Platy

BY DR. JOANNE NORTON

There are albino strains of most of the commonly kept livebearers, including mollies, guppies, and swordtails. However, there were no albino platies available to hobbyists until an albino variatus platy was introduced recently (*Tropical Fish Hobbyist*, January, 1966). A few months later, Dr. Herbert R. Axelrod discovered in Budapest, Hungary, a different kind of albino platy that he had not seen anywhere else. He obtained several pairs there from Laszlo Albert and brought them to the United States. These then were sent to me to try to get an increased stock. I consider this albino platy not only beautiful, but also distinctly different from any platy now on the market.

Characteristic of albinos, these platies have pink eyes and no black pigmentation anywhere. When lighted from the front they have a striking iridescent body color, which appears mostly blue but also other colors because of the combined effect of this blue iridescence with other body colors. Since their color resembles mother-of-pearl, these platies were named "pearl albinos". Albino variatus platies have a body-shape like that of other variatus platies, such as marigolds. Pearl albinos differ since their body shape is like that of maculatus platies, of which the common red wag

5

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platy is typical. The pearl albino platy probably will be included with maculatus platies when listed scientifically, and the name "pearl albino" describes its color and distinguishes it from the albino variatus platy.

Some albino variatus platies are white, while others are yellow or pale orange. The color variation of pearl albinos is less obvious, so a group of them appears fairly uniform. On closer inspection, you will see that some pearl albinos have white background, while others have a golden background color, this being most noticeable in large females.

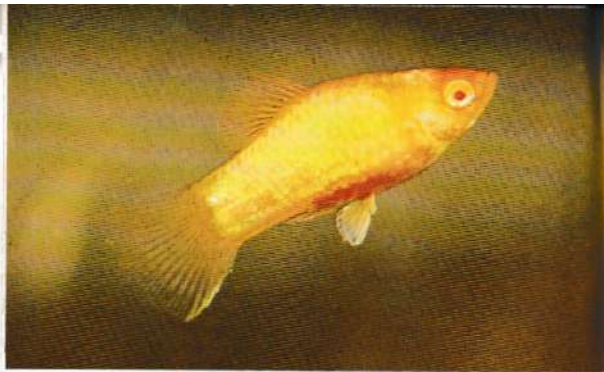
Most pearl albino males have some red color, which varies among individuals from none, at least in half-grown males, to almost the entire body colored red (not solid red, but a mottled red). There may be bright red present, mainly on the lower part of the body or along the top, especially the top of the head. In most cases the red color does not cover the entire body. So far no females have had any red color. The fins are mostly without red, but the lower part of the dorsal fin of some males is red. In both males and females, the blue iridescent color occurs in the ventral and anal fins. Also, there is a streak of blue along the lower edge of the tail.

Pearl albinos breed true in that they produce all albino (pink-eyed) offspring. Also, the iridescent color is present in all of the two generations from the original three pairs that I had. It is probable that they are also true-breeding for this iridescence.

Perhaps albino platies should not be considered new because in 1950 Myron Gordon published pictures of offspring from platy-swordtail hybrids, one of which was an albino that looked like a platy. Actually, the albino gene of this fish had come from an albino swordtail, but the result was an individual that looked like an albino platy, in this case also having the bleeding heart pattern. However, no albino platies got into the trade until 15 years later, probably because no one tried to develop such a strain. So the albino variatus platy and now the pearl albino platy are new, at least to aquarists.

We know that albinism in platies and swordtails is due to a recessive gene. Albino swordtails first appeared in aquaria about 1934. It is possible, even likely, that albino platies may have been derived from albino swordtails, either by chance crosses or by selective breeding, although it is also possible that a mutation to albinism occurred in one or more platies. By crossing platy-swordtail hybrids back to platies, then their offspring mated brother to sister, one can obtain individuals that look more like platies than did their platy-swordtail hybrid parents. This kind of breeding can produce fish with size, body shape, and fins closely resembling characteristics of the

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Compare the color and form of the two recently introduced albino platies. Above, a pearl albino male. Photo by Dr. Joanne Norton. Below, a variatus albino male. Photo by Dr. Herbert R. Axelrod.



Albinos have been known among swordtails for many years. A comparison of this albino sword (note also high dorsal fin) male with the platies on the facing page show it to resemble the variatus type in both body form and color. Photo by Dr. Herbert R. Axelrod.

original platy that was crossed with a swordtail. The point being made here is that albino variatus platies, with their size and shape similar to that of other variatus platies, could have a swordtail background. Likewise, pearl albino platies, with shape like that of maculatus platies, also may have swordtail ancestry. Even if this is the case, it does not mean that swordtail-like offspring will be produced by albino platies. In fact, the several hundred pearl albinos that I now have all look like platies.

There are several things apparent about the genetics of pearl albinos, since they have some characters that look like those already known in other platies. Blue iridescence, which is caused by guanin-containing cells, called guanophores, in the skin, under the scales, is known in blue platies, and is due to a dominant gene. Probably this same gene causes the iridescence of pearl albinos. Since all of the first and second generation from my original three pairs have this iridescent color, it is likely that they are true-breeding for this character.

It is known that the white background color of bleeding heart platies is due to a gene that is recessive to the gene causing the gold color of gold platies. The two types of background color of pearl albinos, white and gold, probably are inherited the same way, white recessive and gold dominant.

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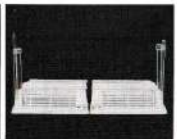
- 4 Snap the filter stem into place; the wider nipple fits into the wider slot. In all cases the narrow air tube goes to the rear as shown.



- 5 This is the new Miracle HiPower Undergravel Filter set up and ready to be placed in your aquarium, where it never need be serviced again.



- 6 For ultra-high power filtration where your fishes are overcrowded, you can use two filter stems in one filter. (Perhaps stock and sell extra stems.)



- 7 The normal approach is a filter stem in each filter at opposite corners so the stems "hide" in the corners of the aquarium.



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Since both are attractive, there does not seem to be any advantage in breeding for either one in preference to the other, or in trying to eliminate either from the strain.

There are several dominant sex-linked genes that cause red color or color patterns in platies. This type of inheritance results in certain traits, in some cases, occurring mostly or entirely in one sex but not the other. Since pearl albino males, but not females, have red color, it appears that the males may have a red-producing gene, or genes, on a sex chromosome present in males but not in females. The fact that red occurs only in males could be explained on the basis of a type of sex inheritance in which the females have XX sex chromosomes and the males are XY, with the red-producing gene or genes on the Y chromosome.

Pearl albino platies are as hardy as many other kinds of platies. A large female may produce 60 or more young, but young females produce smaller broods. They are easy to feed, accepting many kinds of fish foods. Another desirable feature is their temperament. They are not shy or easily frightened. If you put your hand into the water in their tank, they swarm around it and nibble on your fingers.

Some of these new pearl albino platies are being sent to Gulf Fish Farms, and they should become available to hobbyists soon. I think that as their supply increases they will become as well known and as widely distributed in this country as are albino swordtails and mollies.

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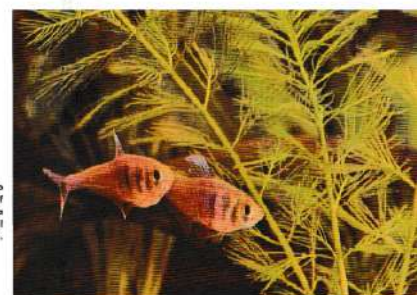
1-A pair of flame tetras explore their spawning tank. The female (right) is swollen visibly with eggs.



3-The male is crowding the female toward a planted corner of the tank, an ideal spawning spot.



2-The fish begin to show interest in one another. The male (right) dances before his mate.



4-Spawning is about to begin as the outskirts of the planted area. In a few moments eggs will begin to fly.

**Breeding the Flame Tetra,**

BY RUDOLF ZUKAL, Brno, Czechoslovakia

In almost all aquarium books and guides it has been said that feeding fishes and watching them eat is one of the greatest pleasures the hobby has to offer. My views are somewhat different; I consider the greatest pleasure to be that of watching the fish multiply. I can say this from my own experience, because when I saw the first eggs in a spawning tank, I forgot everything else in my eagerness to raise 12 *Pantius conchonus*. (This was my

***Hypsosbrycon flammeus***

Photos by the author

first successful spawning.) I am convinced that among American hobbyists there are a great many beginners who want to spawn some kind of egg-layer. I feel that *Hypsosbrycon flammeus*, the flame tetra, is a fish which is ideal for spawning by all hobbyists; in addition, the fish are insensitive to lower temperatures, like to swim in schools, are peaceful, and will accept all sorts of food.

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sufficed to get them to spawn. The tap-water was raised to a temperature of 75° F. After 2 days, the chlorine had become dissipated and the gas-bubbles were gone, so I put the pair in. Early in the morning, when the sun streamed through the window, I approached the tank and noticed that the female was being chased by the male. He kept trying to butt her in the belly. After a few minutes of wild chasing, the female retreated toward the bottom, and the male came along with widespread fins and rammed her soundly in the belly. (This was also repeated several times during the actual spawning.)

Egg-laying takes place at lightning speed; the eggs are just seen to fly when the pair swims apart. The male approaches the swimming female from the side and, pressed together, the pair swims in a spiral. The male wraps his tail around the female's body at this time until the pair fall apart after making a complete circle. The eggs can be seen momentarily alongside the male. Then, they fall down a split second later. The commotion

Spawning has been going on for awhile. Eggs are visible among the plant fronds.



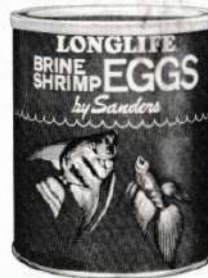
After a good spawning there are eggs everywhere. Those that don't stick to plants fall all over the bottom.

in the water sends the eggs flying, and the female sometimes releases a few eggs after she is no longer in contact with the male. (Naturally these eggs are not fertilized and should be picked up with a glass tube when they turn white, lest a fungus develop and spread to the healthy ones.)

These fish do not vary much in their spawning motions, and many scientists use them as a standard for the entire group. (A slight variation has been noted where the pair brushed the eggs off on plants and left the plant leaves loaded with them. The eggs were heavier than water and lightly adhesive.) Because the eggs are eaten greedily when spawning is over, the pair must be removed. The number of eggs is quite large for small fish, sometimes more than 200. Hatching takes place in 24 to 36 hours, and 6 days after this, the brood becomes freewimming. At this time, they can be fed with the smallest sizes of living infusoria. After 8 months, the youngsters become sexually mature. However, I do not use them for breeding until they are a year old, males even a bit older.

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## Freeze-Drying, a Space Age Process Now Used for Fish Foods

BY DR. AARON BRODY



"Freeze-dried." Scant months ago the phrase exploded on the tropical fish hobbyist scene. Freeze-Dried Tubifex Worms and Freeze-Dried Brine Shrimp began it all. Tropical fish attacked the products with such obvious gusto that they won immediate acceptance. Retailers demonstrated the foods to hobbyists. Hobbyists looked and then purchased. And they've been purchasing again and again ever since.

Some dared ask what this "freeze-dried" meant. The food wasn't frozen, and it did not look like the normal dried food. The answer often came back: "What difference does it make, it's great stuff, isn't it?" This, no one can deny. So everyone continues to buy freeze-dried products because they see their fish grow faster and bigger, have more energy and better color, and reach breeding condition right in the community tank. But a few still ask "What in heck does freeze-dried mean?"

Freeze-drying is the result of many years of scientific work and engineering research which was given a tremendous boost by this country's aerospace program. It is in essence the dehydration of food in a manner which allows the food to retain all of its original color, flavor, nutritional goodness and structure. It is first freezing and then drying from the frozen state. The result is a product which is in every way identical to the original food. Only the water is removed, so that the food can be handled and stored without refrigeration. Nothing else has changed. So simple to state, but so long in coming!

Once in every generation, there comes to the fore a process so powerful and so compelling that it overwhelms even the scientists. For decades, scientists in the medical laboratories used freeze-drying principles and few saw the commercial value of their tool. Even in the early and mid-1950's, the technologists who experimented with this process could only dream of the day when maybe, just maybe, somebody would have a practical use for it.

Then came that dynamic day in 1957 when the Sputnik launched all mankind into the Space Age. Few, if any, who were quoted in the days that followed spoke of freeze-drying, but that launching was the first event in a wave of irresistible forces which were to bring the freeze-drying process out of the laboratory.

As two great world powers readied themselves for manned space flight, scientists began to realize that pills were not going to replace food. The crew aboard expensive space vehicles was going to require good, wholesome food if it was going to perform well the arduous tasks that would be required.

Space scientists noted the weight of all kinds of food, saw that it was mostly water, and quickly placed orders for dehydrated food. There was just one problem: dehydrated food did not taste good, and one of the great psychological satisfactions in the loneliness of outer space might be eating.

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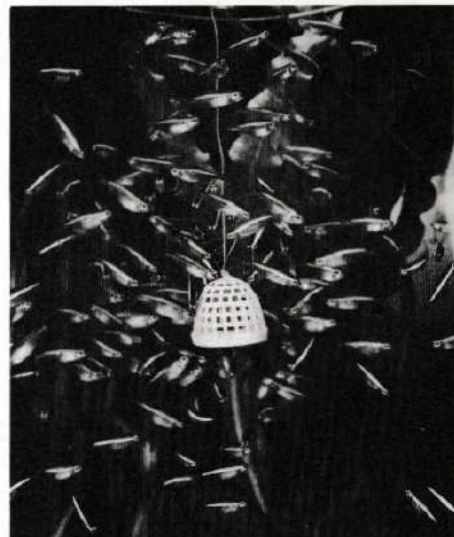


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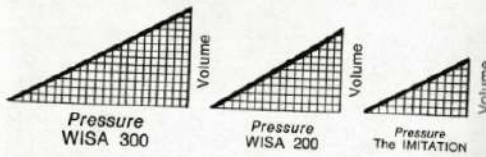
Cardinal tetras attack a feeding bell filled with freeze dried food. Of course, the foods can also be put directly into the tank without a bell. Photo courtesy Miracle Plastic Corp.

How then to satisfy the food desires of the highly trained astronauts? Freeze-dried foods filled the bill! With the money our government budgeted to the space program, the expense of freeze-dried foods was not even noticed. But now the process of freeze-drying was noticed, and its study became an accepted part of America's surging space-research program.

What exactly is this freeze-drying (which has also been called "lyophilization" by many people)? Water constitutes most of food. Remove the water and you eliminate not only weight, but a key factor in spoilage. The easiest means of water removal is by simple dehydration, heating the food and

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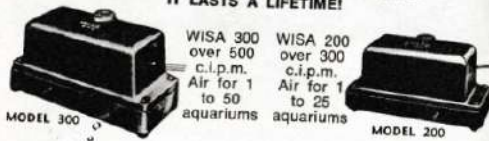


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literally boiling off the water as steam. When you boil off the water, however, the heat drives off flavor, color, and nutritional value and causes shrivelling and hardening. But, if the food is frozen before it is dried and the drying is done in the cold, the resultant product retains its color, its flavor, and its texture.

Let's look at a simple example to explain freeze-drying: before the advent of electric and gas clothes dryers, our mothers hung the laundry out on wintry days; the clothes froze, but the wind blew and the shirts dried without thawing. This change of ice into vapor without going through the liquid phase is called *sublimation*. It is the basis of freeze-drying. There is no heat to damage the food, its flavor, or its nutritional value. There is never any heated liquid to collapse the structure. The ice vaporizes into a gas which floats or is blown away, and what remains is the light, porous, solid material, just as it was in its natural state. Only the water, and nothing else, has been removed.

Expensive because the product must be frozen and carefully dried at below-freezing temperatures requiring many painstaking hours, freeze-drying is now used to make those new fruits packed right in with breakfast cereals, and to make much of the shrimp which we eat in restaurant cocktails, as well as for many of man's most sensitive new drugs. It is providing the highest quality stable product which requires no refrigeration or freezing.

Commercial freeze-drying is the major food technological break-through of the Space Age: its application to aquarium food represents the most revolutionary advance in fish feeding since man first began to keep fish as a hobby. Freeze-dried food products, by their very nature, have leaped to leadership in the fish food business. They are the birth of a new era in fish feeding.

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# The MONSTER of Craggy Castle

BY WENDEL CHILTON



About 15 years ago, when our house was new, I cut a window in the wall of a storage cabinet adjoining the fireplace, trimmed it with pecky cypress, and installed a 15-gallon aquarium behind it. Landscaped and stocked with a variety of tropicals, it immediately became the focal point and family gathering center of our living room. High enough to keep sticky little hands off the glass and protected from the world by the walls of the storage cabinet, it held off the advent of television for a number of years. Its jeweled inhabitants were so dear to our hearts that an epidemic of ick created a major family crisis. Having read somewhere that aureomycin was effective in treating this, I set forth to buy some but quickly found it to be unavailable except with a doctor's prescription. Undaunted, I called a doctor friend (a very big man in the medical business) to obtain the desired prescription. I can still hear his carefully considered medical opinion on the state of my sanity when the purpose of my call finally became clear to him. I would strongly recommend against getting a doctor out of his shower to prescribe for tropical fish! Even when they are good friends, they can be not very understanding in matters of this kind. However, my anguish was so acute and my lament so loud, that I got the prescription. It didn't cure the fish, but its parent mold grew wonderfully well in the warm water, and I spent several weeks skimming rafts of white, yeasty stuff from the surface before it finally gave up and died out.

The years went by, and the children grew and forced me to buy a television set just to keep them home nights. So, the aquarium was pushed into second place. Not long after that I learned that guppies require little attention. So, a guppy tank sat there in the wall and became a separate, little green world all by itself. The population rose and fell, and generations of guppies grew up and died of old age, and babies were swallowed before they could swim an inch, which was just as well because nobody cared very much anyway.

Then disaster (in the form of the algae *spirogyra*) really hit. When the algae got to be 2 inches deep on the bottom, I introduced a pair of mystery snails. They went to work and ate every last green hair in the tank, after

I don't want any of that creek water in the tank." This was pure habit, because as far as I was concerned it didn't matter now. "They're not much bigger than the frozen brine shrimp we feed the fish, so they'll probably never reach the bottom alive," I continued, remembering the fate of a pair of neonos I had put in with a large male black tetra. (That was probably the most expensive lunch he ever had!)

The washing completed, the five little fellows were unceremoniously dumped into the aquarium. If I had had doubts as to their safety, it was because I had not taken into account the survival instincts of these particular crustaceans. They shot, stern first, like bullets to the bottom, where they vanished in the moss, and I quickly forgot them.

A night some 2 weeks later found me standing in front of the aquarium, distastefully contemplating the amount of work involved in its removal. I couldn't decide whether to hang a picture over the opening or rebuild the entire wall. Then into my awareness began to trickle the realization that there was something different about the tank. The spirogyra wasn't as lush as it had been. As a matter of fact, here and there thin areas let the sandy bottom show through. As I watched, a small crawdad walked slowly across a clearing, waving his claws defiantly. I called my son, and we watched and presently we accounted for four of the original five. The whole thing was so remarkable that I decided to postpone removal of the tank, and as the days went by, the spirogyra receded and finally vanished.

No longer did our aquarium look like a cross section of a stagnant swamp. Instead, the fishes hung suspended in a crystal medium that apparently had no light resistance. The sandy bottom was patrolled by our four little bulldozers constantly stirring the sand with their back legs, looking for bits of edible debris. They had personalities of their own, and since everything in our house has a name, including an upstairs storage cabinet referred to as "the horse", they quickly became "Twiddly, Tweedly, Scorpy, and Climber". Twiddly and Tweedly are obvious. Climber had an unquenchable desire to reach the highest place in the tank, and he spent much time working his way to the top of a plant, only to have it bend under his weight and deposit him back on the bottom. Scorpy was apparently a different species. His shell was a uniform gray, his thorax disproportionately large. His tail was small, and his pincers were no match for those of his cousins. The dispositions of all were bad, and their chance meetings were accompanied by much waving of pincers and gnashing of mandibles until one invariably gave ground and took off at high speed, stern first, to safer territory. Scorpy avoided these meetings and became a digger, spending endless hours excavating dens under rocks, only to have the soft sand cave in and spoil his work. Eventually his frustrations became unbearable and he took up residence in a small ceramic conch shell.

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We were all a little disturbed when we discovered our four crustaceans were eating the plants, starting with the roots and working up, but conditions otherwise were so good that I couldn't really complain. When the plants were gone, I installed the ceramic ruins of an English castle to embellish the barren desert. This set off a free for all for occupancy in which the undersized Scorpy lost two legs. The castle was won by Twiddly, who settled himself in the door with his pincers folded across his face and defied anybody to oust him. The castle became known as "Craggy Castle", and because of a combination of his ugliness and menacing protection of his new home, Twiddly was often called "The Monster".

In August it became apparent that, due to growth, by volume the crawdad population was getting too big for the available territory, and I netted out Tweedly and Climber and returned them to the creek, where, I trust, they are doing well. We kept Scorpy because of his missing legs, hoping that shortly he would be strong enough to cope with the wild, but he came up missing one day, and I suspect that Twiddly, the lord of the castle, caught him with his shell off (moultling, you know) and ate him on the spot.

These moultings are interesting events, and we have been fortunate enough to witness a good many of them. Twiddly, for instance, announces the approaching disrobement by losing his appetite (an obvious signal, for normally at feeding time he emerges from the castle and rushes about like a driverless tank). Shortly after he discontinues feeding, he begins to itch, and he uses all of his legs for scratchers. Watching him reminds me of my boyhood and cold winter mornings in church when my long woolen underwear began to itch. If I'd had eight arms then, I'd have used them all. Presently he splits across the back, just where the carapace joins the first tail segment, after which he rolls over on his side, apparently in his death throes. Then, when it appears that all is lost, he gives a mighty flip and pops out, complete down to the last antenna.

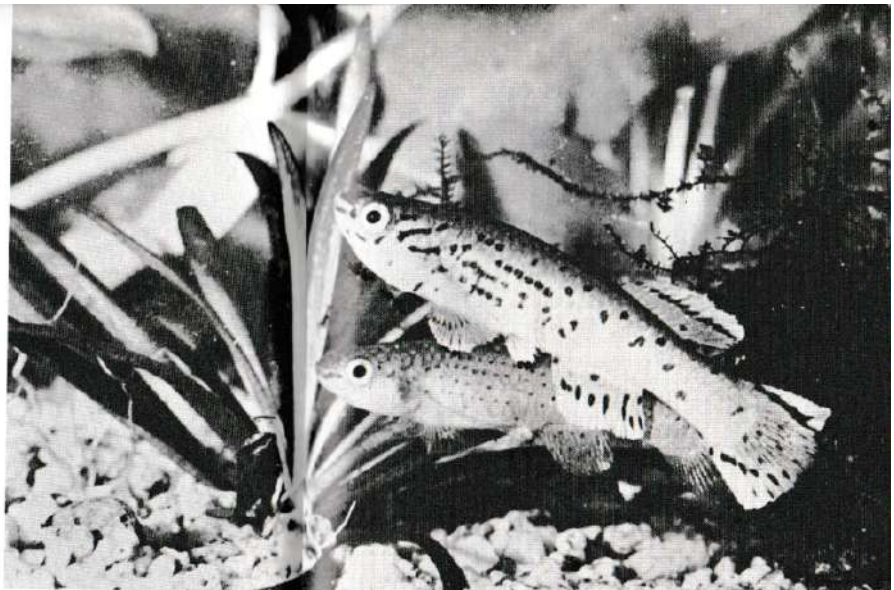
While his new shell is still soft, Twiddly grows so fast you can almost see it, so that the next day he is much larger and very hungry. His first meal is the discarded shell, which he polishes off down to the last hard pincer tip.

Twiddly has eaten enough of the color food we feed the fishes so that he no longer resembles his drab wild relatives. He sits atop the turreted castle (he can no longer enter the door) and brandishes 2-inch, jade green pincers decorated with gold knobs. His back is jade, changing to amber and gold on his sides and tail. In spite of his riotous coloring, he sets some kind of record for ugliness. He is, in fact, so ugly that he is fascinating, and my family will not let me return him to the creek until spring, when we are hoping that my son will catch us a new batch of little ones. There's just one thing that bothers me: if Twiddly continues to grow at his current rate, how will I get him back to the creek without losing an arm?

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## Care and Breeding of *Aphyosemion calliurum ahli*

BY KARL HAJEK  
Prague, Czechoslovakia



A male *Aphyosemion calliurum ahli* displays his colors to a female. Photo by Rudolf Zitel.

Two years ago I received a pair of *Aphyosemion calliurum ahli* which were imported from Germany, where they were very popular. *Aphyosemion calliurum ahli* is a Cyprinodont which is native to western Africa, mainly in the coastal regions. These beautiful fish are 2½ inches in length; the male is very attractively colored, with an olive-green to bluish-green body, shading to bluish-gray on the back. The belly is light in color. Red dots are sprinkled from head to tail, more tightly grouped on the head, where they form irregular lines. The lower lip is also adorned with bright red dots. Eyes are black, with a golden iris. Pectoral fins are yellow to green, and yellow forms the edge on the dorsal and anal fins. Below this edge there is a bright red

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stripe, and from there to the body the fins are blue. The tail is greenish blue like the body, with the same red stripe and yellow border as the dorsal and anal fins. The female is light brown with a lighter belly and very few markings. There are some red dots on the dorsal and anal fins, and the tail is round.

Most breeders have found that a small aquarium is sufficiently large for breeding *Aphyosemion calliurum ahli*, and is much less trouble when searching for eggs. If the breeding aquarium gives the fish a choice between a peat moss bottom and floating bushy plants, they will frequently choose the peat moss and bury their eggs there rather than hang them in the floating plants like the other top-spawning species. I prefer to keep mine where there is no

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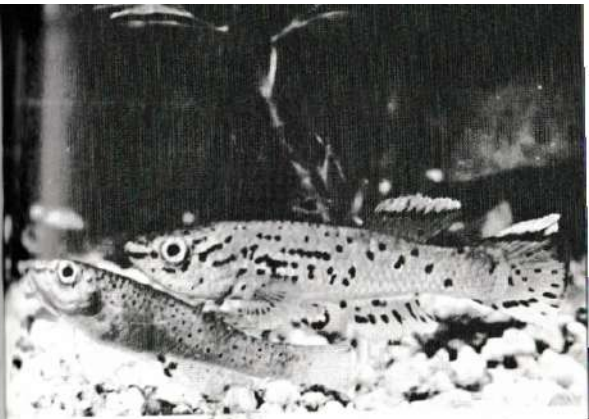
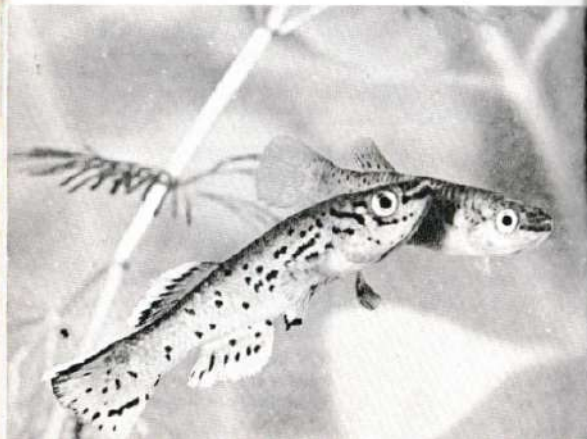


**Tropical Fish Hobbyist**

peat moss on the bottom and they have no choice but to spawn in the floating plants. Many breeders have found it convenient to use the "spawning mops" instead of floating plants. These are made by tying a tassel of nylon yarn to a piece of cork. The fish readily accept this as a substitute and spawn into it. These mops may be lifted out and put into a hatching container when spawning is finished, or the eggs may be removed easily with the fingers and the mop used again. Because of the long hatching period, it is an easy matter to pack a few eggs between two layers of cotton and mail them to a friend who can take them and put them into water to complete the hatching cycle. The water in which the fish breed must be soft, acid, and free of minerals, DH 1 to 3 and pH 5.8 to 6.3. Rain water with a little added acidity is very good. 65 to 68° F. is adequate for keeping them; if spawning is desired, the temperature should be raised to somewhere between 70 and 75°. I have had them spawn for me at a temperature as low as 62°. *Aphyoseion calliarum ahli* is not a very demanding species, and room temperatures are usually adequate. Shifting their tank to a warmer spot in the room is enough to start them spawning.

When I wish to get a good spawning I separate the sexes for 10 to 14 days and then check the female. A light placed behind her will clearly show the presence of eggs in her body. When placed together, a pair will lose little

Intent on spawning, a male *A. calliarum ahli* pursues a female. Photo by Rudolf Zukal.



Above, the female rolls to her side, showing submission. Below, the male presses in close. He is about to move to her other side to edge her into the plants. Photos by Rudolf Zukal.



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time beginning to spawn and frequently a female is depleted in 2 to 3 hours. The male lures the female into the bushy plants or the strands of the spawning mop, where they take a side-by-side position, quivering. With a rapid jerk an egg is dropped and flung into the plants or mop by the male with his anal fin. The eggs are quite sticky and adhere to any surface with which they come in contact.

When spawning is finished and the breeders no longer pay any attention to each other, they may be moved to another tank. Usually 35 to 50 eggs are laid, more if the female is a large one. Spawning may be repeated in another 14 days if the pair is kept apart in the meantime. Eggs and young fish are not eaten if the parents are well fed, but it is best to remove the temptation by taking the eggs out and allowing them to hatch separately. Incubation period varies from 2 to 3 weeks. Fry are large, about 1/4 inch in length, and hunt for food as soon as they have hatched. Brine shrimp nauplii are perfect at this time, but they should be fed live rather than frozen, because from earliest youth the youngsters are hunters who love to track down their prey. Growth is very rapid and sexes may be distinguished in 6 to 8 weeks. The youngsters should be sorted for size frequently to avoid cannibalism by the larger individuals. At the height of the spawning period the female may be

The male, now on the female's outer side, is in the proper position to push her toward the plants. Photo by Rudolf Zukal.



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Side by side, the pair of *A. callitrum* will head into the plants to spawn. Photo by Rudolf Zukel.

spawned every week, but at other times she will have few eggs and more and more of them will tend to be infertile. You will have more and better youngsters if you wait until your female is well stocked with eggs.

*Aphyosemion callitrum ahi* tends sometimes to deteriorate in color with successive generations. Inbred males will sometimes lack the red and yellow in the dorsal and anal fins. Such males should not be used for breeding, as the colors will become constantly weaker. Always use only your best colored males and healthiest females for breeding.

Males will sometimes put on mock battles in which the fins are spread almost to the breaking point and the colors are at their brightest. Although they look as if they want to kill each other, there will seldom be any real injuries inflicted. Although there are no real injuries among themselves, it is not unlikely that they might attack other species put with them, and for this reason they should be given their own aquarium.

I recommend *Aphyosemion callitrum ahi* to any hobbyist; they are not at all sensitive to temperature drops and can be kept in comfort by any hobbyist. Breeding them and raising the young is very easy, and a tankful of males is a thing of real beauty.

## SOCIETY NEWS

by Mike Reed

All inquiries about The International Federation of Aquarium Societies should be addressed to: IFAS, Glenn P. Tomlin, President, 5334 Blow St., St. Louis, Mo. 63109.

**Burbank, Calif.** . . . The L.E.R.C. Aquarium Society meets the second Thursday of each month at 7:45 p.m. at the Lockheed Employees Recreation Building, 2814 Empire Ave. in Burbank. They are probably a fun group, for on the title page of their club publication *Fin Fun* the following slogan appears prominently: "Fin Fun. The kind of magazine that once you put it down is hard to pick up again . . ."

**Tape-Booklet Programs for societies** . . . Society program chairmen have been telling us of a new way to build up the society treasury at the same time as they provide their members with informative meetings. The famous artist, author and lecturer W. L. Whitern, F.Z.S. has prepared a number of tape-book-

let programs for society use. The society rents the taped lectures (\$5) and sells the booklets that go with the tape to its members for \$1.00 apiece. The society keeps 25c on each book for its treasury. Among the tape-booklet programs are White Spot, Aquarium Management, and Foods & Feeding. If you're interested, get in touch with one of the following societies for further details: Norwalk Aquarium Society, P.O. Box 503, Belden Station, Norwalk, Connecticut 06852; Duluth Aquarium Society, 607 Bong Blvd., Duluth, Minnesota 55811; Aireborough Aquarium Society, The Headlands, Scotland Lane, Horsforth near Leeds, Yorkshire, England.

**Scarborough, Ontario** . . . The Scarborough Aquarium Society announces suspension of its meetings for the summer season. The last meeting is the one scheduled for June 13. Meetings begin again in September. The group meets on the second Tuesday of each month at 2857 Lawrence Ave. East (Brimley Rd. and Lawrence Ave.) at 8 p.m. Their mailing address is P.O. Box 31 Station "B", Scarborough, Ontario.

**Pittsburgh, Pa.** . . . The Greater Pittsburgh Aquarium Society Show will be held from Sunday, September 24, 1967, through Sunday, October 8, 1967, at Buhl Planetarium, West Ohio

and Federal Streets in Pittsburgh, Pa. A Guppy Show in conjunction with it will be held Sunday afternoon, October 1. Hours for the main show are 1-5 and 7-10 on weekdays; 10:45-

5:00, 7-10 on Saturdays; and 1-10 on Sundays. If you have any questions about exhibiting or attending, contact Mrs. R. D. Beck, 4354 Murray Ave., Pittsburgh, Pa. 15217 (phone: 412-521-6152).

**Detroit, Mich.** . . . For the third time the Greater Detroit Aquarium Society was invited to display an exhibit of aquaria at the Annual Builders, Home, Furniture and Flower Show. Attendance exceeded a quarter of a million. The effectiveness of the Society's display was reflected by the standing-room-only crowd of 150 people who showed up for their next meeting.

**Rialto, Calif.** . . . The Tri-City Aquarium Society at 4099 West Second Street, Rialto, Calif. 92376, started way back in March to get some of its members together to charter a boat for a deep sea fishing jaunt in June. They did it last year and had a ball.

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# MAIL CALL

By William Vanderwinker

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 Connelton Avenue, Jersey City, N. J. 07302.

### White convict and firemouth hybrids

Q. One Saturday I was in an aquarium shop which I visit quite often, and the dealer who knows me quite well called me over to one of the tanks. In it were about 25 young fry (not yet free-swimming), and I asked him what was so special about them. He replied that they were a cross between a female white convict cichlid (*Cichlasoma fasciatum*) and a male firemouth cichlid (*Cichlasoma meeki*).

1. Is a cross like this rare?
2. Which parent will the young resemble most?
3. Will the young be fertile?
4. I purchased the father (he's about 2 1/2 inches) with the intention of breeding him to my female firemouth (also 2 1/2 inches). Will this cross spoil him for breeding with another fire-

mouth? They both try to get through the glass to each other.

5. The size of the tank is 7 1/2 gallons, the pH is about neutral, the hardness

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than half adult size. Does this meet their requirements?

6. What surface do they spawn on?
7. What does a figure-eight puffer eat, and what is its Latin name?

Donald Fitzsimmons,  
 N. Vancouver, B.C., Canada

- A. 1. I have never heard of it before.
2. I could not answer a question like this, for I have never seen fry from such a cross.
3. In many cases where two species are interbred the progeny are sterile, and the probability is quite high that this is what will happen here.
4. It is always easier to get a fish to breed with one of his own species than with another species that does not at all look like him. If they are both ready, they will probably spawn, but you know how cichlids are: they may for no apparent reason eat their eggs or fry.
5. A small pair will probably spawn for you in this tank, but with the fry there it will soon be overcrowded. All the other things are OK.
6. What they seem to like best is a flowerpot laid on its side.
7. It is not accurate to refer to a scientific name as a "Latin" name, because many stem from the Greek as well. The figure-eight puffer is *Tetraodon*

very soft, and the temperature a steady 78° F. I know that the recommended tank is 15 gallons, but the fish are less

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June, 1967

fluvialike, and they eat all sorts of live foods, as well as pieces of shrimp or crab meat, and clams or mussels. Their worst habit seems to be nipping off pieces of the fins from other fishes.

### Light requirement

- Q. 1. I am an avid aquarist and about to set up a 25-gallon tank. If such a tank contained an Amazon swordplant, *Vallisneria*, hair grass, *Gebomba*, and *Eloidea* what should the daily average amount of artificial light be?
2. Could you please explain in full the advantages of fluorescent lighting compared to the normal type of incandescent?
3. Do bleeding heart tetras (*Hyphessobrycon rubrostrigatus*) become aggressive to smaller fishes in a community tank?
4. Is it safe to keep a full grown male betta in a community tank of fishes averaging 2 to 2 1/2 inches in length?
5. I think that Mike Reed's column is GREAT! YOUR FISH'S HEALTH is very interesting and he should keep up the good work.

Robert Winters,  
 Westbury, L.I., N.Y.

A. 1. All of the plant species you mention have rather high light requirements. It is difficult to make any hard-and-fast rule about light requirements, because tanks get varying amounts of natural light besides, and this is a factor as well. Read

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given for fluorescent tubes is that they provide more light with less current. Another is that they give off much less heat, and still another is that the light is

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distributed more evenly. A point in the incandescent bulb's favor is that it requires no complicated installation and a reflector that takes these costs less initially, although in the long run it would be more expensive.

3. There is always the chance that any large tetra could become obstreperous toward his smaller tankmates, but this species seems quite peacefully inclined.

4. I can see no objection.

5. At a great risk of doing permanent damage to his sweet, modest nature I have quoted your letter to Mike. He thanks you.

**What are they?**

**Q:** I had been an active hobbyist for 2 years before I joined the Air Force last year. I have missed my fish greatly since and even more so when I saw the condition they were in on my last leave home (my mother just can't give the fish the care I used to). I am now stationed in Florida and decided to set up a tank or two in my room. Since there are many tanks here in Florida and since I like to explore, I decided to look for my own fishes instead of buying them. I found one fish that I can't identify. It is a live-bearer, larger (both males and females) than a common guppy. The male of this species is the only one with any coloring, which varies from a drab gray to almost-white speckled with black. They are not

mosquito fish, and I have never seen anything quite like them before. Do you think they would make a good aquarium fish? They are very playful and are apt to get a little rough at times. Their requirements are exactly like those for guppies.

A3C Robert Soklaski,  
Orlando AFB, Florida

A. What you have is probably *Gambusia affinis holbrooki*. They are not my idea of a good fish for a community tank, because they are usually ready to attack a fish they happen to take a dislike to, and are apt to nip the fins of almost any tankmate.

**Turtles**

**Q:** About 2 years ago we had two small turtles, which have since died, that ate snails but did not bother the fishes nor plants in our aquariums. We have not been able to find more of these turtles

in our local shops, nor where they came from. We would like to know, if you could tell us:

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water? If so what is its name and where could I get it?

2. If not, is there any other way to cool aquarium water? I have tried making ice cubes from aged water with a pH of 6.8 and floating them in my outside filter, but the water only goes down 1 or 2 degrees and doesn't stay there very long. I leave the reflector lid up so the water can be cooled by increased evaporation.

3. I now keep white clouds, zebras, cardinal tetras, a leopard catfish, and a bronze catfish. These seem to do all right and do not seem to be bothered by the warm water. I would also like to add a pair of rammy-nose tetras and a pair of dwarf gouramis. Could all these be kept together peacefully with the above conditions and a pH of 7.0 to 6.8?

4. Because of a lack of space and

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aquariums, I have been planning to spawn my fish in a 5-gallon tank and after a while move half the fry to another 5-gallon tank for raising. Would this be all right?

**Jim Crane, Hollywood, Fla.**  
A. 1. There are a few experimental models, but at the present time they are prohibitively expensive.

2. Water which has been cooled too quickly can raise a great deal of havoc with your fishes. It is not so much the high temperature that causes trouble, but the quick change. Try using more aeration and change to a terrarium cover with a screen top, and on really warm days have an electric fan blowing on the surface of the water.

3. Your tank is not particularly crowded at present, and adding the fish you suggest would do no harm.

4. You would not raise very many fry

in only two 5-gallon tanks. Figure on the size, not of the fry but of the mature fish you intend to raise, and plan accordingly.

**Tiger barbs**

Q. 1. I am a bit confused between *Puntius tetrazona*, *Capoeta tetrazona*, and *Barbus sumatrana*. Whenever these names come up, they are referred to as "tiger barbs." Are they all the same fish,

Tiger barb.



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or are they three different ones that resemble each other?

2. I have 35 angelfish in a 29-gallon tank. I acquired the habit of "stuffing" them with food (live, frozen, and dry). I feed them five or six times a day, so that in a few months they are breeding size. Will this make them sexually mature to breed?

3. What effect, if any, would the practice of "stuffing" have on a fish's health?

**Marc J. Beavstein, Brooklyn, N.Y.**

A. 1. They are all the same fish. When first introduced, the importers, seeing that they came from Sumatra, called them *Barbus sumatrana*. Then they were given a proper scientific name and called *Barbus tetrazona*. Then Dr. Schultz split the barb species into three groups, and they became *Capoeta tetrazona*, a name that holds good today. *Puntius tetrazona* is a name that never had any validity.

2. Angelfish have very healthy appetites, and I very much doubt if you are "stuffing" them. What you are doing is giving them a deficiency of food. Most hobbyists do not have the opportunity to feed theirs as often as you do, and of course they do not grow as rapidly. If you notice that they are beginning to pair off, the time has come for them to breed.

3. You wouldn't get very far if you tried stuffing them in the same manner as a farmer "stuffs" a goose, remaining food down its throat. What you probably mean by "stuffing" is feeding frequently and generously. If you can do this without overfeeding and thereby fouling the water, you are coming very close to duplicating their natural conditions, and the result would be very beneficial to their health.

**Molly-swordtail hybrids**

Q. For a year now I have been cross-breeding black Yucatan mollies with male green swordtails. Now the offspring are taking on weird colors. They are black with a white chest, with red and blue lines running down the sides.

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**Gordon Arnaud, Winnipeg, Man., Canada**

A. Looks as if you really have something

there. There is a real question here, though: Often, when a successful hybridization is achieved between such widely different species the offspring, attractive though they may be, turn out to be sterile. If yours are fertile and turn out to produce young that look like their parents, you may have something.

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**125 babies**

Q. Recently my guppy had a total of 125 babies. Three days afterward she died. Can you give me a reason for this, or is it too obvious?

**Fred Shaw, Atlanta, Ga.**

A. You neglected to tell me how old this female was. That many babies is quite an accomplishment. A female's first litter is generally 10 to 25. As she grows older there will be more at each birth. A female that has just had a litter of young is of course at a low ebb and is more likely to contract a bacterial or parasitic infection at this than any other time.

**Young female**

Q. 1. Last June I purchased a pair of fancy guppies. The male has mated with the female countless times. She is heavy-bodied but has no gravid spot

and has never given birth. She is very active and eats well. She has been this way ever since I got her. Can you tell me what is wrong with her?

2. Is it all right to breed and raise fancy guppies in a community tank?

3. At what age are fry capable of breeding?

4. Do you know how I could find out if there are any guppy clubs in my area (near San Francisco)?

5. One of my female guppies had her babies when her gravid spot was still very small and not very dark. The fry

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(there are only five left because I didn't expect them so soon) are healthy and active. What happened?

Debbie Byrd, San Pablo, Calif.

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A. 1. It could be that the female is sterile, or that her food contained too much fat, or there could be other reasons.

2. There is nothing wrong with having guppies in a community tank, except that your other fish would look upon any babies born in the tank as a delicacy and would make a meal of them.

3. A healthy strain will reproduce at the age of 6 weeks.

4. Ask Ted Steinhauer, 1644 A Irving St., San Francisco 22, Calif.

5. If a female is very young you have to expect a small number of babies.

*Salts From  
The Seven Seas*



By Alfred A. Schultz

**Q.** My roommate and I are students at M.S.U. and we are both certified scuba divers. We would like to know if there is any opportunity for us to collect fish this summer for any fisheries?

**Gary Shaw, East Lansing, Mich.**

**A.** I would suggest writing to the Florida Chamber of Commerce, Tallahassee, Florida for a list of fisheries, and then write to them directly.

**Q.** I have recently purchased a copy of SALT-WATER AQUARIUM FISH by Dr. Axelrod and Mr. Vorderwinkler. Even though it is an excellent as well as

thorough book, I still have questions left unanswered. They are:

1. Are the *Hemichus* species hardy? What size do they reach in an aquarium? What foods do they prefer? Do they get along with most other fishes?

2. Can neon gobies be used as scavengers?

3. Besides feeding brine shrimp, daphnia, and tubific worms is it possible to feed dried foods occasionally?

**Robert Winters, Westbury, N.Y.**

**A.** I'm glad you asked about *Hemichus*

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*acuminatus. This is by far my favorite fish. As a matter of fact I have kept one specimen of this species for 7 years, and when it died I felt as if I had lost a good friend. It is a very hardy fish and adapts to all types of food. It does not bother other fishes, and will not take bullying from them. I obtained my fish when he was only 2 inches long. He grew to over 7 inches in the years that I had him.*

2. Although neon gobies do a good cleaning job on other fishes, I couldn't class them as scavengers.

3. Most saltwater fishes can be adapted to eating dry food. It takes time and patience. Do not feed your fish for a few

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**YOUR FISHES' HEALTH**

BY MIKE REED

**Fry**

There are few things so frustrating in our hobby as finally getting some difficult-to-spawn fish to turn the trick and then to lose all or most of the fry or to have most of them grow up into runts. Good management is particularly important in raising good fry. Three things are of special significance here — feeding, room, and water conditions. If you follow the suggestions I am about to make, you should find a considerable difference in the number of fry that survive and grow up into good, robust adults from your next spawning.

**Feeding**—Those egg-layer fry that are very small should get infusoria to begin with. Now don't start moaning about how hard it is to raise infusoria, because I'm going to tell you about a really simple method I have been using for years. Wait until your fry are 3 to 4 days from the freeswimming stage. Take a quart milk bottle that has been rinsed (but not washed with soap or detergent) thoroughly. Fill it about 4/5 of the way up with water from the aquarium in which the fry are developing. Now add 2 drops of the liquid food made especially for feeding to egg-layer fry (available at your dealer's shop), and stir the mixture briefly. Place the bottle in a moderately warm, dimly lit spot. After 2 days, add another 2 drops of the fry food to the water and stir again. At this time start another bottle off just as you did the first. Infusoria should be present in great numbers in these bottles after 3 days. You should keep creating new cultures every 2 days. That way you'll be sure to have enough, particularly if an occasional jar spoils (you'll know by the smell).

When the fry are freeswimming, check your oldest bottle. It should be cloudy with tiny life, some of which is visible with a hand magnifying glass. (If you have a microscope available to you, check a drop of the culture with it. You'll be shocked at how rich it is).

Fill a 6-ounce cup (use a paper cup, because it's never been washed with soap or detergent) with some infusoria mixture and 1 drop of the liquid food and stir. Now empty the cup into the aquarium. The fry will eat most of the infusoria and some of the liquid food. The remainder of the liquid food will help feed any of the infusoria that are left. After about an hour check your fry. Their bellies should be distended from the gorging they have done. It is

also a good idea to keep some algae in your growing tanks. Most fry will pick at the algae and get added nutrition from it. If the algae is not forming on the side of the tank on its own, scrape some off the sides of another tank.

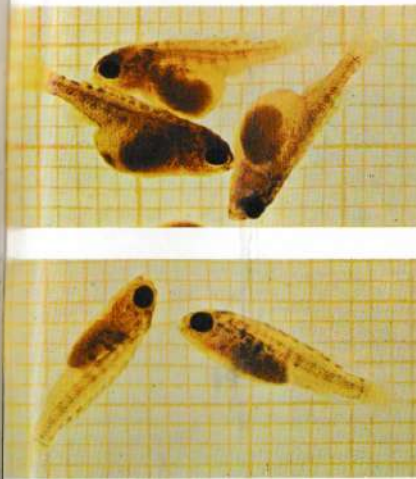
Feed the infusoria and liquid food mixture to your fry three times a day unless you find that you are overfeeding. If you are overfeeding, the first sign will be that the youngsters' bellies are full even just before feedings. The second sign will be cloudy water. In the first case, reduce the quantity given at each feeding. In the second case, stop feeding until the water clears. If you are not feeding enough, it will be obvious because your fry will not have full distended bellies an hour after feeding. This is particularly likely to happen after the fry have grown for a few days. Simply feed a bit more if it is necessary.

When most of the fry are as large as livebearer young, feed only small amounts of infusoria (for the smaller fish) and begin feeding newly hatched brine shrimp, either live or frozen; fine dry food; and freeze-dried fry food (soon to be found in your pet shop under the brand name Miracle Fry Treat).

Within a day or two your fry should be on these foods completely, with the infusoria no longer needed. (Of course, it goes without saying that your livebearer fry are born at a size too large to be started on infusoria. These fry are started on a diet composed completely of the foods just mentioned.)

Just as soon as they can handle it, get your fry on adult-sized live, frozen, freeze-dried, and dry foods. You will have sorted the fry for size by this time, and, naturally, those that grew fastest will be ready for the large foods first. Feed a wide variety of foods. I like to use many of the new freeze-dried products, for I find my fish grow and look better when fed with them.

**Room**—Probably the main reason for incomplete growth of tank-raised fishes is crowding. I have seen hobbyists attempting to raise several hundred gourami or cichlid fry in a single 5- or 10-gallon tank. They end up with two or three fish, and these are runts. You can figure roughly 100 fry per gallon only when they are splinter size. But what you must realize is that your babies should never be moved until they are slightly larger than newborn guppies. At this size you can keep about 25 per gallon, so your hatching tank must provide enough excess room to house your fry until they are this size. Thus, if you see about 300 eggs ready to hatch, you will need at least a 12-gallon tank to house the fry until they can be moved. And you'll need even more tanks as the fish grow still larger. Don't



Above, the newly hatched fry from the mouth of a *Pseudotropheus* female. The yolk sac is present, so there is no need to feed these young. Below, some young from the same spawning. Several days have passed, and the yolk sac has been absorbed. These fry are large enough to start on fine dry food and newly hatched brine shrimp. Photos by Marcuse.

kid yourself: you must give your fish room to grow. If you have 300 fish of the size of blue gouramis or swordtails, you will need at least enough tank space to hold 200 gallons of water before you are through. If you are raising 300 fishes the size of platies or tiger barbs, you will need a minimum of 150 gallons capacity. If you don't have enough space, cull your fish by picking the best ones out and giving the rest away when they are just large enough to move. Don't be greedy; keep only as many as you will have room for.

**Water Conditions**—Fry are extremely sensitive to changes in water temperature or water chemistry. They must never be moved from one tank to another where conditions may be even slightly different until they are at least the size of week-old livebearers. This means they are best off at first in the tank in which they were born. Check the temperature pH and DH of the water when the young are

born, and check it again every other day to be sure no drastic changes are occurring. If something does happen, don't compound the problem by changing things back too fast. If your checking as regularly as you should, you will never run into an emergency situation that requires too-great corrective measures.

Another very important thing about water is the necessity for partial water changes. Just as you should be draining water from your community aquarium every now and then and replacing it with fresh water, so you should be doing the same thing in a fry tank. The difference is that you drain off considerably less water each time, and you do it more often.

In the first week, I drain off and replace about 3 percent of the total water volume every 2 days. The replacement water is always at the exact temperature of the tank water. During the second and third weeks, 5 percent of the total volume can be changed every 3 or 4 days. After this, change about 10 percent per week until the fish have reached adulthood. This program of regular water changing cannot be stressed too much when it comes to growing fishes to maximum size. Soluble waste products can have an inhibitory effect on growth in young fishes. No filter removes such soluble substances, but draining out water does.

And now I'm going to tell you something I shouldn't. I tell it to you only to stress what good management of the above factors can mean in raising good fishes, not as an example of what to do. Several years ago I decided to see how many fishes could be raised in a 15-gallon tank utilizing extreme care in feeding and water conditions. (The decision to work in limited space eliminated the possibility of giving the optimum amount of room.) I started with 50 newborn red swordtail fry, figuring to cull out any that seemed unable to keep up with its brothers. I went to ridiculous extremes, feeding the fish a bit every time they did not look absolutely gorged and checking and making partial (but small) changes in their water at least once, but sometimes three times, each day. Two of the fish died the first week from causes unknown. But believe it or not, all of the 58 remaining fish grew up into beautiful specimens. I sold them after 7 months to a neighborhood petshop. The dealer was shocked when I told him they were tank-raised; they were just too big and too colorful. Yet, I'm sure even more might have been raised in that tank had I tried. Perhaps some day I'll get up the enthusiasm to try it again, maybe with 75 fish. I wouldn't advise any of you to try it though, unless you are ready to devote an awful lot of time and energy to the project.

## Invertebrates for the Marine Aquarium

BY ALFRED SCHEINBERG

With the increasing popularity of the marine aquarium, many hobbyists are experiencing a problem. Unlike freshwater aquariums, marine aquariums seem to present a very limited selection of possible inhabitants. The choice seems to be limited to sea horses, pipefishes, and a few coral fishes. Other fish species are either prohibitive in price or extremely delicate.

Through the combined use of hardy, inexpensive, and bizarre marine invertebrates with common species of marine fish, however, a very interesting aquarium is created at a relatively low cost. No other aquatic group of creatures offers such a wide variety of interesting life forms. For the sake of brevity and utility, I will discuss only the species which may be kept in community tanks; and, therefore, octopi, sea hares, sea squirts, cuttle fish, and most shellfishes will be omitted.

### Horseshoe Crabs

One of the most interesting invertebrates for the marine community tank is the horseshoe crab, *Limulus polyphemus*. Horseshoe "crab" is actually a misnomer, for this ancient animal is not a crab, but a primitive arthropod whose nearest living relative is the spider!

Horseshoe crabs are found only on the Atlantic Coast. They spend most of their time plowing along the sandy bottom of shallow bodies of water where they devour huge quantities of sand worms, proboscis worms, clams, seaweed, and dead fish. Adult specimens may reach 2 feet in length, but the ones seen in aquariums are usually only about 3 inches long.

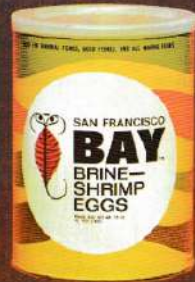
*Limulus* is occasionally seen swimming upside down close to the surface by the use of its leaflike gills which flutter under its abdomen. As do all joint-footed animals, the horseshoe crab molts its outer skeleton at regular intervals. Although harmless, the horseshoe crab can crack molluscs with powerful crushing structures that are located at the bases of its hind legs. In the home aquarium, these creatures are quite inoffensive and function quite effectively as scavengers. They may be fed shredded beef or shellfish as well as the commercially prepared frozen foods.

### Sea Anemones

One of the most familiar marine invertebrates is that carnivorous "flower," the sea anemone. This animal is actually a coelenterate, closely related to the jellyfish, and what appears to be its petals are really tentacles bearing myriads of stinging cells. When a fish enters these tentacles, thousands of thread-like hollow tubes are discharged and penetrate its skin. These threads, though impotent individually, combined produce enough poison to kill the



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Sea anemones are found in a multitude of shapes, sizes, and colors. This species resembles a cluster of underwater flowers. Photo by Marcus.

fish, which is then sucked down into the gaping hole in the middle of the animal which serves as a mouth.

The clownfish may be kept in the aquarium with this animal. As in nature, these tiny fish will live unharmed in the poisonous tentacles. Also, hermit crabs may be kept with anemones. As a matter of fact, they often carry these "plants" on their shells.

**Tropical Fish Hobbyist**



Stepping on the spines of a white sea urchin like this one can be very painful. The spines of a black variety inflict far more serious damage, however.

If you are in an area where you can collect the anemones yourself, pry them off of their rocks with a hamburger spatula or place them in your aquarium with their rocks, for they will eventually detach themselves. Feed them pieces of worms or shellfish by dropping the food into their mouths about twice weekly. Remember not to keep them with any fish but the clownfish.

**Hermit Crabs**

One of the most common and fascinating of the marine invertebrates is the hermit crab. In order to protect its soft abdomen, the hermit crab inserts itself into a hollow snail shell. As the crab grows, he discards his old home and finds a new, roomier one. When danger threatens, he withdraws into his shell and plugs up the opening with one of his claws. The tail appendage of the crab is specially adapted to hook onto the shell, and most crabs will be pulled in two rather than leave their homes.

Hermit crabs make excellent scavengers for any marine tank and are quite peaceful. They ceaselessly scurry about the bottom searching for the decaying organic matter which comprises their diet. This food can easily



Many species of starfish are quite beautiful and are ideal aquarium inhabitants. Photo above by Marcus. Photo below by v. d. Nieuwenhuizen.





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be duplicated, if necessary, in the home aquarium through the use of shreds of meat, fish, or shellfish.

One amusing note: if shells are in short demand, and a hermit crab has grown "too big for his britches," he may use an old bottle or tin can for a home. As with most crabs, if you are transporting some from a bay and do not wish to carry them in water, they may be kept alive easily in damp grass, seaweed, or moss. One important thing to remember is that they will escape easily unless your aquarium is tightly covered.

#### Spider and Kelp Crabs

Spider and kelp crabs may be kept in marine aquaria which contain larger fish. Both of these crabs have long, thin legs, and a more rounded shell than is found in swimming crabs. The spider crab is the more sluggish and less offensive of the two. Their diet is essentially the same as that of the hermit crab.

#### Sea Urchins

Many aquarists do not advise keeping sea urchins in home aquaria. The reason for this lies not in any ferocity, but in the fact that some people believe that urchins excrete toxic matter. I have seen several aquaria, however, with these animals in them. If you wish to take the chance, feed these "living pincushions" foods similar to those recommended for the crabs mentioned in this article. As with anemones, these fellows are frequently found on rocks. In the urchins' case, however, it is most advisable to include the rock they are on in your aquarium.

#### Starfish

As with urchins, some aquarists believe that starfish should not be kept in a home aquarium. Others, however, use them as scavengers. Starfish certainly make an interesting addition to any aquarium. I have used them in my community tanks on several occasions with no bad results. The most common species of starfish have five arms at a sharp angle to the central disc, which has, on top, a sieve plate used to circulate sea water through the animal. Most species are spiny and have very tiny pincers among their spines. The main diet of starfish is comprised of shellfish, but substitutions of animal matter may be accepted. One of the most interesting traits of these animals is their power to regenerate damaged or severed arms.

There are certainly many other species of invertebrates which are suitable for the home marine aquarium. I have only attempted to give you the most common and representative kinds. Remember that invertebrates count as similarly sized fishes in their oxygen requirements, so don't overcrowd an aquarium with them. With the use of a few unusual invertebrates a dull aquarium can be changed into a conversation piece that is really representative of marine life.