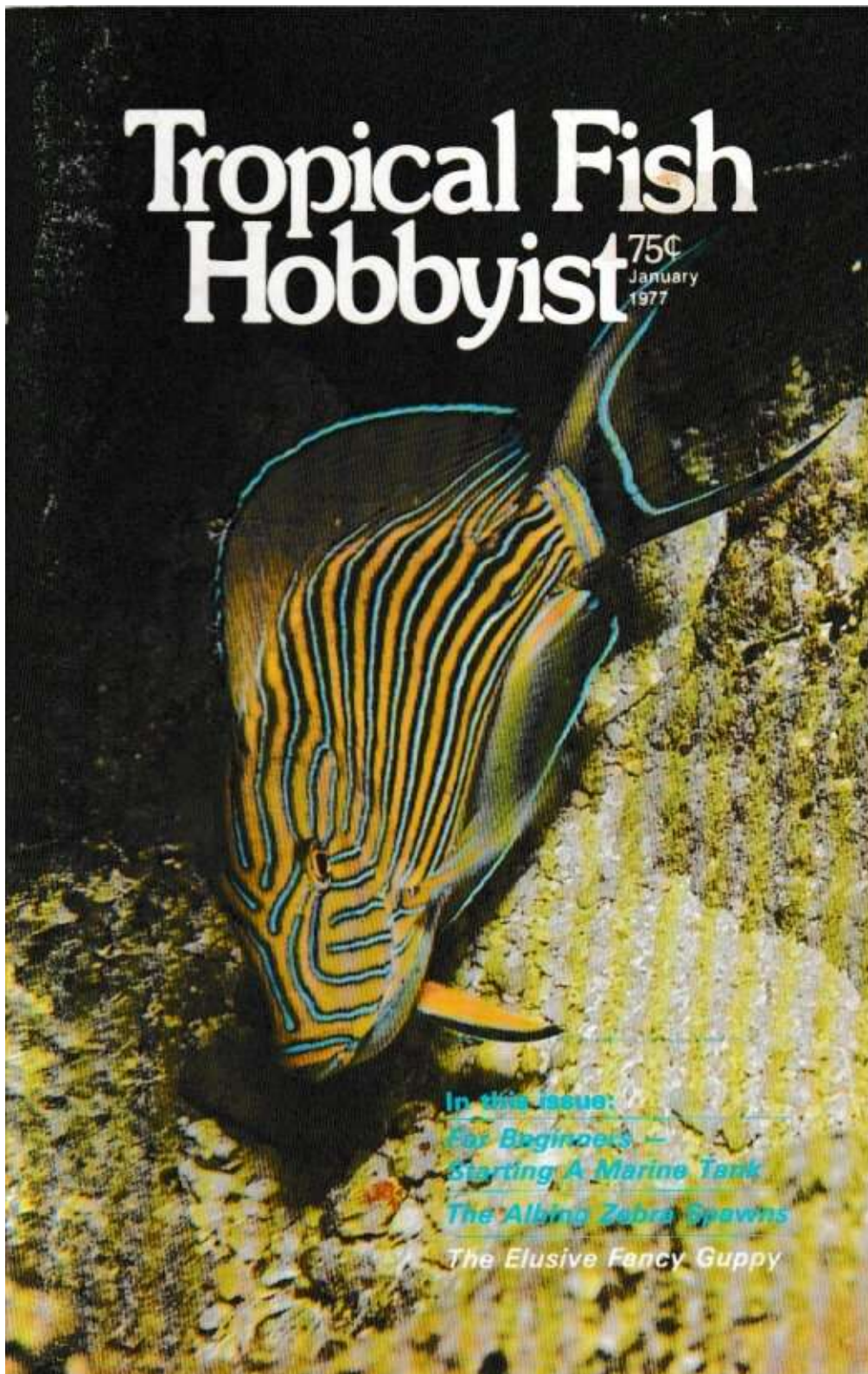


Tropical Fish Hobbyist

75¢
January
1977



In this issue:

For Beginners —

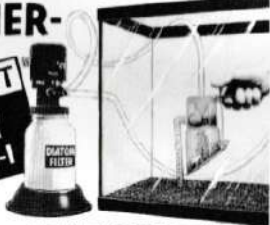
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The Albino Zebra Spawns

The Elusive Fancy Guppy

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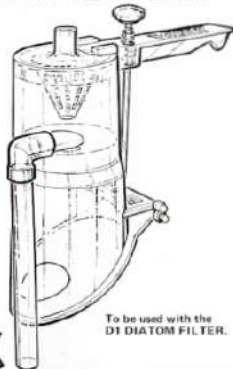
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VOL. XXV, January 1977 (#251, No. 5)



Cover
The clown surgeon,
Acanthurus lineatus.
Photo by Allan Power.

CONTENTS

FEATURES

Tropical Fish Hobbyist Articles Index, 1976	10
Cichlids: The Albino Zebra Spawns	12
A Dramatic Reduction of Egg Incubation Time for the Fire Killie	22
You Too Can Be An Article Writer	61
Livebearers: The Elusive Fancy Guppy	70

DEPARTMENTS

For Beginners: Starting a Marine Aquarium	4
Editorial: As I See It	17
Centerfold Portrait Fish	51
Idea of the Month	94

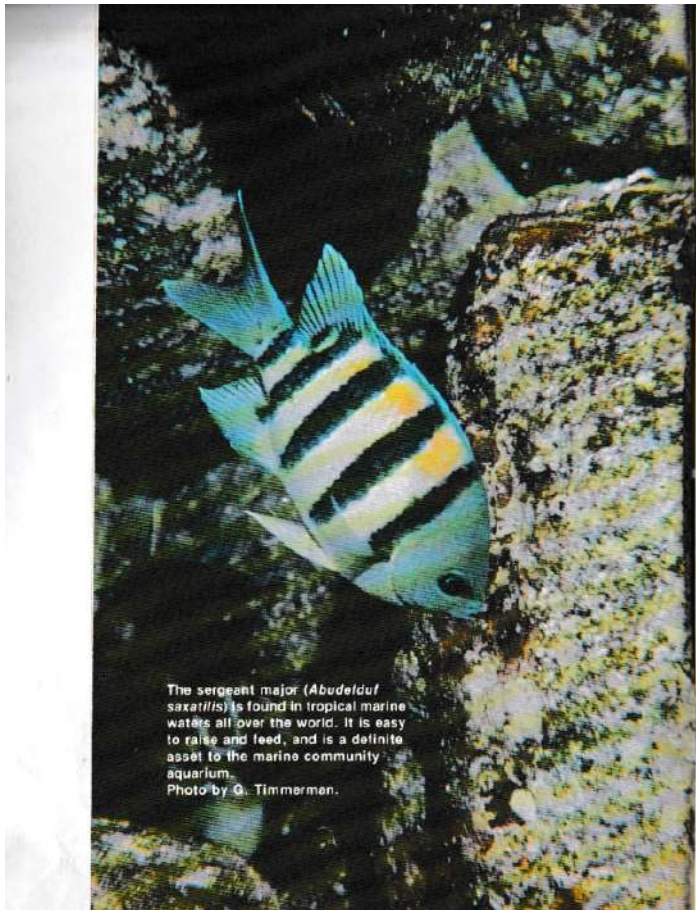
COLUMNS

Salts from the Seven Seas: Sea Urchins	37
Yout Fishes' Health: "Ich"	57
Mail Call	73

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The sergeant major (*Abudefduf saxatilis*) is found in tropical marine waters all over the world. It is easy to raise and feed, and is a definite asset to the marine community aquarium.
Photo by G. Timmerman.

For Beginners Starting A Marine Aquarium

by John R. Goldthorpe

The single most important concept for maintaining a marine aquarium is the establishment of a biological filter. A newly set up marine tank will support life until the animals' waste products reach a toxic level. Fortunately there exist bacteria that consume these waste products. It's this group of

bacteria living on the surfaces of the particles of aquarium gravel that serve as the biological filter. These organisms consume the animals' wastes almost as quickly as they are produced if the tank is not overcrowded. This description of the nitrogen cycle is certainly simplified, but it is adequate.



Like most of the peace-loving blennies, the striped blenny (*Blennius rouxi*) is a bottom dweller that assumes odd postures and has a cutzlicol look on its face. Photo by S. Frank.

Let us now go step-by-step through the procedure of setting up a marine aquarium.

ITEMS NEEDED

- All-glass tank and hood (the larger, the better)
- Pump
- Undergravel filter
- Two to three inches of substrate (preferably dolomite)
- Synthetic salt mix
- pH test kit
- Nitrite test kit
- Hydrometer-thermometer
- Heater



A marine aquarium tastefully decorated with colorful reef fishes and treated corals can easily be blended into the decor of homes and offices. Photo by Dr. Herbert R. Axelrod.

SETTING UP THE TANK

1. Rinse and wipe out any dust that may be in the tank. Do not use soap or chemicals in the tank.
2. Position the tank in its desired location and place the undergravel filter in the tank.
3. Add two to three inches of dolomite over the top of the filter. Dolomite will aid in maintaining the correct pH and is readily available as well as inexpensive.
4. Fill the tank with tap water.
5. Add the salt mix to obtain a hydrometer reading of 1.023 at 78° F. (26° C.). Consult the direc-

tions on the salt mix. Some mixes have the essential trace elements in the salt and some mixes provide the trace elements in a separate package. Allow the pump and filter to run for 24 hours to be sure all the salt is dissolved. Check the hydrometer reading and adjust if necessary by adding salt or more fresh water.

6. Check the pH. Optimal reading is 8.3. If the reading is below 8.1, adjust by adding sodium carbonate. Be sure it is sodium carbonate and not sodium bicarbonate.



A number of good quality marine salt mixes are available in convenient prepackaged sizes. Photo courtesy of Aquarium Systems, Inc.

A nitrite test kit (available in most pet shops) is an essential item for the marine aquarist. Photo courtesy of Rila Products.

The tank is now able to support life, but because we have not yet established a biological filter, the animals' waste products will cause an ammonia and nitrite build-up and this will soon kill the fish. Therefore, the filter should be activated and "seasoned" before putting the fish or invertebrates into the tank. The easiest way to do this is to dump some flake food into the tank and as it decays, ammonia is created which is converted into nitrites, then the nitrites are converted into relatively harmless nitrates. About one-half ounce of food

Tropical Fish Hobbyist

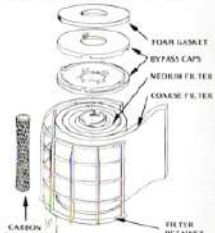
How to tell a new Mod-Four filter from all the rest



Kordon's unique Mod-Four represents the latest state of the art in aquarium filtration. Mod-Four is versatile and will meet the needs of both beginning and advanced hobbyists. Mod-Four is an excellent ready-to-use filter complete with filter materials. Mod-Four's large canister can easily be modified for a variety of filtering situations.

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can be used in a 30-gallon tank. After putting the food in the tank, wait a few days, then check for nitrites. The nitrite level will go from zero to over 15 parts per million (ppm) or more, and the tank will begin to cloud up. Continue to monitor the nitrite level until it again drops to zero. As the nitrite level declines the cloudiness will clear up. If, during the seasoning process, the tank becomes a bit odoriferous, don't be concerned, as this is to be expected. The odor will dissipate as the water clears up. When the nitrite level drops to zero the rate of ammonia to nitrite conversion has become equal to the rate of nitrite to nitrate conversion. This indicates that the biological filter is established and it is now safe to add the fish or invertebrates to the tank. This seasoning technique requires four to six weeks to complete. The whole process can be accelerated by "seeding" your gravel with a small amount of gravel from someone else's already established tank. Perhaps your dealer will be kind enough to give you a little bit of his.

Now that your tank is in full operation, remember to feed a varied diet of live and prepared foods, and provide some greens (kelp, spinach, etc.), especially for many of the tangs and angels which, in nature, are algal grazers. Don't overfeed your fish because the excess of metabolic wastes produced by fish that overeat will quickly overload your filter system. Keep the temperature constant at 78° to 80° F. (26° to 27° C.).

The three-spot damselfish (*D. trimaculatus*) is hardy and can occasionally be found inhabiting the tentacles of certain anemones. Photo by G. Wolfshamer.



Frequent water changes will help keep the nitrate level low; even nitrates, the end products of biological degradation, can be toxic if they reach a high concentration. Change ten to twenty-five percent of your water at least once a month, and much more often (weekly) if possible. Water changes also make pH buffering and supplemental trace elements unnecessary.



Algae seems to be a necessity in a marine tank since it provides forage for your grazing species; in addition, it plays an essential role in the nitrogen cycle. The front glass of the aquarium can be kept clean for better viewing, but algae should be allowed to grow on the back or sides of the tank as well as on the coral and rockwork.

To avoid destroying the beneficial bacteria in the gravel, antibiotics should not be used in your tank. If you must use such drugs, and on some occasions there just is no other way to cure certain ailments, use them in a separate treatment tank. Copper and malachite green may be used in the exhibition tank without fear of disturbing the bacteria. When using these medications, however, remove the invertebrates from the tank; copper is toxic to most invertebrates and malachite green seems to have toxic effects on starfish. It is best to check with your dealer if you are uncertain of a particular invertebrate's tolerance to medications.

A final word on filtration: supplemental filters can and should be used on certain occasions, such as when you have a high amount of particulate matter accumulating in your tank. Most of these filters, however, are meant to be used as particulate separators, and usually provide very little biological filtration due to their limited surface exposure. Power filters or other means of mechanical filtration should not replace your biological filter. Rather, they should be used in conjunction with your sub-gravel filter system.

Close adherence to the simple well-tested techniques outlined here will assure you of having a successful first marine aquarium.

Tropical Fish Hobbyist Articles Index 1976

• = Your Fishes Health Column
† = Salts from the Seven Seas Column

Ailments and Treatments

Administration of Antibiotics and Other Remedies in Treatment of Fish Diseases . . . Jan.
Drug Abuse in the Aquarium* . . . Nov.
Hole-in-the-head Disease of Discus Fish* . . . Dec.
A Lernaeocera Copepod of the fire-fish, *Ptereleotris splendida* . . . Jan.
Your Fishes' Health* . . . Oct.

Collecting and Exploring

The Heavenly Paradox: Angelfish Cichlid Eggs . . . Jan.
The Kingdom of the Cardinal Tetra . . . Feb.
The Magnificent Obsession: Discus . . . Mar.
Visit to Malawi . . . Aug.
Collecting Marine Tropicals† . . . June

Management

Artificial Hatching of Mouth Brooding Cichlid Eggs . . . Nov.
Choosing Your Tank . . . Dec.
An Unusual Cause of Fish Deaths . . . June
The Hydrometer† . . . Dec.
The Nitrogen Cycle† . . . Aug.
Plastic Tube Bender . . . Dec.
Prudent Piscean Purchasing . . . Oct.

Foods and Feeding

Culturing Microworms . . . Dec.
White Worm Culture . . . Nov.

Invertebrates

(Marine and Freshwater)

Bloodworms: A Good Fish Food . . . Mar.
Crayfish in Captivity . . . Apr.
Culturing the Glass Worm, *Chaoborus* . . . June
Nudibranchs† . . . Feb.

Plants

Something About *Cryptocoryne* . . . May
Land Plants for Tropical Fishes . . . Dec.
The Java Fern, *Microsorium pteropus* . . . Aug.

Personalities

Misha Fainzilber, The Pride of Tanzania . . . Oct.
The Flying Dutchman and His Annuals . . . Nov.
Meet the Hobbyist—Walter Kolsto . . . July
Meet the Hobbyists—Maurice and Carolyn Meyer . . . Sept.
Meet the Hobbyists—Alois and Sidonia Tham . . . May
Meet the Hobbyist—Lawrence Weiner . . . Dec.

Obituaries

Hermann Meinken . . . Sept.
Robert P.L. Straughan . . . June

Miscellaneous

Articles Index, 1975 . . . Jan.
Editorially—The Federal Zoological Control Board . . . Apr.
Index to *Exotic Tropical Fishes* Supplements . . . Feb.
Index to *Exotic Marine Fishes* Supplements . . . Feb.
Income Tax Effects of Selling Surplus Tropical Fish . . . Sept.
The J.L.B. Smith Institute of Ichthyology, Rhodes University, South Africa . . . Sept.

Marine Fishes

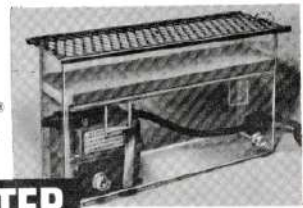
Spawning and Rearing the Blue Devil, *Abudefduf cyaneus* . . . Aug.
Antennarius zebrius, Spawning† . . . Oct.

Continued on page 44
Tropical Fish Hobbyist

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Cichlids

The Albinos Zebra Spawns

by Lawrence A. Weiner



The Wicklerian interpretation of this behavior sequence contends that the female *Pseudotropheus zebra* (left) pecks at the egg dummies on the male's anal fin, at which time the male fertilizes the eggs in the female's mouth. Photo by L. Weiner.

Pseudotropheus zebra, an African cichlid endemic to Lake Malawi, is probably one of the most popular and readily available African cichlids on the market today. It is usually one of the first fish purchased by beginners in the African cichlid hobby. Several different color morphs of *P. zebra* exist in the wild, and in captivity many are being enhanced and some even created by selective breeding. One of

the most striking and possibly the rarest morph is the albino variety.

The albino zebra is not likely to be found very often in nature, since, like most other albino organisms, it is poorly fit. This low fitness level might be the result of poor eyesight, physical anomalies such as fin and spinal defects or even behavioral aberrations, all of which are frequently manifested in organisms carrying an albino mutation. These abnormalities usually, in one way or another, prevent the afflicted individual from competing efficiently with its conspecifics. This is how natural selection operates in the wild to minimize



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the proliferation of deleterious gene mutations. Ironically, the oddity that nature tends to eliminate is the one the breeder wishes to proliferate. In a carefully controlled aquarium, where most environmental stresses, including excessive competition for food and living space, are eliminated by the hobbyist, such poorly fit fish can not only survive well, but can often



The swollen chin pouch of this female *P. zebra* is where the eggs are being incubated. Photo by L. Weiner.

reproduce as well as their normal relatives. This has been the case with a number of albino fishes such as catfishes, barbys, swordtails and now even the discus!

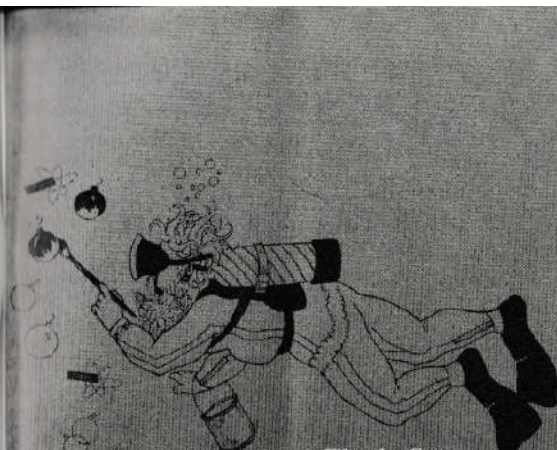
The albino *P. zebra* has been around for several years, but it didn't come into existence, at least for me, until July of 1975, when I found a trio of adults in a Tampa aquarium shop. One female was brooding, and of course the fish were not for sale. I left my name and telephone number with the owner just in case. A few days later I received word that the female

had dropped the eggs and that the fish, assumed to be sterile, were now for sale. Intent on owning them, sterile or not, I bought the trio. The fish, approximately four to five inches in length, were housed in a 20-gallon tank with the usual African cichlid decor of flower pots and rocks, and the water was hard and alkaline. On their second night home I observed my first albino zebra spawning. I was justifiably ecstatic and counted down the minutes until the 21-day brood period was over. After 20 nervewracking days the female released 20 bouncing baby albinos. Obviously, the fish were not sterile! Since then, there have been 20 other spawnings including four from my first offspring.

For the first few spawnings I let the female brood the eggs full term, which ranged from 19 to 22 days. During these periods the female was isolated from the male to prevent unnecessary and harmful harassment. The average length of time between spawnings was 73 days. I subsequently began experimenting with artificial incubation in an effort to decrease the lengthy inter-spawn period. The female was allowed to brood for seven days, after which time I removed the well-developed embryos from the female's buccal pouch and placed them into a floating livebearer breeding trap with a nylon mesh bottom. The female, still isolated from the male, was fed frozen brine shrimp and a good flake food. After three weeks, she was placed back with the male. Spawning usually commenced after one to four days, beginning the cycle once

Continued on page 96

14



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Editorial

As I See It. . .

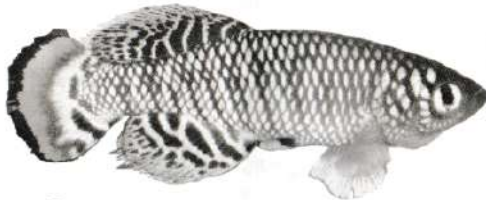
After spending the last five years confined to the linguistic shackles of non-editorializing academia, it is indeed a pleasure to join the team of editorializing and refreshingly interesting TFH Publications. As an aquarium hobbyist of more years than I care to reveal, I have vicariously traveled, explored and learned with Dr. Axelrod. By a stroke of good luck, as it were, I am now kinesthetically enjoying this exciting repast as my occupation. So with no further ado I shall begin my opinionated and hopefully stimulating editorial.

In the recent past TFH has literally stomped up and down and beat their proverbial drums in response to the federal government's many-faceted forms of proposed legislative harassment of the pet industry. Perhaps some of our squawking and your support of same has had its effects in producing a stay of execution of the new proposed amendments to the Lacey Act. The Lacey Act is a set of federal regulations designed mainly (and probably with good intentions) to protect our native species by preventing the potential ecological destruction that could be caused by the release of non-native species into local habitats.

The Department of the Interior (DOI) originally approached this problem by creating a "clean" list that named specific animals that could be imported without concern for environmental damage if they were released. TFH published a complete list of the freshwater fishes that were included on DOI's original "clean" list in the March, 1974 issue of *Tropical Fish Hobbyist*. The pet industry and its legislative supporters felt that the "clean" list was a backwards approach at least partly because enforcement of these regulations would mean that no newly discovered species

Killifish

A Dramatic Reduction of Egg Incubation Time



for the Fire Killie

by Marshall E. Ostrow
Photo by Dr. Herbert R. Axelrod.

Because of its dazzling color pattern the fire killie, *Nothobranchius rachovi*, has long been one of the most talked about annual killifish. When seen in tropical fish shows around the country and particularly at killifish shows, fire killies probably draw more spectators and bring more oohs and ahs than any other species there. In spite of



The male fire killie (above) initiates the spawning sequence by approaching the female from above. Photo by R. Zukal.

the fact that they are so well known, few hobbyists have ever actually owned them. One reason that many annual killifish, including fire killies, have remained absent from the collections of most tropical fish hobbyists is that few people are willing to wait out the six-month egg incubation period in order to see the fruits of their labors.

In the last few years killifish devotees have become more enthusiastic about the annuals because through experimentation they have

developed a way of reducing the prolonged six-month incubation period to about four weeks. It is accepted fact that the eggs of *N. rachovi* as well as those of most other annuals require incubation in peat moss. Apparently the embryos need some particular substance given off by the peat moss to complete their development and to hatch. Some experts believe that the peat moss gives off a hormone that is essential for normal egg development.

The new short incubation technique requires three weeks of water incubation followed by one week of peat moss incubation. Here is how it works. To begin with the fish are spawned over fine silica sand rather than the conventional bed of peat moss. The material that I use is a fine white sand called glass beads. It is the industrial product used in sand-blasting machines to polish metal. It is so fine that it's almost powder-like in consistency. Other people with whom I have recently spoken use a sand called green mari which is not quite as fine as glass beads, and can be purchased from plant nurseries. You can also use the fine sand that is sold for the new sand painting craft, as long as it is colorfast. The color you use doesn't seem to matter too much but you may get better results with a darker color, and in addition, it will make the tiny transparent eggs easier to see. The glass beads are white and to darken them I sprinkle a few particles of finely sifted peat moss over the spawning bed. The darker appearance seems to be more attractive to the fish.



As the ritual continues the male drives the female against the spawning substrate. Photo by R. Zukal.

Place about one centimeter (three-eighths of an inch) of the sand of your choice in a shallow glass or plastic dish about ten centimeters (four inches) in diameter. Slowly lower the dish into the spawning tank (which need not be any larger than eight liters or about two gallons) so as not to stir up the sand. The spawners can then be placed in the tank. With *N. rachovi* several ripe females should be used with one male because the male is a bit rough on the females. Actually this is a good idea with any killifish because you will get a better egg yield. The water should be kept cool (room temperature is

fine) and the pH can be anything from 6.4 to 7.8. Fire killies are very adaptable and will spawn in any water that is within a reasonable range of pH and hardness. The tank should be kept fairly dark since most killifish do not like bright light, and the spawning activities can be observed with a flashlight. If they are ripe, the fish will begin to spawn almost as soon as you drop them into the tank. Spawning will continue until all the females have flat bellies. This can be a matter of a few hours, a few days or one to two weeks, depending upon the condition of the spawners.

Bio-Sorb will never work. Until you try it.

When Dave Grosheim, owner of the Coral Cove Marine Fish Shop, and associate Barry Rosenfeld in Cincinnati, Ohio, first read about Bio-Sorb they threw the literature away.

Having been in the marine fish business for many years and now handling over 2,500 gallons of salt water fish, they felt there was no way Bio-Sorb would do all it claimed.

After all, raising marine fish requires special knowledge, knowledge that comes only after years of working with salt water aquariums.

How could this small package keep ammonia, nitrite and nitrate levels down to a tolerable level and how could it do that without an undergravel filter? No way.

Several weeks later, Dave and Barry were again confronted by this upstart product. This time one of their wholesalers gave them a sample. Still skeptical but willing to try anything once, the fellows set up a 20-gallon tank using the methods outlined in the product's "How To" booklet and package instructions. Twenty-four hours passed and all fish were still alive, then 48-hours passed all was well. This scene took place more than a year ago and all is still well.

Today every new tank that's established at Coral Cove is run on Bio-Sorb, every holding tank is a Bio-Sorb tank. And the former skeptics are now strong Bio-Sorb supporters.

Here's what they have to say about Bio-Sorb.

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If you're one of the skeptics, still left, pick up a package of Bio-Sorb and try it in one of your tanks. You'll never know how easy salt water can be until you use Bio-Sorb. Gilcraft... fresh ideas for water...!

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Once the spawning is complete you can harvest the eggs. Remove the dish from the tank and pour its contents through a fine-meshed fishnet. This, of course, should be done over a bowl of water from the

one centimeter apart. The spacing will help prevent the spread of fungus should a few of the eggs become diseased. The eggs are non-adhesive and can easily be moved apart with a clean tooth-

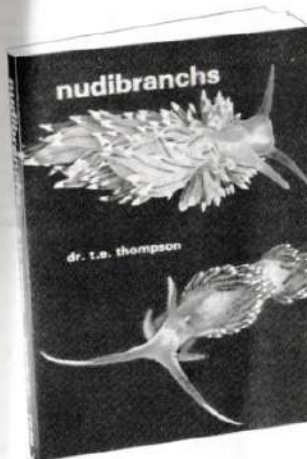


The male nudges the female (below) with his head to position her for the copulatory act. Photo by R. Zukal.

aquarium. Dip the net up and down partially into the water. This will cause all the sand to sift through the net leaving the eggs behind. Now reverse the net into a shallow dish of tank water that has previously been treated by adding four drops of a one percent solution of acriflavine (available at your local pet shop) to a half-liter or about one pint of water. Acriflavine is a disinfectant that inhibits fungal attacks on the eggs. The water in the incubation dish should be about one centimeter deep and the eggs should be placed in the dish about

pick. The dish should be tightly covered to protect the eggs against foreign airborne material and to eliminate evaporation. After four to seven days the eggs should be transferred to another dish set up in the same manner, but without acriflavine in the water. Prolonged exposure to this disinfectant can produce developmental anomalies such as two-headed fish, and after a few days of soaking in this solution the eggs are hard enough to be fungus resistant without the aid of disinfectants.

After two weeks of incubation (including the time in the acriflavine solution) the eyes of the developing embryos can be seen



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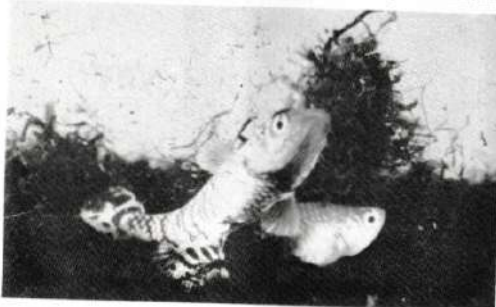
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through the transparent egg membrane. The eggs should remain in the water for about another week until well developed embryos are visible. At this stage the eggs are referred to in the trade as "eyed up." Now they are ready to be transferred to peat moss. Canadian sphagnum moss is the best type to use since no additives are mixed with it. Prior to its use it should be boiled thoroughly and washed clean. Wring as much water out of

Put the bag in a dark warm place such as a desk drawer in a warm room or a box carefully placed near but not directly adjacent to a heat vent, and allow the eggs to incubate for one more week.

Now you can hatch the eggs by dumping the contents of the bag into a bowl or small aquarium containing five or six centimeters (about two inches) of aged water. The eggs should begin to hatch almost immediately. The hatching



Once the female is in position the male (left) drops in beside her tail first. Photo by R. Zukal.

the peat moss as possible then spread it on a clean paper towel. When the peat moss is about as dry as fresh pipe tobacco it is ready to use. Place about one handful in a plastic bag, then using a medicine dropper, drop the eggs one by one into the peat being careful to add as little water as possible to the bag. Seal the bag with a rubber band enclosing as much air as you can.

process can be accelerated by infusing the water with carbon dioxide. This is done by blowing into the water through a straw for about one minute or by dissolving a pinch or two of sugar in the water. The fry will be free-swimming within a few hours and can then be netted or siphoned out and placed in a rearing tank. They are somewhat smaller than the fry of non-annual killifish and should be started on a food that is little smaller than newly hatched brine shrimp nauplii; such a

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food would be infusoria or even microworms. After a few days they can be switched to brine shrimp. *Nothobranchius* fry grow quickly and will begin to spawn in six or eight weeks.

Sometimes the eggs of *N. rachoi* will not all hatch on the first try. You will be able to determine whether they are all hatched if you count the eggs as you put them into the peat moss, then simply count the fry as they hatch. If there is a substantial number of unhatched eggs in the peat moss, drain off the water, redry the peat moss on a paper towel and place it back in the bag for about another week. Then repeat the hatching process. You can actually do this a number of

Finally, side by side, with vents in apposition, a few eggs are laid and fertilized. Photo by H. Zukal.

times until you get a sufficient hatch. However, if the eggs are well developed before they are put in the bag and they are kept warm during incubation (24 to 27°C [76 to 80°F]), repeated drying and soaking should not be necessary.

I have seen the results of this hatching method firsthand and discussed it at length with a number of hobbyists. This shortcut method apparently works on many *Nothobranchius* species and certainly does cut down on the suspense as you wonder for six months whether or not the eggs in your bag of peat moss are still alive. The use of this method should soon make the fire killie as well as many other beautiful African killifish more popular among hobbyists and more readily available as well.

i.f.h.



32

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36

Tropical Fish Hobbyist



Salts From the Seven Seas



Sea Urchins

by Warren E. Burgess

For most divers sea urchins are very familiar animals which, in many cases, should be carefully avoided. For most aquarists the sea urchin is an 'unknown quantity' and is usually passed over for many of the more exotic invertebrates. But they are sometimes offered for sale and for those who are interested in owning one of these creatures, I will try and enlighten them a little.

Sea urchins are echinoderms, that is, they belong to the same phylum as the starfishes and sea cucumbers. They have the calcium plates of the skeleton fused into a rounded structure but with openings for the mouth, anus, madreporite (opening for the hydraulic system which aids in locomotion), and tube feet. The sea urchin is also provided with many spines of various lengths and diameters which serve as protection.

In the wild, sea urchins can be found in sandy and grassy habitats as well as rocky or coral areas.

Both the color pattern and the normal swimming posture of the shrimpfish enable it to be well disguised among the spines of the long-spined black sea urchin. Photo by Pierre Labouie.

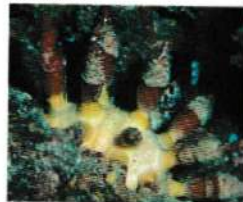
January, 1977

37

This photo shows a sea urchin burrowing into a rock. Most burrowing species secrete a substance that dissolves the rock as they burrow into it. Photo by M. Goto, Marine Life Documents.



Although this photo looks like a flower show exhibition, the "blossoms" are actually defense and cleaning appendages (pedicellariae) on the surface of a *Toxopneustes pileolus*, one of the few toxic sea urchins. Photo by Walter Deas.



Many waders in Florida have discovered their first sea urchin by stepping on one. But the long spined sea urchins of the genus *Diodemna*, which frequent both habitats (but mostly the rocky or coral areas) are the ones to be treated with great respect and to be avoided. Actually this warning is usually not necessary because the appearance of this type of sea

urchin is enough to dissuade the curious. I might add that some of the urchins have spines that seem to be poisonous or at least if they puncture the skin will generally lead to infection. While diving in Florida I was caught by a sudden surge of water and one foot was jammed on to a long-spined black sea urchin. Luckily my flipper provided a great deal of protection but



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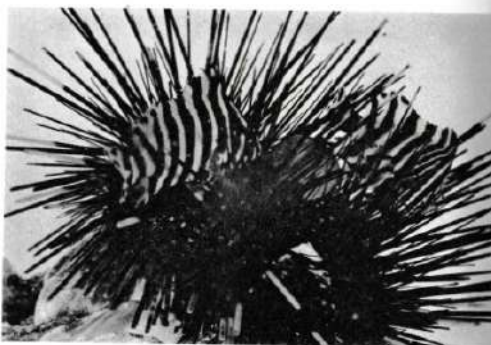
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Epinephelus (Dermatolepis) dermatolepis are quite at home among the spines of this sea urchin. The color pattern of this species is a fine example of the adaptive value of cryptic coloration. Photo by Aaron Norman.

at least nine spines penetrated the rubber and entered the ball of my foot (one of the tougher parts of a foot). After the first jolting pain subsided a little I thought I was finished with it, but shortly the pain again increased to a high level and included most of the leg. My swimming was greatly hampered and I was forced to leave the water. For half an hour the intense pain remained until finally it eased off. Later, a doctor sterilized the wounds but was unable to remove the short pieces of spine that were imbedded in the foot and I was to have small purplish black spots on my foot for about a month until they finally dissolved away. I am very careful around these urchins now.

This protection by the spines is used by many types of fishes. They swim among the spines of the sea urchin when frightened, sometimes almost daring a large predator to try and get them. The shrimpfish (*Aeolisus*) is known for this behavior, several species of cardinalfishes (*Apogon*) and wrasses frequent the sea urchin spines, and even a grouper (*Epinephelus*) makes use of this sort of protection. Young fishes of all varieties can be seen among the spines and I have chased butterflyfishes and angel-fishes in and out of these urchins as well. Small aquarium inhabitants will soon learn that they are protected against the larger bullies among the spines and take refuge there often.

Sea urchins are also provided with fascinating organs called pedicellariae for cleaning debris off the surface of the urchin and for protection as they can move about independently and bite anything that comes within reach. Some



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genera (ex. *Toxopneustes*) are provided with poison sacs at the base of these structures so that the bite from the pedicellariae can be dangerous.

Even with all these protective devices the sea urchins are subject to predation by a variety of crabs, some sea stars and fishes. There are motion pictures of a triggerfish taking a long-spined sea urchin by a spine and (after some difficulty) turning it over to expose the softer underparts which are vulnerable to the strong teeth of the fish. Usually, however, the urchins are found deep in crevices in the rocks with only the sharp spines protruding. Certain urchins can secrete an acid which dissolves away rock so that it can "burrow" into it.

For anyone who is still interested in sea urchins as inhabitants for their aquarium, some species do fairly well. They are browsers and will feed on any green algae

and debris by gnawing away with their teeth (which in some species can also be used to gnaw themselves a hole in a rock). As they move across algal covered rock (or the glass of an aquarium) they leave a trail cleared of algae. The teeth and the muscles which move them form an interesting structure called Aristotle's Lantern.

So for those who are looking for the unusual invertebrate the sea urchin might provide the answer. With plenty of green algae it is relatively easy to keep and long lived. But be careful of the spines and pedicellariae, be prepared for some burrowing in certain species, and be aware of what animals can do them damage. The dealer who regularly keeps sea urchins (and does well with them) should be able to help you select the tank mates and provide more specific information on the type of urchin you select.

(I.F.H.)



The slate pencil sea urchin (*Heterocentrotus triammatus*) is a popular rock-boring species that is usually found in strong surge or rocky surf. Photo by Dr. Herbert R. Axelrod.



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Index: Continued from page 10

Canthigaster: The Sharpnose Puffers Jan.
 On Rearing Marine Tropicals Nov.
Platax: The Batfishes! Jan.
Zanclus cornutus: The Moorish Idol Mar.

Freshwater Fishes
Acantopoma myersi: Spawning Jan.
Amblydoras nascoi Aug.
Aphredoderus sayanus: The Pirate Perch, Nature's Anatomical Wonder July
Apocheilichthys bloeki June
Barbodes schwanenfeldti: Tinfoil Barb—The King of Flash Nov.
 Spawning the Giant Betta, *Betta brederi* Mar.
Betta splendens: The Beta Fish—Some New Directions Dec.
Bryconus (formerly *Aleates*) *longipinnis* July
Capoeta tetrazona, Spawning: The Tiger That Meows Oct.
 Centrarchidae: Something About Sunfish Aug.
Epiplatys olbrechtii Oct.
Gymnocorymbus ternetzi, Spawning the Black Tetra Mar.
Herotilapia multispinosa: The Amazing Rainbow Cichlid Dec.
Hypheosobricon serpaes, Spawning Aug.
Labo frenatus, Spawning Nov.
Lamprologus elongatus—A Spotted Substrate Spawner Sept.
Macropodus opercularis: Courtship and Breeding of the Albino Paradise Fish Nov.
Monodactylus sebae, Spawning Oct.
Mystus vittatus Apr.
Nothobranchius korthausae, Spawning Apr.
Parosphromenus deisneri, Spawning

..... May
Potamotrygon laticeps, Breeding July
Pseudorasbora niger: One of the Weird Ones June
Pterophyllum: Unexplained Angelfish Breeding Failures May
Puntius everetti, The Clown Barb Apr.
Puntius stoliczkae, Spawning July
 Rivulinae: Confessions of an Annual Killifish Addict Nov.
Symphysodon: New Colors and Color Combinations in Discus Feb.
Symphysodon: Albino Discus: A Startling New Reality Oct.
Trematocecus jacobfreibergi Apr.
Tropheus moorii: Moorily We Roll Along July
Xenotoca canalis: Spawning the Silver Needlefish Aug.

Ichthyology (New Species; Biological Phenomena)
 Distinguishing Juvenile Angelfish I? Apr.
 Distinguishing Juvenile Angelfish II? May
Betta imbellis: A New *Betta* Species Feb.
 Unique Characid Has Strange Spawning Modification May
Centromochlus Species, The Jaguar Catfish Mar.
Corydoras gracilis: A New Callichthyid Catfish From Brazil Sept.
Cyrtopoma axelrodi, A New Species of Mbuna From Lake Malawi (Pisces: Cichlidae) Oct.
 A New Approach to the Old Problem of Fish Classification: Electrophoretic Studies of *Betta* July
 Two New Species of Mbuna (Rock-Dwelling Cichlids) From Lake Malawi Mar.
 A New *Melanochromis* From Lake Malawi, With Comments on the Genus Feb.

Population Variations in Marine Species? July
 Proper Association of Juvenile Stages With Their Adults? Sept.
Pseudotropheus aurora, A New Species of Cichlid Fish From Lake Malawi May
Pseudotropheus laeticoela: A New Shovel-Dwelling Cichlid From Lake Malawi and its Inquiline Catfish Sept.
Pterophyllum: The Rio Negro Angelfishes Jan.
Rasbora axelrodi, A New Cyprinid From Indonesia Dec.
Rasbora brittani, A New Species of Cyprinid Fish From the Malay Peninsula Feb.
 Releasing Spawning in Fishes Apr.
 Spawning Patterns of Lake Tanganyika Cichlids June
 Taxonomic Techniques? Nov.

Exotic Tropical Fish Supplements (1976)
Eretmodus cyanostictus (#226) Jan.
Cyphotilapia frontosa (#227) Feb.
Priatherina weberi (#228) Mar.
Halophryne trispinosa (#229) Mar.
Gonyochromis mento (#230) Apr.
Julidochromis regani (#231) May
Julidochromis transcriptus (#232) May
Hoplochromis polytipima (#233) June
Linnochromis auratus (#234) July
Melanochromis johanni (#235) Aug.
Pterolebias longipinnis (#236) Sept.
Lamprologus elongatus (#237) Oct.
Pinarumpia pirinampa (#238) Oct.
Aulonocara nyassae (#239) Nov.
Cichlasoma volvini (#240) Dec.
Bolophrichthys pectinirostris (#241) Dec.

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48

Tropical Fish Hobbyist

Your
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'ICH'

by Dr. Mark P. Dulin

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Yes, there has been a lot written about "Ich," and rightfully so, for Ich is undoubtedly the most commonly diagnosed parasitic disease of freshwater tropical fishes. *Ichthyophthirius multifiliis* was first described in 1876; since that time the disease has been reported in a multitude of freshwater species. Epizootics are most common in captive fishes (both in aquariums and commercial fish farms); however, the disease also occurs in ponds, rivers and reservoirs.

PREVENTION

This ciliated protozoan is an obligate parasite of fishes. The mature organism survives only by feeding on the epithelial cells and tissue fluids of fish; it cannot survive long periods of host deprivation. Although the encysted stage can survive for a month in cold water (50° F.), the developing and infective stages can only survive a few days of host deprivation in warm waters (above 72° F.). This is really the basis for quarantining all non-fish specimens (such as plants or invertebrates) before placing them in your exhibition tank. If these organisms harbor either the encysted developing stage or the free-swimming infec-

tive stage, they will become free of this protozoan within a week if there are no fish available for them to attack.

It goes without saying that you should quarantine all of your newly acquired fishes; not just for Ich prevention but for many other diseases as well. It's just good aquarium management to quarantine new specimens and observe them closely for signs of disease. In the case of Ich, the signs of disease are usually obvious—I say usually because fish that have survived an outbreak of Ich can become immune and harbor the parasite without having any readily visible lesions. In these rare cases, a quarantine may not be sufficient to prevent Ich but these immune yet infected fish are uncommon—in the majority of cases, you can detect diseased fish during this seven to ten day quarantine period.

SIGNS OF DISEASE

If *Ichthyophthirius multifiliis* does gain entrance into your aquarium the "swarmers" bore into the epidermis or gill epithelium causing severe irritation accompanied by an excess secretion of mucus and hyperplasia (enlargement) of the epithelium. Affected fish may scratch the opercle on aquarium objects, have bizarre swimming behavior (flashing), show loss of appetite, become anemic and show signs of respiratory distress (rapid breathing, gasping etc.). Usually, small white pustules are produced where the parasite is located; however, in some instances, affected fish die before the characteristic white spots appear.

DIAGNOSIS

A presumptive diagnosis can be made based upon the rapid development of those characteristic signs of disease as mentioned

January, 1977

57

'ICH' Life Cycle



1 Each spot contains a protozoan parasite that is actively feeding on the tissue fluids and epithelial cells of the fish.



2 After a few days of feeding and maturation the parasite falls from the fish to undergo reproduction. Notice the characteristic horseshoe-shaped macronucleus.



3 Within 24 hours, hundreds of infective organisms are produced. These will soon erupt from this gelatinous capsule as swarmers.



4 Highly motile swarmers generally only have a few days to attach to a fish or they will die. Their longevity is occasionally prolonged if they undergo conjugation (a form of sexual reproduction in lower organisms).

above. A confirmatory diagnosis is based upon the microscopic observation of highly motile ciliated protozoans with typical *Ichthyophthirius* morphology from lesion scrapings (wet-mount preparations).

TREATMENT

Over seventy different agents have been tested for their therapeutic value in the treatment of Ich (2). This list includes everything from pine needles and lilac leaves to pesticides and antibiotics. One of the best treatments for labyrinth fishes such as gouramis and bettas is to raise the water temperature to 90° F. (32° C.) for five days. This will cure the disease if the species can survive this high temperature and consequent low dissolved oxygen level. Stressing an already sick *non-labyrinth* fish by raising the temperature to this level is not advisable.

There are many chemical formulations commercially available for the treatment of ich; perhaps your local pet store can be of assistance in selecting a quality product. I personally favor those products containing malachite green as opposed to those containing methylene blue. Both are probably equally effective in killing the free-swimming stages but a single therapeutic dose of methylene blue (5 mg./liter) stops nitrification for sixteen days (1), and this can result in the accumulation of toxic levels of metabolic wastes. Methylene blue can also have an adverse effect on aquarium plants. On the other hand, therapeutic levels of malachite green (0.16 mg./liter) have no effect on the beneficial bacterial flora in the aquarium when given every other day for a total of three applications (1).

When using any commercial formulation be sure to read the

manufacturer's recommendations and remember that these chemicals have no effect on those parasites embedded in the skin. Because they only kill the free-swimming stages, therapeutic levels must be maintained for five to seven days depending on the water temperature. If the temperature is only 77° F. (25° C.) then seven days of chemical treatment are required.

Wishing you a Happy Holiday Season and an Ich free 1977.

Marshall Rubin

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Help Support Research

Additional research efforts are urgently needed in the area of tropical fish diseases. The aquarium industry has much to gain by providing financial support to academic institutions. Persons interested in supporting tropical fish research at the University of Idaho's new fish disease laboratory are urged to contact:

Dr. George (Bill) Klontz
Department of Fishery Resources
College of Forestry, Wildlife and
Range Sciences
University of Idaho
Moscow, Idaho 83843
208-885-6336

You Too Can Be An Article Writer

by Frederick J. Kerr

It would be a gross misstatement to say that any aquarist can write an article, but it would be even worse to say that only a few can. There can be no doubt that many aquarists are capable of writing articles which are not only informative but also entertaining. The chances are very good that you could write an article which would be accepted for publication. The task is not as difficult as you might think.

Article writing is usually started in one of two ways; either the aquarist has something to say that he feels other aquarists should know about or the aquarist simply would like to write an article about something. Either reason is a perfectly good one for starting an article and both have produced good articles.

CHOOSING A TOPIC

Selecting the topic is one of the most important steps in article writing. If you have had an experience breeding a new fish or found a new way to breed an old standby, chances are very good that other aquarists would enjoy reading about it. Articles about very new and rare species are good even if you have not succeeded in breeding

them, because other aquarists are interested in merely knowing how to keep such species.

The standard fishes tend to inspire a rather standard type of article. Because of this, it is difficult to make these articles interesting and unless the aquarist specializes in these species, he is well advised to leave this type of article to more experienced writers.

When there is doubt as to whether a topic will "go," the aquarist should consider if he has seen similar articles in aquarium publications. If he has not, he should think about his topic very carefully before expending the time and effort necessary to write an article. It is wise when considering a doubtful subject to write a letter to the editor briefly outlining the topic. Editors are very helpful people in this line and can easily inform the writer of the potentialities of a given topic.

PLANNING THE ARTICLE

Once a topic has been settled on, the aquarist-author faces the problem of creating the article on paper. Many authors find it extremely helpful to make a preliminary plan. First they list all the facts they will include in the arti-

cle, and then they group them into logical sets. The best order for presenting these sets is then determined, and at this point the author is ready to make sentences and paragraphs. It should not be thought that the preliminary plan cannot be changed. The plan is only a starting point and should be changed as the needs of the article become apparent.

THE ROUGH DRAFT

After a rough outline is prepared, the author is ready to start making sentences. Some authors do this in longhand. Others prefer to use a typewriter. Both methods are fine, and which one is selected depends on the author's personal feeling as to which method produces a maximum flow of words with a minimum of effort.

The key to the rough draft is to write as fast as the words come to you. Don't worry about such things as spelling, punctuation, or even if you are writing complete sentences. All that can be repaired later. Many authors even invent their own abbreviations to make the original composing go faster.

THE FIRST REVISION

After the rough draft is completed, revising begins. The secret of revising is to work from the largest item to the smallest. In other words, from the arrangement of the paragraphs, to the arrangement of the sentences within the paragraphs, to the arrangement of words within the sentences. Spelling, punctuation and capitalization can wait until still later.

Revising paragraph arrangement is usually necessary, because

in the course of writing the rough draft, related ideas become separated. If the article is to have organization, these ideas must be united. This can be done by drawing arrows to show where improperly placed paragraphs should be placed when the final copy is made. If you write on only one side of the paper, it is then possible to do this type of revision very rapidly with the aid of scissors and tape. Be on the lookout for paragraphs which have little or nothing to do with the topic at hand. These paragraphs may be inspired prose, but a paragraph on guppies in an article on bettas is clearly out of place.

After the author is satisfied with the arrangement of the paragraphs and has discarded any which are off the topic, he is ready to consider the arrangement of sentences within each paragraph. It is especially important to see that the sentences are in a logical order and do not jump from one aspect of the topic to another at random. For example, it would not do to talk about the color of the dorsal fin in one sentence, the shape of the anal in the next, the color of the anal in the next, and the shape of the dorsal in the last. Again, be sure each sentence sticks to the subject of the paragraph. If a sentence does not, the author must either find another paragraph in which to fit the sentence logically, or it must be discarded.

After this has been done for all the sentences in all the paragraphs, the author should be sure that everything he has ended with a period, question mark or exclamation point is really a sentence. In

the course of writing rapidly it is extremely easy to put down phrases and clauses which are not complete thoughts. These are easily eliminated by a simple test. Ask yourself: "If this tentative sentence were written alone on a piece of paper, would it be a complete thought?" If the answer is no, you have a fragment which must be provided with either a subject or a verb, or it must be added to one of the other sentences in the paragraph. There are many other stylistic problems with sentences which are beyond the scope of this type of article. The editor will usually find and correct these errors, but the fastidious author may wish to brush up on these in a composition book and eliminate them himself. There can be no doubt that the less work you leave for the editor, the more likely you are to sell your article and the more money you are likely to receive for it.

The aquarist-author is now ready to consider each word in each sentence. This is where it is a good idea to read the manuscript out loud to yourself. The ear is often quicker than the eye to pick up bad word combinations. Reading aloud also helps call attention to words which are needlessly repeated and to point out pronouns which should be replaced with nouns. Beware of and eliminate words which add no meaning to the sentence.

When the author has done this, he has completed his second draft. Up to this point he still has not corrected punctuation, capitalization or spelling, but this can wait still longer. At this point it is best to put

the article aside, the longer the better. This period of time will make the author more objective about his article, and he will be able to find more errors when he starts to work again. One day is an absolute minimum for this.

THE SECOND REVISION

The second rewrite is essentially like the first, but there is, naturally, less to do if the first rewrite has been effective. It is now that spelling is checked and capitalization is made consistent. Commas, especially if you do not write regularly, are always a problem. Those you are not sure of are best left to the editor after you have taken care of the periods, question marks and exclamation points.

It is now time to see if you need to add an introductory sentence or paragraph. Some writers have a natural tendency to start an article with a suitable introduction without giving it much thought; others do not. For the latter group this is the time to work on this most important part of the article. The introduction can do either or both of two things: it can stimulate the readers' interest, or it can inform them as to what the article will be about. Most topics the aquarist will write about will have built-in interest for fellow aquarists, and simply indicating what the article is to cover is ample to stimulate interest. There are topics, however, in which the aquarist is less interested, and if the article is to be a success, the introduction must catch the readers' interest. In the course of planning an article on scientific names ("Why Scientific Names?" TFFH, July 1967), I knew it would be

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SYMPTOMS: Fish lose normal color, scratch against gravel or stationary objects, and appear sprinkled with golden-tan powder.
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GENERAL CURE: FUNGUS CURE.

FIN AND TAIL ROT
SYMPTOMS: Fins are usually folded or closed.
Fungal: Fins rot evenly and have an appearance of white edging.
Bacterial: Fins rot unevenly and have a very ragged appearance.
RECOMMENDED TREATMENT: FUNGUS CURE.
GENERAL CURE: FUNGUS CURE.

NOTE: Fungal rot and bacterial rot are often seen together on the same fish, in which case the recommended treatment is a combination of FUNGUS CURE and T.C. CAPSULES.

BACTERIAL HEMORRHAGIC SEPTICEMIA
SYMPTOMS: Good tanks without sign of skin damage show a problem as blood oozes in the fins.
RECOMMENDED TREATMENT: T.C. CAPSULES or E.M. TABLETS or FUNAN-2.
GENERAL CURE: FUNGUS CURE.

COTTON MOUTH DISEASE
SYMPTOMS: Appears as a soft, white cotton or white discoloration on the mouth, often associated with white patches on other parts of the body.
RECOMMENDED TREATMENT: T.C. CAPSULES or E.M. TABLETS or FUNAN-2.

NOTE: A similar disease, Red Sore, may appear on the sides of discus fish, in which case the recommended treatment is E.M. TABLETS.

BACTERIAL BODY SLIME AND EYE CLOUD
SYMPTOMS: Milky white patches on the body or a white haze over the eye.
RECOMMENDED TREATMENT: T.C. CAPSULES or E.M. TABLETS or FUNAN-2.

ICHTHOPHTHIRIUS ('ICK')
SYMPTOMS: A few or many raised white spots, the size of pinpoints, on the body or on stationary objects.
RECOMMENDED TREATMENT: FUNGUS CURE.

FUNGUS
SYMPTOMS: Open red sores (ulcers), which sometimes appear as small raised lumps.
RECOMMENDED TREATMENT: T.C. CAPSULES or E.M. TABLETS or FUNAN-2.

NOTE: A similar disease, Red Sore, may appear on the sides of discus fish, in which case the recommended treatment is E.M. TABLETS.

NOTE: The illustrations on the reverse side of this page were rendered by our expert staff from actual photos of disease descriptions.

HOBBYISTS—Clip out and save this valuable free chart... additional information on reverse side

necessary to overcome the lack of professional looking manuscripts. The typewritten page should have a half of margin in not too much. The lines should be double spaced so that the editor can make corrections to scientific names. This name is long, hard to pronounce, impossible to remember, and meaningless to most of us. Thus, by apparently agreeing with the reader who is hostile to scientific names, I hoped to catch his interest.

A conclusion is necessary on the other end of the article. It usually needs to be only a single sentence, but all times a paragraph is necessary. To test whether or not your first sentence or paragraph is sufficient as a conclusion, simply ask yourself whether your reader would know that the article is the end of the matter. If your reader would have to turn the page to be sure, you need to add something. High school students often solve this problem by putting "The End" at the bottom of every page, but this is considered very unsophisticated by professional writers. With a little thought the author can easily write a good concluding sentence.

Now the manuscript should be ready to prepare for the editor. If at all possible it should be typewritten. If handwritten manuscripts are sent, the editor will have to edit and send to the printer. You always stand a better chance of making a sale when you submit a manuscript that has been typed and edited. Even if the article is not extensive, he may decide that revision is necessary. If the revision is not extensive, he may do it himself after purchasing the article. If extensive changes are needed, he

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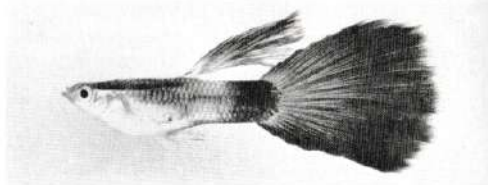
Livebearers

The Elusive Fancy Guppy

The fancy show guppy is one of the real challenges in today's aquarium hobby. Over the years, through the cooperative efforts of thousands of guppy breeders, today's guppies have reached a state of fin and color development that is second to none for beauty and variety. We now have guppies with tails over an inch wide, males reaching the size of yesterday's females.

If you don't belong to a guppy society you may think I am stretching the truth. The problem is that you have been looking in the wrong places. At one time or another I have visited most of the tropical fish shops in the Los Angeles area; in fact I regularly visit some of them. The probability of seeing very many exceptionally fancy guppies in these shops is indeed

Because their generation time is only about three months, new strains of guppies having new fin shapes and more dazzling color patterns can easily and quickly be developed. Photo credits: upper left, upper right and lower right by Midge Hill; center left by Dr. K. Knaack; lower left by A. Nozhov; center right by H. Hansen.



Solid fin colors can be developed as easily as regular spotted patterns in guppies by selectively culling one's

stock. Upper photo by Dr. Herbert R. Axelrod; lower photo by Dr. E. Schmidt.

slim, for they are expensive and a bit more difficult to handle than their less fancy brethren. For the exceptional guppies you will have to go to guppy societies. There you will learn who is raising what and how they do it.

You may wonder why anyone would want to go to so much trouble for such an elusive fish. The answer seems to lie not in the large fancy finnage or gorgeous color patterns, but in the fact that the guppy can be genetically altered and thus changed in appearance more easily and quickly than any other species of ornamental fish. The possibilities for color, size

and fin shape are limited only by the boundaries of your imagination. A guppy breeder can express his individuality by creating his own strain and fashioning it to his own specifications. If the breeder wants to compete with others he will probably breed for wide or delta tails approximating an equilateral triangle, and if he achieves some success he will make it his business to find out what other guppy breeders are doing.

No other fish has had so many societies formed for it or shows given for it than the fancy guppy. There is even an international guppy competition. The excite-

Mail Call



by Marshall E. Ostrow

If you have an aquarium question that you would like to have answered, send it to MAIL CALL. Letters containing questions of course cannot be acknowledged or answered personally, but each month a number of the most interesting questions and their answers will be published in this column. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., P.O. Box 27, Neptune City, New Jersey 07752. Please do not combine MAIL CALL questions with correspondence about subscriptions or book orders.

Acidic Water

Q. I have a 30-gallon aquarium that is filtered by an outside power filter. About six months ago I started to notice a severe pH drop in the tank. Within two weeks of making chemical adjustments the pH dropped right back down to 4.8. This condition seems to persist in spite of many chemical adjustments. Nothing has been changed in this tank since it was set up a year ago. How can I control this situation?

Peter D'Arrigo, Jr.
Fall River, Mass.

A. There are several causes for the acidification that you describe and they all revolve around organic decomposi-

tion. When organic matter such as uneaten food, fish droppings or dead fish decay in the aquarium, carbon dioxide is one of the byproducts of that decomposition. Carbon dioxide combines with hydrogen in such a way that an excess of carbonic acid results. Carbon dioxide does not leave the water very easily and only does so at the water-air interface. In order to relieve your tank of its excess carbon dioxide it is necessary to have strong water movement at the surface. Directing the filter outflow across the surface rather than down into the water might help. In addition, an airstone placed in the corner opposite the filter will help.



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Frequent water changes are another big factor in stabilizing the water chemistry in a closed system. One-fourth to one-third of the water in your tank should be changed weekly if possible. You can do this more often for a few weeks until the situation is corrected, then regular water changes should hold the pH at a fairly constant level.

Close Shave

Q. I own a large *Corydoras* genus that has been with me for about four years. Recently all the fish's whiskers fell off. The fish has no problem finding food and seems to be doing fine. I would like to know what caused this and if the whiskers will grow back. I would also like to know if four years is a long life for a fish in an aquarium.

Kenneth Chu
Spring Valley, N.Y.

A. The loss of barbels is a common problem among *Corydoras* species. This may be due to the fact that they are almost constantly digging through the gravel in search of bits of food, and if the gravel is too coarse its barbels can easily be injured.

If the fish load in your tank is too heavy or the feeding is too heavy the bacteria in the gravel bed may not be sufficient. This condition causes an accumulation of decaying matter on the bottom making the bottom an ideal place for fungi to proliferate. Since the catfish's barbels are usually on the bottom, they are subject to attack by these fungi.

We recommend that you use a stronger filtering system and use a finer, smoother gravel on the bottom. With these precautions, your catfish's barbels may grow back if they are not too severely shortened.

The aquarium lifespan of fishes varies in different species and is often directly related to the aquarium condi-



The female *Corydoras sensus* can easily be distinguished from the male by her stouter body. Here she is laying eggs on the aquarium glass. Photo by R. Zukal.

tions provided by the aquarist. It is difficult to say what the expected longevity for *Corydoras* species should be, although four years is not at all unusual.

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Jaws He Isn't

Q. I recently bought what was called an iridescent shark but haven't been able to find out much about this fish. What are the best water conditions for it and how well will it do in a 55-gallon community tank?

Joe Spaniolo
Muskegon, Michigan

A. The iridescent shark (*Pangasius sutchi*) is, of course, not a shark at all, but derives its name from its shark-like appearance and reflective coloration. It is a schooling fish that is native to the Malay Peninsula. It is fairly peaceful with fish its own size, and in a large tank it can grow to over ten inches. It is not particularly picky as to water conditions or food. Be advised, however, that it is a gluttonous eater, and care should be taken to see that it does not overeat or it will become very lethargic.

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tunity to expound upon his favorite subject. He wants to have you as a customer and will do everything in his power to see that you are correctly advised as to which species will do well together in the same community aquarium. There are, of course, exceptions, as there are in any business, but the great majority of pet dealers will help you and work with you in any way they can.

Chicken-hearted Bettas

Q. I would like to ask a question that has intrigued me for a long time. If male bettas instinctively fight when they see one another, what goes on in the wild? I have seen, during a visit to Indonesia, ten-gallon aquariums containing about 20 male bettas who merely threatened each other, then swam away without bloodshed. Any explanation?

Didi Chadran
Arlington, Virginia



Two male *Betta splendens* engage in a battle. The male on the left flares out his operculum as part of the agonistic ritual. Photo by G. Timmerman.

A. The Siamese fighting fish, *Betta splendens*, has been selectively bred by aquarists around the world for many years, and Oriental aquarists originally selected them for their pugilistic ability. Through genetic selection, the fighting instinct became so well fixed that fighting matches between

male bettas became a gaming sport in many of these Asiatic countries. In western cultures bettas were selected for color and finnage, but the stock from which these strains were bred probably originally came from the fighting stock of the Orientals since the color of these Oriental strains was already somewhat enhanced over wild bettas. In other words, the instinct for fighting in domesticated bettas is much stronger than it is in wild bettas.

In the wild, of course, even if the fighting instinct was as strong as it is in domestic strains, environmental conditions are considerably different than they are in a small bowl or aquarium. In the wild, if a dominant male threatens a submissive male, the submissive male has a place to flee. In the aquarium the submissive male has no choice but to stand his ground and fight, for where can he go?

There are several possible explanations for the betta behavior that you observed in Indonesia. A distinct possibility is that the dealer could have had them dropped in order to save space and keep them together rather than keep each one in a separate bowl. This is practiced by some exporters who

ship large quantities of aggressive species and saves considerable amounts of money in shipping costs. The hobbyist can benefit directly from this saving. Another possibility is that what you saw were wild bettas which do not have such a strong fighting instinct. A third possibility is that the fish you saw were immature specimens. Young bettas do not fight as readily as adults.

Clowning Around

Q. I would like to have some information on the black clownfish (*Amphiprion sebae*) such as its origin, feeding habits and whether or not it will go well with an anemone.

Bob Judd
Playas, New Mexico

A. We assume that you want this information because you believe that you have an *Amphiprion sebae*. This species, however, is rarely imported, probably because its natural range is restricted to the northern Indian Ocean. A clarkii, which is almost identical in appearance to *A. sebae*, is probably what you have. The range of *A. clarkii* extends from the east coast of Africa eastward to the central Pacific

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Amphiprion species are members of a large group of fishes that are collectively known as anemonefishes because of their propensity for dwelling among the tentacles of anemones. Photo by G. Budich.

Ocean and southward to Australia. This fish is frequently imported and sold as the black clownfish.

Volumes have been written about the interesting mutualistic relationship between Amphiprion species and anemones. Even in the aquarium this relationship is quickly established.

Most Amphiprion species are hardy, gregarious fish that easily adapt to a variety of live, frozen and prepared foods. In the aquarium they will do quite well without the presence of

an anemone but should be given a choice of shelters such as treated coral, rocks or shells.

You can find more complete information on this and many other anemone-dwelling fishes in the TFH publication, Anemonefishes, by Dr. Gerald R. Allen. This book is available at most tropical fish shops.

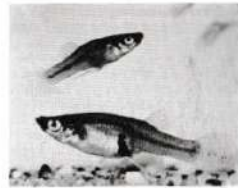
Mad Marauding Minnows

Q. I would like some information on maintaining and breeding *Gambusia* minnows. I would also like to know how to sex *Taricha granulosa*, the rough-skinned newt.

Willow Munger
San Francisco, California

A. Much has been written about fishes of the genus *Gambusia* with respect to their voracious appetite for mosquitoes, hence the common name mosquito fish. In addition to wiping out any mosquitoes they encounter, they are also known for their propensity for doing the same thing to their tankmates when placed in a community aquarium. They are aggressive, pugnacious and are definitely not an asset to a community tank.

Since *Gambusia* are found in subtropical and temperate regions, they are highly tolerant of a variety of



Gambusia affinis, a Mexican livebearer is found as far north as the tributaries of the Rio Grande River in Texas. Photo by G. Timmerman.

water conditions with respect to temperature, pH and hardness. In addition to feeding on mosquitoes, they easily adapt to a varied assortment of live, fresh and prepared foods.


Gambusia are viviparous species; that is, the males have a gonopodium, they engage in internal fertilization, and the females bear live young. Breeding them simply involves placing the sexes together, preferably with several females for each male due to the male's aggressive driving of the females, and patiently waiting out the gestation period which is usually about four weeks. The gestation period can vary with water conditions and feeding.

With reference to the rough-skinned newt, *Taricha granulosa*, it is essentially a terrestrial species found on the coastal plains of California northward to British Columbia. Like all amphibians, evolution has not completely freed *T. granulosa* from the watery environment, therefore, even though they are terrestrial, they must return to water, their skin becomes smoother and more vascularized to aid aquatic respiration. Throughout the year the male is a bit larger than the female and has a larger, longer vent. During the spring breeding season the male's vent becomes swollen and protuberant, and the soles of its feet as well as the posterior surface of its knee joints become a deep brown color.

Club Notices Welcome

TFH will continue its long-standing policy of printing, without charge, notices of coming events that are of interest to our readers. Such notices include fish shows, conventions, and special club meetings, all of which will be printed on an as-space-available basis. Notices should be typed and mailed to Marshall E. Ostrow, Articles Editor, at least two months before the scheduled date of the event.

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January, 1977

81



The mature male *Apistogramma ramirezi* (front) can be distinguished from the female by the long second dorsal spine. Photo by R. Zukal.

A Dwarf Community

Q. I am thinking of setting up an aquarium for dwarf cichlids. This aquarium would contain pairs of *Apistogramma agassizi*, *A. ramirezi*, *Pelvicachromis pulcher* (kribensis) and *Haplochromis strigatus* (Egyptian mouthbreeder). What would be the minimum size tank for this group of fish? Would they get along with each other? Are they territorial like the larger cichlids? Would they spawn in this community?

Janice Constable
Bloomington, Indiana

A. All of the fish you mentioned are territorial and would require plenty of room so that their territories have little overlap. No matter how much room you give them you may have some problems, however, since the two African species you have chosen (kribensis and mouthbreeders) are considerably more aggressive than the Apistogram-



Pelvicachromis pulcher (formerly *Pelmatochromis kribensis*) is a territorial fish. Here a female attempts to chase another intruding female away. Photo by R. Zukal.

ma species. The larger your tank, the greater are your chances of success. With plenty of shelters, you may be able to keep them together, but you may have difficulty getting some of them to breed. For maximum success, we recommend that you spawn each pair in a separate tank.

Apistogramma agassizi usually spawns in enclosed shelters. Here the female (upside down) is depositing her eggs on the roof of a coconut shell cave while the male waits in position to fertilize them. Photo by R. Zukal.



Crossing Guppies

Q. I have some guppies that are, in my opinion, rather striking. Do you know of any guppy shows I can enter them in? Also, do you know if a guppy can be crossed with a swordtail?

Don Adams
Springfield, Illinois

A. We have received several reports of guppies being crossed with swordtails but the hopeful hobbyists generally had poor results. These fish, *Poecilia reticulata* and *Xiphophorus helleri*, are two different species. Their physiological, genetic and morphological differences are what make them separate species. Even if you were to produce viable offspring, the genetic incompatibility of their parents would probably render them sterile.

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January, 1977

83

Spawning the Earth-eater

Q. I have just had a successful spawning of *Geophagus jurupari* in a 55-gallon community aquarium at a temperature of 75° F. and a pH of 6.8. Immediately after the male picked up the eggs, I put a divider in the tank to separate him from the other fish, and when the fry reached one-quarter of an inch in size I installed a filter siphon on their side of the divider. I would like to spawn these fish again but I need more information. How often will these fish spawn? When they do spawn again can I move the male who is carrying the eggs in his mouth to a separate tank? Should I have a filter going all the time in this tank or wait until the fry are large enough not to get sucked into the filter?

Ralph H. Libby
Rome, N.Y.



Geophagus jurupari. Photo by Dr. Otto Kloas.

A. *G. jurupari* is a tropical species, so its spawning rhythm is not necessarily seasonal. Parent fish can spawn again within a relatively short time after a spawning, because in their case their readiness to spawn is more dependent on their general good health than on a specific seasonal factor such as length of the daylight period. In this species it is usually the female that broods the eggs, although in some instances both female and male share the brooding duties. *G. jurupari* is what is called a "delayed" mouthbrooder, because the eggs are not picked up until a day or so after they are laid.

Moving a brooding *G. jurupari* is very likely to cause it to eat the

eggs or fry. It would be best to breed your *jurupari* in a separate tank so that they won't have to be moved.

It is a good idea to have some sort of filtration running in the tank all the time, and especially because of the heavy feeding necessary to successfully raise the fry. You can solve the problem of fry getting sucked into the filter by using an inside box filter and leaving the lid off. If fry swim into the filter they are free to swim back out. This method has the added advantage of allowing the fry to eat any brine shrimp or other food that settles on the filter floes.

Overseas Hobbyist Specialty Groups

For those hobbyists interested in finding out what hobbyists are doing in other countries, here are the addresses of several more overseas specialty clubs which can be added to the partial list published in last month's issue:

Deutsche Killifisch Gemeinschaft e. V.
(German Killifish Association)
Mr. D. Gandert
Wilhelm-Holzmeier-Strasse 4
2800 Bremen 61, Germany

British Discus Association
F.W. Ashworth
41 Pengwern, Llanelgollen
Denbighshire, N. Wales

American Specialty Organizations

If you are interested in joining any of the following specialty organizations, send a stamped, self-addressed envelope with your inquiry to the person indicated.

North American Native Fish Assoc.

Harry Abrams, Jr.
RR 1, Box 76
Greenwood, Indiana 46142

Goldfish Society of America

Centre LoCoCo
748 Broadway E.
Seattle, Wa. 98102

American Livebearer Assoc.

John Bury
512 So. 12th St.
Clear Lake, Iowa 50426

American Killifish Assoc.

c/o The Sellers
1908 Bryan Road
Brandon, Fl. 33811

American Catfish & Loach Assoc.

Joe Vitale
3840 N.W. 3rd Terrace
Pompano Beach, Fl. 33064

International Betta Assoc.

John Stanton
7021 Plantation Blvd.
Miramar, Fl. 33023

International Fancy Guppy Assoc.

9905 Candia Drive
Whittier, Ca. 90603

Federation of American Aquarium Societies

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Sexing Labeos

Q. In the November 1976 edition of *Tropical Fish Hobbyist* you have an article about *Labeo frenatus* in which you explain how they spawn. Some pet dealers with whom I have spoken say that it is impossible to spawn *Labeo* species in the aquarium. Can you please tell me how to sex *Labeo bicolor* and *L. frenatus*?

Deigo Vilas
Chicago, Illinois

A. We have in our files a number of accounts of the spawning of *L. bicolor*. Not only can *Labeo* species be spawned in the aquarium, but apparently a number of hobbyists are spawning them.

Like many of the cyprinodonts, there are few external morphological differences between the sexes. The best way to assure yourself of having a



The red-tailed shark, *Labeo bicolor*, is the most popular member of this interesting group of Asiatic cyprinids. A number of captive spawnings of this colorful fish have been reported. Photo by G. Serfitt.

sexed pair of labeos is to buy perhaps six young specimens at a time and let nature take its course. When they reach sexual maturity, the females are usually stouter through the abdominal area, and the males become more aggressive as they begin to drive the females.

Spawning Lionfish

Q. I am enclosing a slide of the *Pterois volitans* that recently spawned in a tank in my shop. Could you tell me if lionfish have ever spawned in captivity and is there any way of sexing them? According to the expert marine aquarists that I've encountered no volitans has ever spawned in captivity.

No male was present with my lionfish, so most people who I've related this experience to assumed that maybe she did not need one, however, all the eggs fungused by the fourteenth day. We are now going to try her with a male. This would be much easier if we knew how to sex them. We hope you can oblige with any information on this matter.

John S. Gilpin
West Yorkshire, England

A. We concur with your experts in that we too have never heard any reports of lionfish spawning in captivity, but we don't agree that a female can produce fertile eggs without the aid of a male. Lionfish are not equipped to engage in internal fertilization, nor have we seen any evidence that they can reproduce parthenogenetically (eggs developing without fertilization).

A distinction should be made between laying eggs and spawning. The spawning process is not really complete until the eggs begin to develop either through fertilization or through parthenogenesis (some organisms actually are parthenogenic). Fish that become laden with ripe eggs must rid their body of them either through expulsion or resorption. Many female fish often metabolically resorb their ripe eggs if a male is not available. Under

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Attention
All National Aquarium Specialty Clubs!

In order that we may continue our policy of publishing the addresses of national interest groups within the aquarium hobby, we must update our files. If your group is interested in being included on our list, please have your publicity or membership chairman forward your current address to: Marshall E. Ostrow, Articles Editor, Tropical Fish Hobbyist Publications, 211 W. Sylvania Ave., Neptune City, New Jersey 07753.

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The lionfish, *Pterois volitans*, has a rather cavernous mouth and is quite capable of swallowing small tankmates. Photo by G. Budich.

certain conditions, however, the same female might expel her eggs with or without the presence of a male. This often happens with angelfish and probably happens more often than reported with non-brooding species. By our previous definition this is not spawning, but merely laying eggs.

As far as seeing lionfish is concerned, there are really no easily visible signs of sexual dimorphism. The only advice we can offer is to look at them from above and assume that the female, when ripe, has a fuller profile. We would be most interested in the results of your attempted lionfish spawning and would appreciate hearing from you however it turns out.

FAAS Aids Local Aquarium Societies

The Federation of American Aquarium Societies (FAAS) is building a file of materials that can be used by local aquarium societies for conducting workshops. An FAAS Workshop is a mode of inter-society communication that was pioneered by the Heart of America Aquarium Society in July, 1978. An FAAS Workshop can be attached to a larger get-together, and requires two or more sessions concerned with society-oriented topics: bulletin upgrading, fund raising, etc. For more details write to FAAS President Larry Brande, Apt. 105, 6601 S.W. 46th St., Davie, Florida 33314.

NOTICE

Tropical Fish Hobbyist traditionally has its pages open to a broad spectrum of editorial features covering widely differing points of view. It also is open to commercial announcements of all sorts regarding products and services for sale. In fact, in most cases we are prevented by law from discriminating among advertisers.

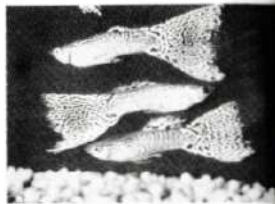
There are a number of long-established and reputable mail order houses in the tropical fish field. There also are a number of firms that lack experience with this highly specialized method of selling and are not always willing or able to cope with the problems it creates for them in terms of customer satisfaction. On that basis, readers should always be aware of the dangers involved with making purchases by mail. Additionally, they should bear in mind that price alone—even for a standard manufactured item like a pump or filter—is not the only basis for deciding from whom it should be purchased. A "bargain" or "discount" price on an item may not be any bargain at all when it comes time to service the item or obtain information about it; what one seller offers by way of price may be more than offset by not having a reputable local tradesman to back up its servicing and delivery of full satisfaction. In general, products available locally should be purchased locally.

Guppy: Continued from page 72

ment of trying to obtain bigger and more colorful guppies will keep these societies alive and active for many years to come.

Most of you have heard that guppies are one of the easiest fish to raise and breed, that inbreeding doesn't hurt the guppy and that no two guppies look exactly alike. I would like to correct these fallacies by saying that fancy show-quality guppies are one of the most diffi-

Here are two different types of color patterns in male guppies that are consistently reproducible with a great deal of uniformity, showing that the idea that no two male guppies look alike can no longer be accepted. By proper selection, color patterns such as these can be firmly fixed in your stock. Photo on left by Midge Hill; right by Dr. Herbert R. Axelrod.



cult fish to maintain and breed with consistent success. The reason for this is not so much their deviation from the wild type as it is from the fact that inbreeding is almost a necessity. It is needed to keep desired characteristics from reverting to their original wild-type forms. Inbreeding too closely can result in sterility, susceptibility to disease, lack of vigor and general deterioration of the fish. In other words, inbreeding can accentuate both positive and negative qualities.

Fortunately there is a workable solution to the inbreeding problem and it's called linebreeding. Linebreeding means starting two separate families or lines from an inbred strain, keeping these two

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closely related lines separate for at least four generations and then crossing the two lines together as they become less closely related. The line-crossing usually restores a certain amount of vigor and generally strengthens the strain. The linebreeding procedure can be repeated indefinitely. This, of course, is a simplified explanation of the process and you should be aware that there are certain problems in

the factor that really burns them out quickly is high water temperature. Keeping guppies in water over 78° F. (25° C.) is asking for trouble. A guppy's metabolism is greatly accelerated at high temperatures; he must swim fast, grow fast and generally expend energy at a much faster rate.

To keep guppies healthy their water must be changed regularly because accumulating salts and



guppy breeding for which precautions must be taken. An example is the necessity of using virgin females since most female livebearers store sperm once they have copulated, and can give birth a number of times before being fertilized again.

Another difficulty with fancy guppies is feeding. In order to obtain large showy specimens it is necessary to force-feed them several times a day with copious amounts of live food. Newly hatched brine shrimp nauplii are an especially good food and are almost a necessity for guppy fry; the older fish really go for it too. It has been said that force-feeding can shorten a guppy's life span, and it probably does to some extent, but

fish wastes can be detrimental. Magnesium, calcium and sodium salts remain in the tank as the water evaporates. To keep the water hardness and ammonia-producing waste products down, don't just replace evaporated water; siphon out about one-fourth of it and replace it with fresh water on a weekly basis.

Light can also be a critical factor in producing high quality guppies. Some guppy breeders have noticed partial or total sterility in their stock following a prolonged exposure to constant light. To be on the safe side I suggest an uninterrupted eight-hour period of darkness during each twenty-four-hour cycle.

As for the old saying that no two

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Here is another fine example of the solidity of color patterns that can be bred into a guppy. Photo by Midge Hill.



guppies look exactly alike, maybe this is true if you look at them under a microscope, but I have seen whole strains that looked as if they had been stamped out by a machine!
There is more to guppy breeding than meets the eye. Before you begin to pursue this interesting facet of the tropical fish hobby, I

suggest you buy a basic book on guppies; there are several good ones available. The rewards and self-satisfaction derived from knowing that you have had a hand in biological creativity make the elusive fancy guppy worth pursuing.
L.F.H.
January, 1977

Idea of the Month

Furniture Saver

by Ed Gralewicz

Water on furniture is a big problem, so aquariums are often relegated to basement areas. This idea may help make it practical to have aquariums in any room in the house.

When setting up the tank, use a foot caddy to protect the furniture finish. I find that a plastic foot caddy fits under a 10-gallon tank and the rim keeps any spills within the caddy. The caddy is a little bigger

than the tank and the extra space provides a safe place to put food, nets and a pump.
For a smaller tank, a cookie sheet with a rim works well. To keep condensation from under it, raise the assembly with wood or cork shims. The shims can be placed every four inches. Rubber shims should be avoided because rubber breaks down and leaves marks.
Any ideas on how to remove black rubber spots from an antique library table?

Name Changes for the Scale-Eating Cichlid Fishes of Lake Tanganyika

Warren E. Burgess

A recent scientific paper by Liem and Stewart (1976) included a revision of the scale-eating cichlids of Lake Tanganyika. Hitherto they were divided into three genera, *Perissodus*, *Pleocodus* and *Xenochromis*, but the research of Liem and Stewart has indicated that they now should be classified into a single genus - *Perissodus*. The new lineup of species therefore is as follows:
Perissodus hequii (Boulenger) formerly *Xenochromis hequii*
Perissodus multidentatus (Poll) formerly *Pleocodus multidentatus*
Perissodus paradoxus (Boulenger) formerly *Pleocodus paradoxus*
Perissodus elaviae (Poll) formerly *Pleocodus elaviae*
Perissodus straeleni (Poll) formerly *Pleocodus straeleni*
Perissodus microlapis Boulenger
Perissodus eccentricus Liem and Stewart

The last-mentioned species was newly described in the same paper. It was reported as closely allied to *P. microlapis* and inhabiting relatively deeper waters of Lake Tanganyika (60-100 meters). It also has an unusual asymmetrical jaw structure (opening to the right or to the left) which apparently enables it to attack its prey and dislodge scales more efficiently. The specimens seem to be equally divided between "right-jawed" and "left-jawed" individuals. These fish must therefore attack their prey from only one side, depending upon which way their mouth opens.

Liem, K.F. and D.J. Stewart 1976. Evolution of the Scale-Eating Cichlid Fishes of Lake Tanganyika: A Generic Revision with a Description of a New Species. Bull. Mus. Comp. Zool., Harvard Univ. Vol. 147, No. 7, pp. 319-350. L.F.H.



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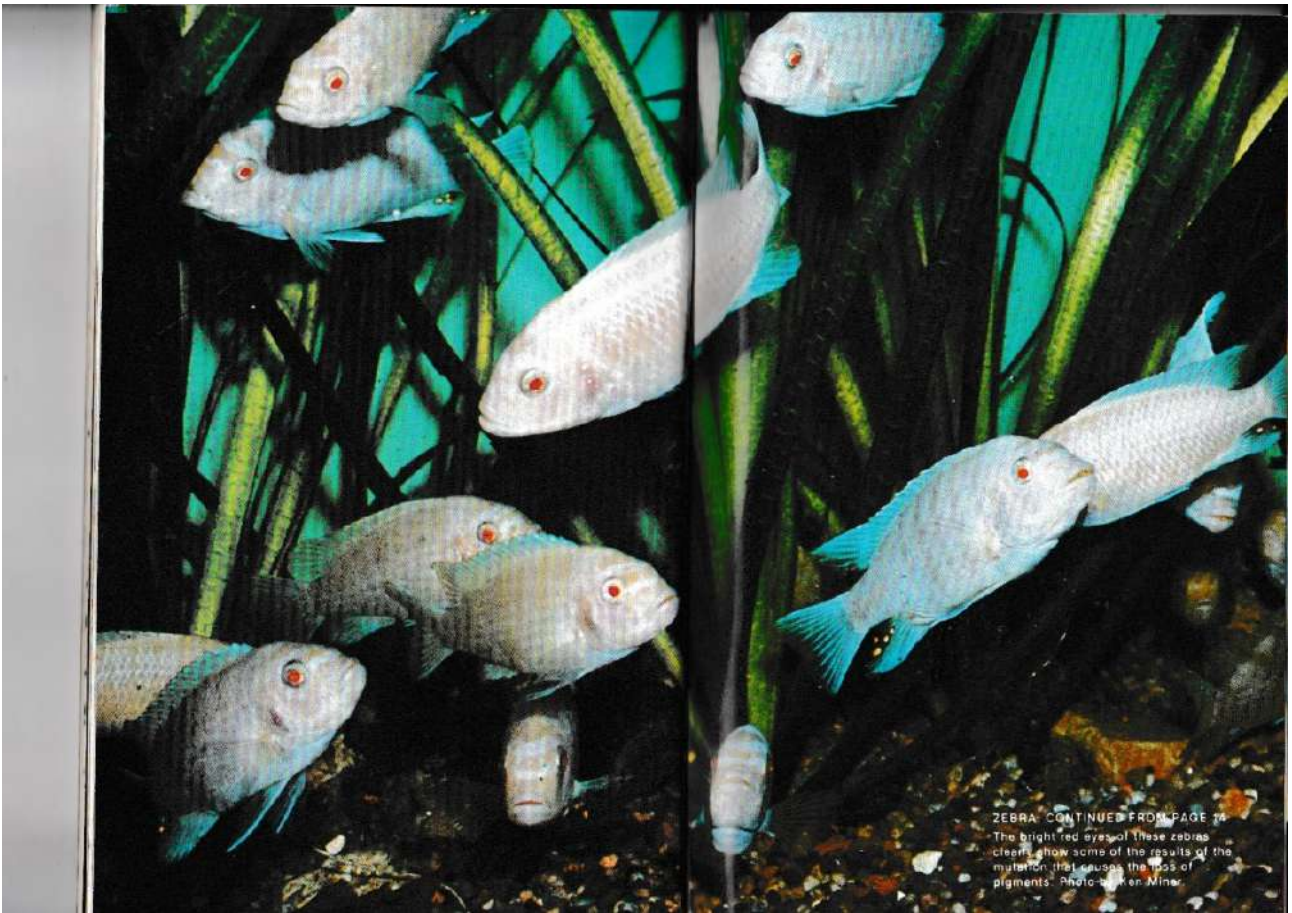
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ZEBRA: CONTINUED FROM PAGE 98
The bright red eyes of these zebra fish clearly show some of the results of the mutation that causes the loss of pigments. Photo by Max Weiner.



more. Using this method, I decreased the interspawn period by 50 per cent.

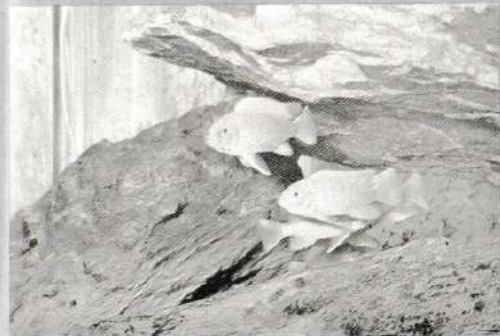
The mean clutch size per spawn for each female was 40 eggs, but on the average, only 65 per cent of the eggs developed. This could have resulted from their mutant genetic make-up. Of the embryos that developed into free-swimming fry, several types of recurring deformations were observed. The deformities occurred at a rate of 0 to 2 percent per spawning and were manifested as vestigial eyes, absence of opercula or jaws and spinal aberrations.

The fry that developed normally grew up to become magnificent specimens and spawned with the fervor of their parents.

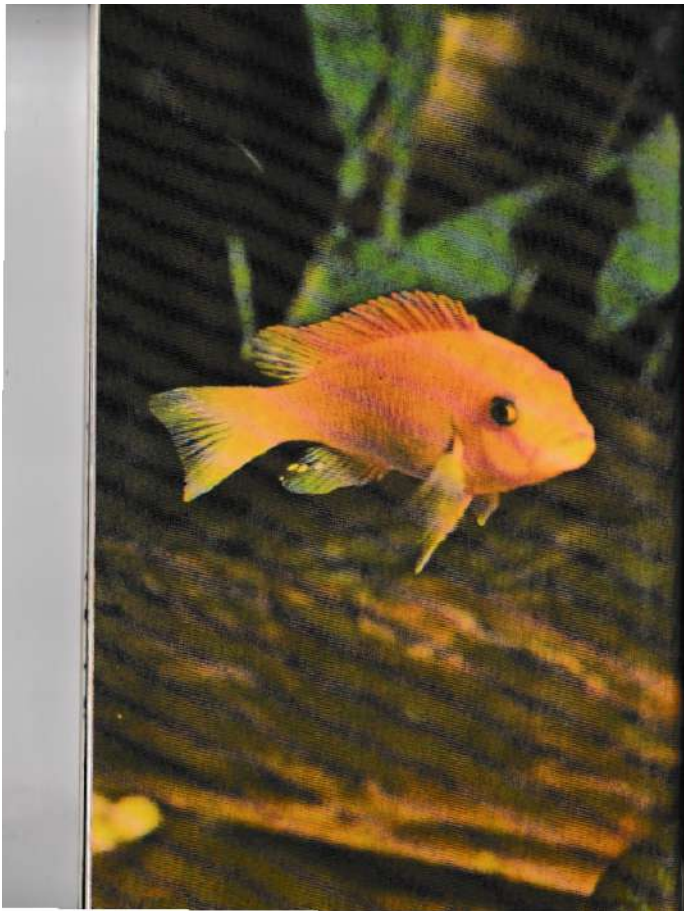
The albino *P. zebra*, although lacking body pigment, is not entirely colorless. The male has a blue iridescence that results from light refracted by guanine crystals situ-

ated in dermal iridophores. The female has the typical pinkish coloration of most albinos, and her blue iridescence is less intense than it is in the male. Curiously, both sexes possess bright yellow egg ocelli on the anal fin.

The albino *Pseudotropheus zebra* may have great potential in the aquarium hobby and may serve as an invaluable scientific tool in the virtually unexplored field of cichlid genetics. Since many of the rock-dwelling fishes of Lake Malawi are very suitable subjects for evolutionary and genetic studies even in their non-mutated wild forms, the incidence of albinism among domestically bred stock adds a valuable genetic variable to their study.



All mbuna are rock dwellers, and these young albino zebra fish, even though far removed from their wild ancestors, have retained their instinct to seek rocky refuges for shelter. Photo by Dr. Herbert R. Axelrod.



Opposite page: *Pseudotropheus zebra* exists in the wild in a number of different color varieties. One of the newest imports is the orange or tangerine morph, and it is rapidly gaining popularity. Photo by G. Marcuse.

This is the natural habitat of *P. zebra* in Lake Malawi, Africa. The algae-covered rocks among which it dwells together with many other mbuna species provide plenty of forage for this grazing fish. The striped (SB) morph was one of the first forms discovered and is the one for which the species was named. Photo by Dr. Herbert R. Axelrod.

Below: The cobalt blue morph has been a popular favorite for a long time. During breeding its normally vivid blue color intensifies to a brilliant electrifying hue. Photo by Dr. Herbert R. Axelrod.



January, 1977

101

Writer: Continued from page 69

might return the manuscript to you with suggestions for its improvement.

If he decides the article is not suitable, he will return your article by mail, sometimes (but not often) with a letter explaining why the material is not acceptable. Frequently the editor has just published an article on the same subject, or he has a similar article in his files awaiting publication. If the editor is interested in your article, he will offer to purchase the publication rights for a specific sum. This sum will be determined by the length of the manuscript, how much editorial reworking is necessary and the subject matter.

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only a certain amount of time to any one article. He makes his best offer in the first letter. If you are afraid your article will be ruined by the editor, you should confine your writing to spiral notebooks and your audience to your closest friends. If you honestly do not feel that the conditions of the sale are agreeable to you, indicate this in a letter to the editor. It is at this point that the author needs patience. It might be as much as a month before your check arrives and a year before your article appears, but when it does, the editor will usually send you some free copies of the magazine (TFH sends six copies) to help you prove to your friends that they know a real live author.

T.F.H.

Metric Conversions

Since it is the editorial policy of TFH to provide measurements in both the English and the metric systems, this chart is provided for your convenience to facilitate your understanding of the transition to the metric system.

One meter (m) is equal to 1000 millimeters (mm). A centimeter (cm) contains 10 millimeters and is 1/100 of a meter. One inch is equal to about 2.5 cm or 25 mm. Four inches are about equal to 100 mm; 6 inches = 150 mm; 1 foot = 305 mm; 3 feet = 914 mm. The number of millimeters divided by 10 gives the number of centimeters.

As to liquid measures, the liter (l) is commonly used. One liter is slightly less than one U.S. quart. A liter contains 1000 milliliters (ml). The unit cubic centimeter (cc) is about the same as one ml.

To convert degrees Centigrade (or if you prefer Celsius) to degrees Fahrenheit, multiply degrees Centigrade by 1.8, and then add 32. ($^{\circ}\text{C} \times 1.8 + 32 = ^{\circ}\text{F}$). Some good base temperatures to remember are: $0^{\circ}\text{C} = 32^{\circ}\text{F}$; $10^{\circ}\text{C} = 50^{\circ}\text{F}$; $20^{\circ}\text{C} = 68^{\circ}\text{F}$; $30^{\circ}\text{C} = 86^{\circ}\text{F}$; $100^{\circ}\text{C} = 212^{\circ}\text{F}$.

T.F.H.

102

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