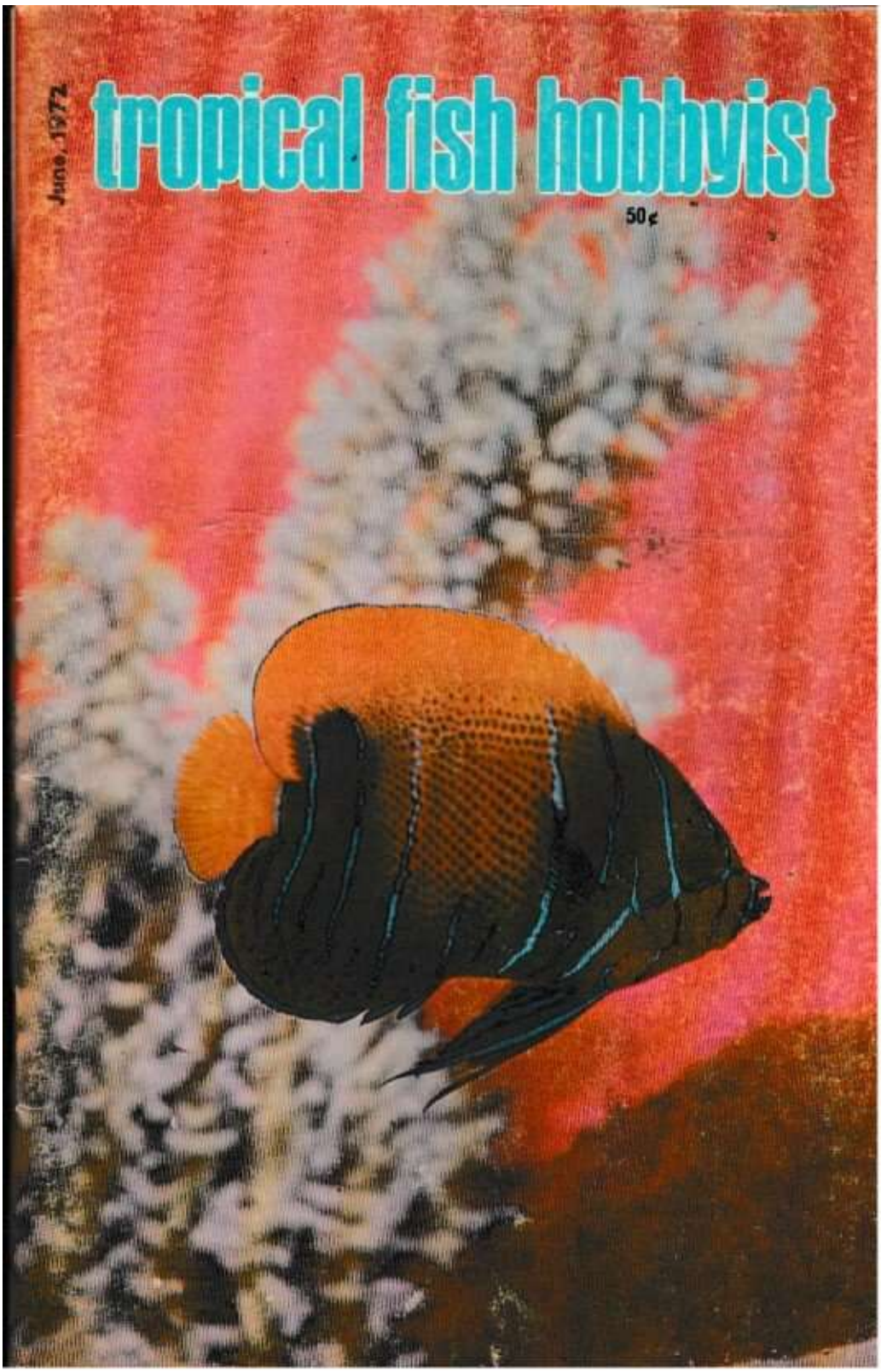
June, 1972
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Vol. XX, June, 1972 (#196, No. 10)

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cover

A juvenile **Euxiphipops navarchus**.

Cover photo by Earl Kennedy

exotic tropical fishes supplements

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rates

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EDITORIALLY.....

Many hobbyists and aquarium dealers have contacted me recently asking about the various laws, proposed legislation and "general attitude of the law" about our hobby. Several of my correspondents even went so far as to be concerned about the possibilities of being "put out of business."

My association with the Federal government and the various state and local governments is limited to my activities as Chairman of the Exotic Fishes Committee of the American Fisheries Society and as a member of the Fish Standards Committee of the National Research Council. One of my responsibilities is a compilation of the laws of all the states as to their restrictions, if any, as pertains to the introduction, sale and/or distribution of exotic fishes. An exotic fish, by the way, is any fish which is not native to the waters of the particular area involved. (Striped bass, for example, might be called "exotic fish" in Nevada, but they are not exotic fish in California or New Jersey.)

My committee has also been called upon to assist in the preparation of certain pieces of Federal legislation dealing with prevention of "imported" fish diseases and with the preservation of our "ecology" from such potentially dangerous species as the grass carp, piranha, walking catfish and freshwater stingrays. We also have been concerned with the very remote possibility of diseases being brought in with shipments of tropical fishes from remote corners of the world where water-borne diseases may be prevalent. We feel fairly safe that the aquarium fishes themselves might not harbor organisms dangerous to man, but we want to be sure that the water in which the fishes are shipped, is as safe as possible from contaminating our local waters.

All of my recommendations have been aimed at preserving our hobby and the businesses which support it and our Committee is preparing the following PROPOSED POSITION STATEMENT which will be submitted to the American Fisheries Society for their consideration. This position statement is still in the draft form and has not been accepted by any person or agency of authority. I would be happy to hear from you if you feel that you would like to be heard in reference to this proposed statement.

I, like many dealers, would be put out of business if the importation of aquarium fishes were to be banned. My responsibilities on these various committees is done without financial remuneration. I want to protect my business..... and my environment....and my fellow-man....you can help by writing your support or objection to the proposed position statement and by discussing it with interested parties.

Continued on Page 86

Herbert R. Axelrod

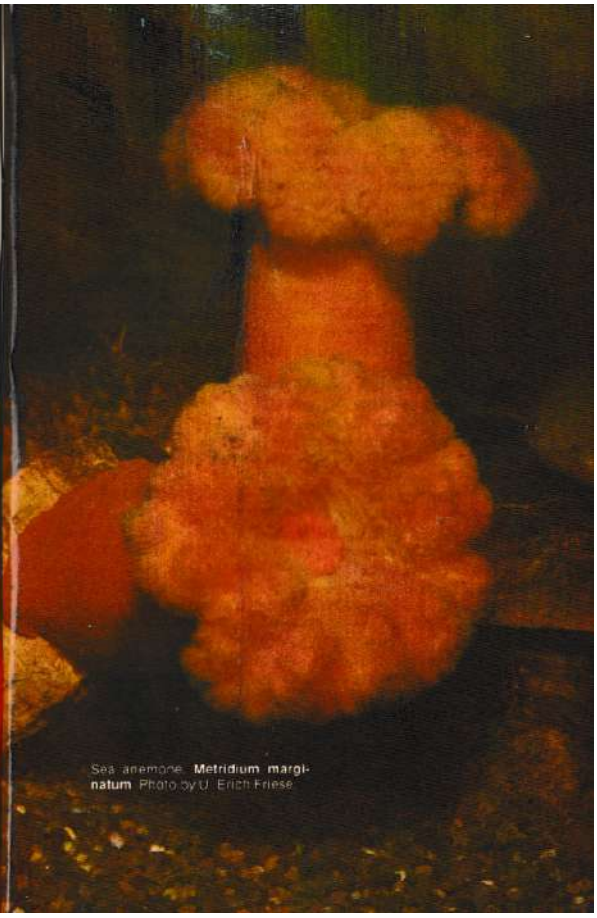
The Establishment of the Nitrogen Cycle in Marine Aquaria

BY RICHARD C. DEVINE

Basic to the stability of the natural marine ecosystem are a number of biogeochemical cycles, of which the nitrogen cycle is one. This cycle, evolved and established early in the history of the earth, cycles nitrogen from organism to organism, from inert to animate material, and from inorganic to organic forms.

One of the prime requirements for successfully maintaining a marine aquarium is to be able to control the ammonia-nitrite-nitrate cycle. Such control, brought about partly by sensible aquarium techniques coupled with the effective use of some of the highly specialized marine aquarium equipment available, is very important to the well-being of the fish. Shown below is **Euxiphipops navarchus**, the same species as shown on the cover, except that the specimen shown here is a younger fish.

Photo by Earl Kennedy



Sea anemone **Metridium marginatum** Photo by U. Erich Friese

In contrast, the marine aquarium, an essentially unbalanced, disorganized microcosm at its inception, must reenact these beginnings each time it is set up. All the elements are present, but they must find a harmony of balance, an equilibrium supporting all. They must go through an ordered set of biochemical reactions to establish the cycle once again. It may be of benefit here to briefly discuss the balanced cycle in its basic form as it applies to the marine aquarium.

The cycle is largely initiated by excreta in the form of ammonia from fish and invertebrates. The oxidation of ammonia to nitrate is accomplished in two steps, both of which require large stores of oxygen. The first step is the conversion of ammonia to nitrite by bacteria of the genus *Nitrosomonas*; the second step, conversion of nitrite to nitrate, is brought about by the bacteria of the genus *Nitrobacter*. These oxidations produce the energy necessary to maintain the life processes of the bacteria, nitrite and nitrate being merely byproducts of more significant reactions.

Nitrogen in any of these three forms, ammonia, nitrite, and nitrate, may be utilized by plants, although the preferred form is nitrate. Through the process of denitrification the plant incorporates the nitrogen into its structure, and the organic protein thus formed is subject to decay or assimilation by animals. The occurrence of either completes the cycle.

In order to elucidate some of the reactions which occur in establishing this cycle during the early weeks, a marine aquarium was monitored for nitrite and nitrate production for a period of forty-five days. The aquarium was of fifty-five gallon, all-glass construction, fitted with an undergravel and an outside carbon filter. The filter bed consisted of approximately three inches of calcite chips of three to five millimeter size. The aquarium was maintained at room temperature and under fluorescent light for sixteen hours a day. Synthetic sea salt was added to tap water until a density of 1.0200 was established. Analysis for nitrate and nitrite basically followed procedures outlined by Strickland and Parsons (1968).

The method of approach was to inoculate the aquarium with algae on the first day and continue monitoring for fourteen days. At that time three Pacific anemones were introduced, and monitoring continued for an additional thirty-one days. The filter bed was bare except for one large previously treated piece of coral.

In addition to nitrite and nitrate analysis, temperature, density, and pH data were recorded.

For the first fourteen days prior to invertebrate introduction the nitrite concentration remained stable at 0.1 ppm while the nitrate varied somewhat around an average of 10.4 ppm.

Immediately after invertebrate introduction, the nitrite concentration began to increase, slowly at first, then rapidly to a peak of 11.2 ppm on the twenty-eighth day. Within four days the nitrite level then decreased to 0.003 ppm and remained negligible (0.03 ppm) until the end of the period.

In contrast, the nitrate concentration did not begin to increase until the eighteenth day, and a peak of 40.5 ppm was reached on the twenty-ninth day, one day after peak nitrite concentration. The concentration then declined to 25 ppm by the thirty-first day and remained largely stable until the end of the period.

The entire nitrite portion of the cycle took eighteen days, while the nitrate portion encompassed thirteen days from onset, through peak, and back to stability. The relative chronological positions of these curves follow closely that which would be expected in the process of nitrification. Nitrite generated first is converted to nitrate, the former increasing prior to the latter.

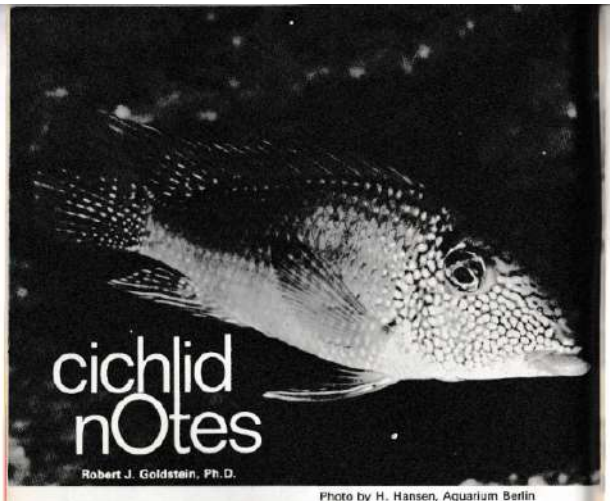
pH conditions varied considerably over the forty-five-day period, averaging 7.6 prior to invertebrate introduction, declining to a low of 6.5 at peak nitrite and increasing to an average of 7.8 after the establishment of the cycle. The low of 6.5 was caused by the release of hydrogen ions during the nitrite production, and the immediate pH increase was undoubtedly due to the compensation of the carbonate buffer system.

Algal growth was not visually observed until the sixteenth day, after which it increased to a stable plateau by the end of the period. This preliminary data indicates algal growth does not proliferate until sufficient nitrate has been produced.

The nitrogen cycle is a multifaceted system whereby components are generated in a predetermined order until stability has been attained. It must be borne in mind, however, that the components are subject to alterations in concentration and duration, as they are dependent on many variables. The establishment of the cycle cannot be expected to take the same precise pattern each and every time the aquarium is set up. Factors such as bacterial population, chemical inhibitors, type and density of specimens, light duration and wavelength among others will affect the exact pattern followed. The basic chronological order, however, will always be the same as described here.

References

Strickland, J. D. H., and T. R. Parsons, *A Practical Handbook Of Seawater Analysis*, Fisheries Research Board of Canada, Bulletin 167, Ottawa, 1968, pp. 71–80.



cichlid nOtes

Robert J. Goldstein, Ph.D.

Photo by H. Hansen, Aquarium Berlin

One of the problems I have in judging shows is caused by the variety of methods different clubs adopt for cichlid categories. Almost every club will set up a category of "dwarf cichlids" and then proceed to include in this category fishes that I personally would not consider dwarfs. For example, *Pelvicachromis pulcher*, the aquarium "krib," is usually placed in this category, even though it attains a size equal to or greater than a number of species of *Aequidens*, which is certainly not a genus of dwarfs. Further, a number of the krib entries invariably turn out to be *Pelvicachromis* cf. *pulcher*, the so-far unnamed giant krib; the aquarist usually thinks he has raised one heck of a big krib!

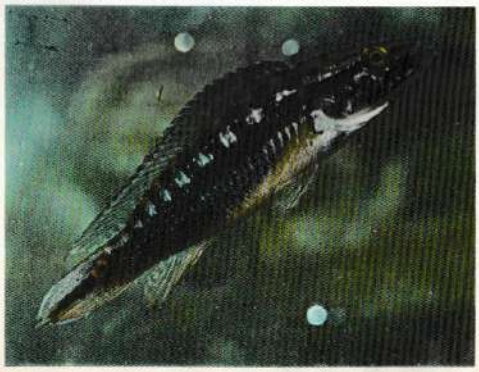
In my opinion, the category of dwarf cichlids ought to be eliminated from competitive shows, and all categories should be based on zoogeography and taxonomy. For example, I find it very difficult to rate a Lake Tanganyika cichlid against a Neotropical cichlid for the same ribbon or trophy. I believe the following categories ought to be considered for adoption:

1. Neotropical Cichlids

a) *Cichlasoma, Herotilapia, Aequidens*

Cichlasoma species (**Cichlasoma meeki** shown here) would be grouped with **Herotilapia** and **Aequidens** species in the first category of the four categories of Neotropical cichlids suggested by the author for show purposes. Photo by H. Hansen at Aquarium Berlin.

Pike cichlids like **Crenicichla geayi** would be grouped within a miscellaneous category; photo by Dr. Herbert R. Axelrod.



Apistogramma would be linked with **Nannacara** and **Crenicara** species in another category of the American cichlid species; shown is **Apistogramma ortmanni**; photo by K. Paysan.

b) *Nannacara, Apistogramma, Crenicara*
c) Angels and discus
d) Miscellany (pike cichlids, etc.)
2. African and Asian Cichlids
a) Malawi and Tanganyika cichlids (other Rift Lake)
b) Congo River cichlids (*Steatocranus, Hemichromis*, etc.)
c) *Tilapia* and *Hemihaplochromis*
d) Miscellany (*Etroplus*, etc.)

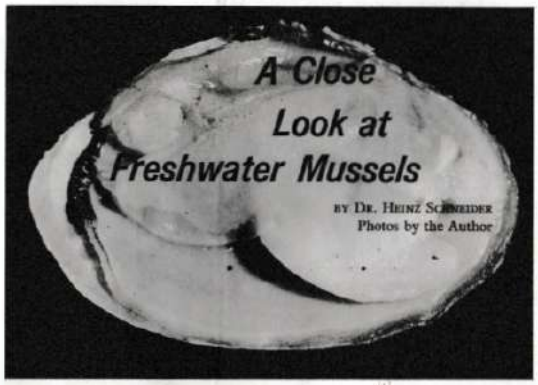
These are interim suggestions, until the American Cichlid Association comes up with its own recommendations. The ACA has already begun an investigation of suitable categories for show standards, and when these are completed and formally adopted, I will report them in this column for the benefit of show committees of regional clubs. As to the common practice of disqualifying a fish because of its misidentification, I think this should be discontinued. Cichlid identification is in flux, a lot of fish are here under the wrong names, and a lot of dealers use names commercially which are absolutely incorrect, and they

know it! The aquarist with a good pair of fish entered in a show will always make a reasonable attempt to correctly identify them, and he should not be faulted for making the same mistake that many of the "experts" make. He is not entering the competition as an expert in nomenclature, but as an expert in raising good fish. On the other hand, we need to have some parameters of what is a reasonable error, and whether the guy ought to pay for an error that a ten-year old shouldn't make. If he mistakes a pink convict for a gold severum, perhaps the judge could dock him points without being tied to a rigid set of show rules. It should be the judge's prerogative to subtract points for really bad errors, or to consider the errors perfectly reasonable and not dock points. As a judge and an author I have made errors in identification myself! Why not the aquarist?

And now for my mail. One of the most common questions I get is: what is the correct identification of the fish listed as in the book by ? (not by me). Really now! What makes you think I own a copy of the book written by what's-his-name? Write to *him*! I also get mail asking for additional information, including references, on subjects covered in recent columns. Be assured that if I had additional information, I would have published it in the column! A third type of question is usually from youngsters asking me how they can get a certain fish or rearrange a tank for breeding, the limitation being money. That is a problem better directed to a parent or guardian, and not to me! Finally, I get lots of mail from people looking for pen-pals. I suggest you join ACA; you can make lots of pen-pals from the membership roster.

An application for membership in the American Cichlid Association can be obtained from Mr. Guy D. Jordan, 6546 Celia Vista Drive, San Diego, California 92115. When requesting a membership application form, please provide a stamped, self-addressed envelope.

To many hobbyists, freshwater mussels are interesting and harmless molluscs that aren't worth keeping in tropical tanks because their temperature requirements are too low. To other hobbyists, they're a convenient source of fish food. To still others, the ones aware of the possible harm to fish from these seemingly inoffensive bivalves, they're a definite source of danger. Whatever you consider them, you can learn a lot more about them by taking



A Close Look at Freshwater Mussels

BY DR. HEINZ SCHNEIDER
Photos by the Author

In the shallow shore regions of old river beds and gravel pits, we often see long furrows in the mud. They appear on the bottom as straight lines, curves, or spirals; where one of these tracks ends we discover one of the large Naiads, a river mussel or a pond mussel. Usually, the animal sets with its anterior end deep in the mud so that only the posterior portion of the shell projects into the water. We are usually able to fish out the mussel from the shore with a dip net. They can be kept easily

in an aquarium and can be fed supplementally with infusion cultures. Although our mussels, like most Mollusca, are outwardly rather passive domestic animals, they are still interesting objects for study.

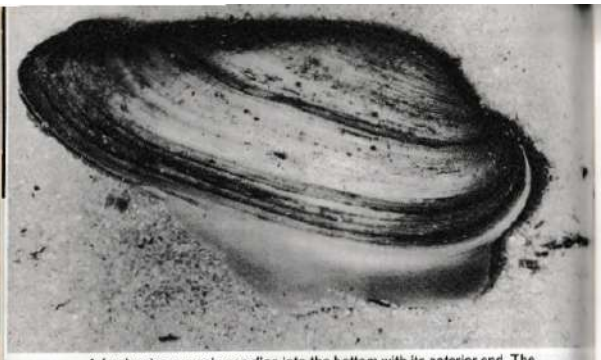
With a fresh-caught mussel, we get to see only the two tightly closed shell valves. Its external appearance is of a greenish-brown color and, on the surface, it shows dark lines running parallel to the edge. These lines define the growth zones and are known as annual rings. The structure of a mussel shell is more complicated than we would anticipate at first. If we look carefully at an empty shell, one we find along the edge of a beach, both shell valves are still in many cases connected on the backside by a ligament. This ligament lies behind the hump-like projecting umbo, the oldest part of the shell. The innersides of the dorsal border of the shells of river mussels carry interlocking grooves and ridges, the hinge teeth, which provide for a tight closure of the shell. Pond mussels have no hinge teeth. On the mother-of-pearl-coated

concave side of the shell, we see deep impressions front and back. These are the attachment points of both adductor muscles. A short distance from the shell edge and parallel to it runs a shallow furrow, the so-called mantle line.

Mussel shells are composed of three different layers. Two of these consist of an organic substance (conchyolin); the outer layer and the mother-of-pearl layer of the concave side, we are already acquainted with.

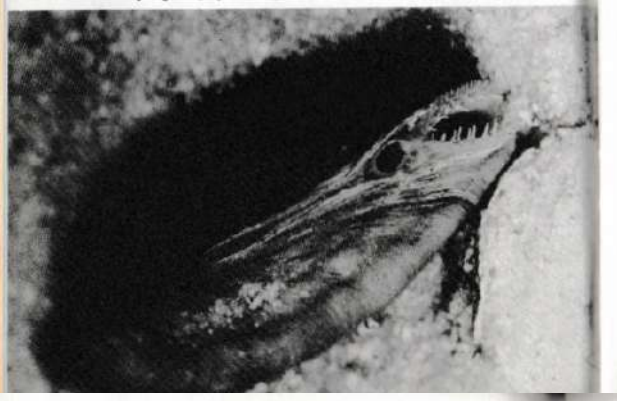
To closely observe a living mussel, prepare a low vessel into which you've put about 1¼" to 1½" of aquarium sand as a substrate. The water level should be about 1½". If you lay the mussel on its side in the basin it will soon become active, because no healthy mussel likes to lie on its side for any length of time. For this reason, you'll usually see that the shell valves open somewhat after only a few minutes and that the yellowish-white foot is stuck out. The foot is the locomotion organ of our mussel. It penetrates the substrate, stretches and then fills tight with

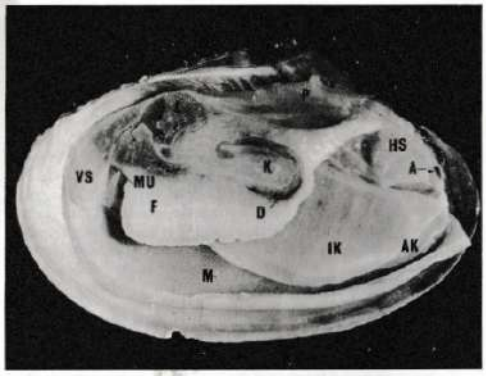
A group of guppies parasitized by freshwater mussel glochidia. The glochidia are equipped with hooks with which they effectively attach themselves to the fishes victimized; victims that are forced to play host to only a few glochidia seldom suffer permanent damage, but fishes that are heavily parasitized often die.



A freshwater mussel soon digs into the bottom with its anterior end. The shell opens slightly, and the foot is stuck out.

Even in full action, only the foot and mantle edge come into direct contact with the external environment. Sensory cells in these places are especially heavy and aggregated on the edge of the incurrent and excurrent siphons. The very passive mussels are only sparsely equipped with sensory organs. They possess two statocysts, one on each side of the foot ganglion and behind the foot base, on the ventral side, a pair of olfactory organs (osphradium).



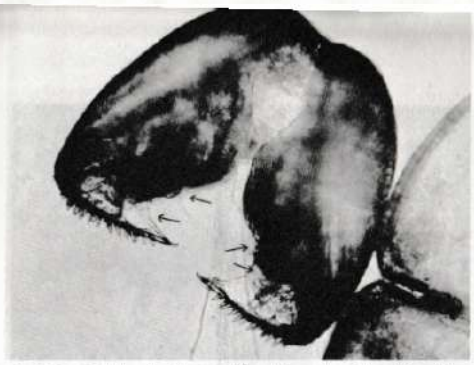


Longitudinal section through *Anodonta anatina*. F—cut off foot, MU—mouth opening, L—digestive gland, D—intestinal loop, P—pericardium, A—anus, K—gonad, VS and HS—anterior and posterior adductor muscles, IK—and AK—inner and outer gills of the right side, M—mantle lobe of the right side.

blood. Thus it anchors itself in the substrate. When its retractor muscle functions, the mussel's body and shell are raised and pulled forward in the direction of the foot. In this way the jerky movements by which the mussel traverses the bottom occur. The tracks which revealed the presence of the mussels in the old river bed can easily be observed in the experimental vessel or in the aquarium.

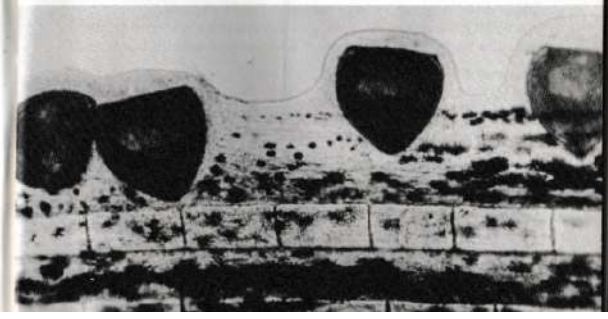
With the beginning of activity, two openings become visible at the posterior end of the slightly widened shell, the lower one of which is surrounded by papilla. If the water level in our observation vessel is not too high, we see that at the water surface drifting particles go into lively movement as soon as they get in the range of either opening. The mussel also creates a stream of water. How this flows can easily be seen if a pipette filled with dye is carefully emptied into the water near the lower of the two openings at the posterior end of the mussel. If the experiment is successful, the colored cloud released into the water will disappear into the opening and reappear after a while from the upper

A view into the shell cavity from the ventral side. The posterior end of the animal is in the upper part of the picture. The white mass in the lower portion of the picture is the foot; the specimen shown carries larvae in its outer gills. The inner gills are grown together in the rear portion of the body.



Anodonta glochidium in side view. The picture shows the origin of the larval thread as well as the sensory nodules with their seta (arrows). The powerful shell hooks, set with their barbs, are impressive. When fish come within range, the glochidium begins to snap its shell open and closed. If it is lucky, it can close its hooks on the body or the fins of its future host in this way. Glochidia cannot swim and therefore cannot actively seek a host.

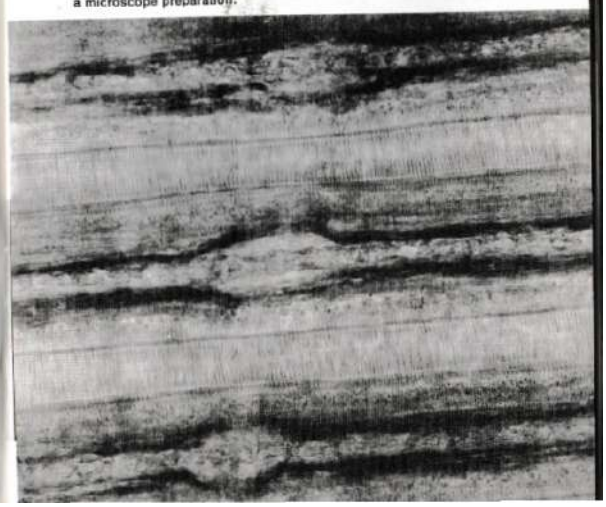
As a result of the wound stimulus, the skin of a fish parasitized by glochidia produces a cyst around the parasite within 24 hours. The larval mantle secretes proteolytic enzymes, under whose effect host cells are dissolved and taken as food by the mantle cells. *Anodonta* glochidia also phagocytize whole cells. In this living assimilator, it can be detected that the post-embryonal development has already begun and the adductor muscle of the larva has been reformed.



method. From the mouth a short esophagus leads to the stomach. On the ventral side of this, the intestine begins. It runs about the foot in a series of loops, then returns dorsally, perforates the heart and terminates above the posterior adductor muscle. Digestion occurs in the stomach and in the digestive gland (liver) which surrounds the stomach as a brownish-green mass. The enzymes are introduced into the stomach in the form of a gelatinous rod.

The four large, finely divided gills of Naiads are ogans of complicated structure. Every gill leaf consists of two lamellae. With a magnification of about 100X we learn that the lamellae consist of numerous gill filaments lying close together, with each joined to its neighbor. At their ventral end, the gill filaments are folded upwards, with their internal and external halves connected together by numerous bridges of tissue. Thus, a lattice is formed with countless spaces. The walls of the spaces are

Section of a gill of *Unio pictorum*.
At a magnification of 360X, the cilia become visible on the free edge of the gill filaments. The ciliary movement can be seen for quite a while in a microscope preparation.



covered with cilia which become visible at higher magnification. Then the movements of the cilia are easy to recognize. In addition, we find such cilia over the entire free body surface of the mussel. They are the motor for the water stream which the mussel draws through. The amount of water transported is significant; for an American species, a capacity of nearly 2.5 liters per hour has been measured. As food materials are also transported with the water stream, the ciliated gills serve in food gathering. We can learn a third function of these multi-sided organs when we examine ripe animals at the breeding and incubation time (about March to July for the river mussels, *Unio*, and the middle of August to the end of April for the pond mussels, *Anodonta*). Frequently we find that the outer gills are greatly swollen and brownish-red colored. If we examine the gill contents, we find vast numbers of tiny mussel larvae, the glochidia. Large Naiads could contain 200,000 to 400,000 such larvae. They reached the gills as eggs and, well protected, have undergone a part of their development. After a given time, the glochidia are expelled through the current siphon of the mother animal in mucoid threads or clumps. They must attach themselves to the gills (*Unio*) or the fins (*Anodonta*) of a fish and remain there several weeks as parasites in order to complete their development. That is one of many accidents of a specific, danger-filled life cycle which only a few of the larvae can complete.

KILLIE CORNER

Robert J. Goldstein, Ph.D.

Some time ago in this column I reported that the American Killifish Association had set up a committee to try to obtain and propagate the endangered desert pupfish, *Cyprinodon diabolis* of Death Valley. The co-chairmen of this committee are Drs. Neal Foster and Richard Haas. Prior and subsequent to the activities of Foster and Haas, Dr. Robert R. Miller has waged a one-man blitz campaign to educate aquarists, ichthyologists and the general public to the problem. Equally endangered is the Pahrump pupfish, *Empetrichthys latos*; the congeneric *E. merriami* died out a little over 20 years ago, and *E. latos* may not have far to go to join it.

Dr. Haas has just reported that the AKA Endangered Species Propagation Committee is ready to roll. All applications have been made and approved to and by the following: Bureau of Land Management, National Parks Service, Bureau of Sport Fisheries and Wildlife, California Fish and Game, Nevada Fish and Game, Desert Fishes Council, and several prominent ichthyologist-conservationist consultants. No wonder it took so long!

Volunteers in the AKA are now being sought to take over attempts at breeding one or more of these endangered species, but only one fish will go to one man at a time. Naturally, it is not simply enough to want to try it; each volunteer will be critically examined, and only the very best qualified aquarists will be entrusted with this precious breeding stock. I guarantee that if success occurs at all, it will occur in the tanks of the man

An application for membership in the American Killifish Association can be obtained from Mr. Frank Smith, 17257 Via Chiquita, San Lorenzo, California 94580. When requesting a membership form, please provide a stamped, self-addressed envelope.

For information about joining the British Killifish Association write to:
Mr. K. Jenkinson,
12 Whitedalehead Road,
Whitburn,
West Lothian,
Scotland.

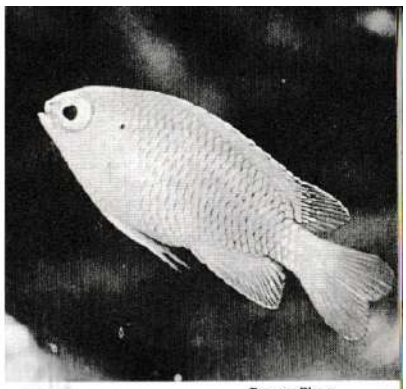
most qualified to get breeding stock, and that is Joe Anascavage. Readers of *Advanced Aquarists Magazine* have been treated to Joe's findings on how best to propagate such various species of *Cyprinodon* as *C. variegatus*, *C. macularius*, and *C. nevadensis*, and shortly he will be publishing information on a newly available Mexican species of the genus, imported through the efforts of Dr. Dave Schleser of Dallas. (Dr. Schleser has also imported some rare South American annuals and will make them available to the AKA at large, through proper channels.)

It is hoped that the authorities get the fishes or eggs into AKA hands before there is much more delay. Already there have been meetings, exchanges of positions, etc., and all for perhaps a dozen fish! The remaining pupfish population in Devil's Hole is too small to wait upon further obfuscation by already obfuscated bureaucrats. If the pupfish are lost before top aquarists get a chance at them, their demise can be laid directly at the door of federal and state authorities for procrastination. On the other hand, if the pupfish are saved, it will be by the AKA, not the various fish and game departments! For details on the status of the pupfish problem, you can write to the U.S. Department of the Interior, Washington, D.C., for a free copy of *Status of the Desert Pupfish*, Task Force Report, June, 1971.

Did you realize that the circulation of T.F.H. magazine is well above 45,000? If one out of ten persons who get the magazine will read this column, that makes 4,500 persons aware of the pupfish situation. And if each of those persons will write a letter to each of his two Senators and to his representative in the Congress, a great impact on saving the pupfish habitats, which are already teetering at the brink of being totally wiped out, can be made. Please write your representatives in Washington *that you support* Sen. Cranston's bill to establish a National Pupfish Refuge. And please send a copy to me, so that I can judge the effect of this column on the Cranston Bill. It is not enough to be sympathetic; all of us have to *do* something!

salts FROM THE seven seas

BY FREDRIC M. SCHWARTZ



Paysan Photo

Q. 1. *My experience with keeping saltwater fishes over the past three or four years has been tainted by a couple of disastrous bouts with Oodinium.* I have a 55-gallon all-glass aquarium in which I maintain a salinity of 1.024 and a temperature of 78 degrees. In this setup I generally keep an assortment of angelfish, butterflies, clowns, and wrasses; to avoid overcrowding I never have more than ten 2-4 inch fishes in the tank at any one time. They are well-fed on adult brine shrimp and algae. For filtration I use both a sub-gravel filter and an external power filter, and once a month I use ozone with a protein skimmer.

The shortest period that any new fish had been in the tank prior

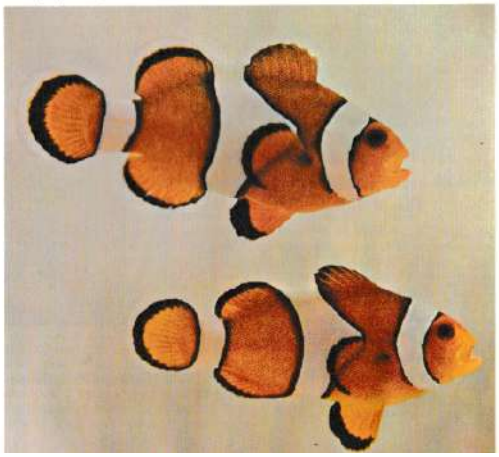
to the *Oodinium* outbreaks I mentioned was three weeks. In both cases the onset of the symptoms of this disease was very sudden, and although I treated with copper sulfate, the entire population of the tank was wiped out in about two or three days. This sort of thing can be most discouraging (not to mention expensive!), and it concerns me very much. Accordingly, I would ask you the following questions: On the basis of the information I've given you, can you suggest any possible cause of the mysterious outbreaks of this disease?

2. Can you recommend any specific procedures (aside from normal tank maintenance, cleanliness, and precautions with new arrivals) that would protect against further problems with this parasite? I would be grateful for any pearls of wisdom you may have to offer on this subject.

Bill Leonard,
Ithaca, New York

A. 1. *The dinoflagellate* Oodinium *is probably always present in an aquarium, even one well set up and maintained. It may be brought in with a fish or may even be in the water the fish is transported in. One thing that is always suspect is the clown fish* Amphiprion percula, *a*

Amphiprion percula. Photo by Dr. Herbert R. Axelrod.

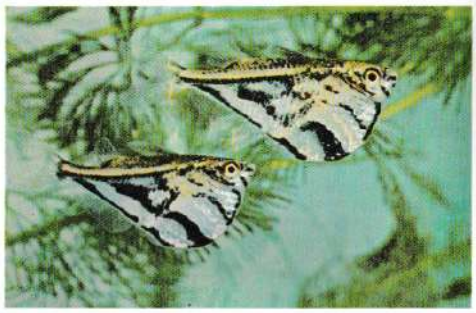


species chronically shipped and sold with this infestation.

2. *The best thing that can be done to prevent outbreaks of oodinium is a good two-week quarantine of all new fish when any observed diseases may be treated without danger of infecting an entire show tank. The best cure for oodinium is the new chelated copper cures which are readily available in all fish stores. At the first sign of disease, the copper should be used. I use half the recommended dosage but treat the tank twice a day until the disease is cured. Filters with activated carbon or marble chips or dolomite must be turned off, as they will remove the copper before it can do its job. Undergravel filters must also be shut off. It is doubtful that a filter with glass wool or Dacron wool will remove copper, so they may be left on. Many hobbyists use a diatomaceous earth-type filter in conjunction with the copper treatment and claim excellent cure rates.*

One common cause for outbreaks of oodinium is a rapid temperature change. Perhaps your heater is not large enough to keep the tank at constant temperature. If you can check the temperature at the top of the tank and at various spots on and near the bottom of the tank, you may find temperature variations caused by poor circulation of tank water. Adding an airstone in one of these regions would remedy this situation. I keep an airstone in all my tanks, no matter how much filtration they have, for just such a reason. The stones are adjusted for medium-size bubbles as opposed to a fine mist, which can cause problems in a marine tank.

A general weakness in the fish may also cause oodinium as well as other diseases. From your letter, it seems as though you are taking good care of your fish, but perhaps you have overlooked one important factor: is the water of the correct composition? To insure this, you should be using a mix that has the proper trace elements in it.



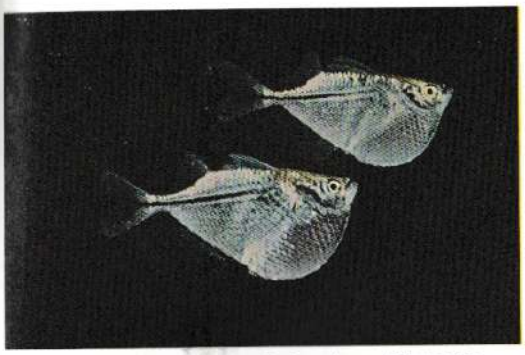
Carnegiella strigata, the marble hatchetfish. Photo by Harald Schultz.

The Marble Hatchetfish

BY ROBERT KREBA

One of the most unusual fish commonly kept by aquarists is the marble hatchetfish, *Carnegiella strigata*. Many aquarists, however, don't fully appreciate their peculiarities. To most of us, the only unusual thing about them is the shape of their body.

In its natural habitat, the marble hatchet is found in small, shaded streams and pools. The water is quite soft, and acid, having a characteristic dark brown tint to it. Weedy areas are avoided. *C. vesca* inhabits similar areas, whereas most of the others inhabit open pools, receiving plenty of sunlight. Water conditions are generally the same. The general appearance of hatchetfishes is well-known to most aquarists, and the marble hatchet is no exception. In coloration however, it is quite different from the silver predominating in its relatives. The back is olive to a rich golden brown. The body is tan at the head, shading to silver at the caudal peduncle. Its lateral line is edged in black, and occasionally bordered with orange. It receives its name, marble hatchetfish, from the irregular brown blotches and bars extending down its sides.



Hachetfishes of two other genera, **Gasteropelecus** and **Thoracocharax**, also are seen offered for sale in the aquarium trade; although the classification of hatchetfishes as to species is a job for an expert, it is relatively easy to distinguish **Carnegiella** from fishes of the other two genera: **Carnegiella** species have no adipose fin. Photo of **Gasteropelecus sterniela** (above) by Harald Schultz; photo of **Thoracocharax** species by K. Paysan.

In the aquarium, most water conditions are tolerated, although soft and acid water is preferred. They can withstand temperatures ranging from 65° to 85° F., although they usually contract Ich if it falls below 70°. They are extremely peaceful fishes, molesting neither their tankmates nor each other. The main problem with hatchets is feeding. Dried foods are usually accepted, but only if it floats. However, except for freeze-dried foods, especially fairy shrimp, they don't exactly thrive on it, and live foods are usually needed to keep them in good health. Swatted flies are good, as are wingless fruit flies (*Drosophila*). Mosquito larvae are appreciated as are *Daphnia* whose shells have been allowed to dry partially (this makes them float).

The hatchetfishes rarely spawn in the aquarium, and when they do, it usually only adds to the confusion. Few reliable reports on their spawning have been published and all those that have contradict each other. One can readily see that this leaves a wide open field for the aquarist with lots of patience, and some spare time on his hands.

Now we come to the peculiarities. The hatchetfish are among the very few fresh-water fish known to science which are capable of "flying" six to eight feet through the air. This is a great aid in escaping predators. In addition, they can leap at low-flying insects. In their home waters, they are known as "surveyor fish" due to the exact straight line that they follow through the air. Obviously, they are incapable of directional flight. Another trick, and one more often seen in the aquaria, is the ability to leap straight up, to a height of about two feet. These fellows need a good cover on their tanks.

Fish Behavior

by Dr. Richard D. Olson

Having given a brief review of how cichlids recognize their young last month, I would now like to present the results of some related research on the orange chromide, *Etroplus maculatus*.

The orange chromide is a medium-sized aquarium fish from India and Ceylon, where it is found in both fresh and brackish water. Following the general breeding procedure of many substrate-spawning cichlids, it spawns about a week after pair formation. Eggs typically hatch in 72 hours, and the young exist in the wriggler stage for 5-6 days before becoming free-swimming. (Wriggler is the term for young cichlids after they hatch but before they become free-swimming.) After caring for the free-swimming young 3-4 weeks, the parents leave the young, spawn again, and the cycle repeats itself.

The research I am going to present this month deals primarily with an interesting behavior, often termed *contacting*, that occurs when the young become free-swimming. Contacting refers to the practice of some young cichlids to eat mucus off the bodies of their parents; this is often the main source of food for the young and occurs in different degrees in many species (e.g., discus).

Ward and Barlow (1967) did a number of experiments to investigate this phenomenon. All of their studies (unless noted) involved the female of the pair and 120 free-swimming young. First, a simple frequency count showed that contacting did in fact occur and that the rate of contacting increased

with age. The number of contacts by each fish increased from two per day on the third day to over eight per day by the nineteenth day. Ward and Barlow also found that after the young reached the seventh day there was a significant increase in contacting by the school following the 10:30 a.m. laboratory feeding.

Once it was apparent that contacting occurred, the next question was where? By marking the body of the parent into a grid they discovered that well over 50% of the total number of contacts were in the parent's ventral region and that very few, if any, contacts occurred in the dorsal region. They further found that individual rate of contacting was not influenced by the number of young in the school. No differences in individual contacting were observed by fishes in schools of 25, 50, 75, 100, and 125 fish. This may explain why a fish can raise its young without personal danger in nature where many young are lost but sometimes is severely damaged and/or killed in an aquarium where many or all of the young survive. For example, because of losses from death and predation, parents that have very large spawns rarely raise a very great percentage of the fry. Thus they experience an acceptable amount of contacting. However, given that the individual rate of contacting does not change as a function of school size, these same parents in an aquarium setting might experience enough contacting to be severely injured.

Perhaps the most important finding from this series of studies for the general hobbyist was that parental care was necessary to raise the young. In aquaria with 120 young and no parents, most young died after three days, and 100% had died by day nine. This is contrasted with approximately 60% of the original 120 young appearing healthy and developing normally after 24 days in aquaria with a parent. Just as was once the case with discus, young orange chromides *MUST* be raised with their parents; if the parents are not present, an acceptable substitute is required.

Quertermus and Ward (1969) continued the work on contacting by filming the behavior on video-tape. Through this procedure they were able to see that contacting did not always involve eating and divided the behavior into two components. The first component was the *micronip*, which was the eating of mucus from the parent's body. The second component was *glancing*, which involved a lateral contact with the parent but did not involve eating. While both behaviors occurred with about the same frequency

during the first three days of free-swimming, micronips became more frequent for a few days and then declined significantly for the duration of the time with the parent. Glancing, on the other hand, continued to increase in frequency during this same period. It was hypothesized that even though the young did not eat during glancing, the physical stimulation of the ventral area of the parent helped to sustain mucus secretion and general parental care.

One final study using *Etroplus maculatus* relates to last month's column. You will recall that while it was initially thought that parents visually recognized their young, it was finally discovered that this recognition occurred through some form of chemo-reception. Cole and Ward (1970) looked at this same problem from the opposite position; i.e., how do young cichlids recognize their parents? It is interesting that three different experiments failed to show that young could chemically recognize thier own parents from foreign parents. However, they could recognize them visually. The primary visual stimulus was the parents' flickering of their dark pelvic fins. This was very reasonable, as Cole and Ward (1969) had already shown that this same behavior was communicative in this species and were now saying that it served as the primary source of parental recognition by young rather than in combination with or secondary to chemical perception. While the fin-flickering varies somewhat with each species, such behavior is often termed *calling*, and generally involves the movement of the pelvic and/or pectoral fins and a twisting of the body.

References

Cole, James E. and Ward, Jack A. The communicative function of pelvic fin-flickering in ETROPLUS MACULATUS (Pisces, Cichlidae). *Behaviour*, 1969, XXXV, 3-4, 179-199.

Cole, James E. and Ward, Jack A. An analysis of parental recognition by the young of the cichlid fish, ETROPLUS MACULATUS (Bloch). *Zeitschrift fur Tierpsychologie*, 27, 156-176, 1970.

Quertermus, Carl J., Jr. and Ward, Jack A. Development and significance of two motor patterns used in contacting parents by young orange chromides (ETROPLUS MACULATUS). *Animal Behaviour*, 17, 4, 1969, 624-635.

Ward, Jack A. and Barlow, George W. The maturation and regulation of glancing off the parents by young orange chromides (ETROPLUS MACULATUS: Pisces-Cichlidae). *Behaviour*, 1-56, XXIX, 1967.

BettaPhile

by Gene A. Lucas, Ph.D.

Sometimes, in spite of everything one can do, things just don't work out right! The following letter was sent to TFH following the IBC Convention last year. It is too old to be timely but, I think, illustrates a point very graphically. Read the letter first and then, if you will, my comments.

"Dear Sirs:

I would like to thank Gene A. Lucas for the information on the IBC Convention.

After one pre-paid reservation, ($17) and one trip with my wife and daughter to Cincinnati, I found that the Holiday Inn knew nothing at all about any convention.

I suppose that I should not complain, because Mr. Lucas may have gotten the wrong information from the IBC, and I suppose that I should be grateful that he did not send me to Texas or Florida.

One discouraged subscriber,
Howard J. Howland
Dearborn, Michigan"

First I'd like to say that this letter made me feel terrible, as it would anyone who is sensitive to the feelings of others. But, in all fairness, I hope Mr. Howland and others who find themselves in similar predicaments would consider the problems accompanying the publishing of information such as this.

The editors serve the hobby by publishing club information such as this free of charge. From the publisher's point of view, the only thing that can be done is to take information, make reasonable attempts to ensure its accuracy, and publish. Time lags are involved. Once publications have been distributed little can be done. *If* plan changes are made *soon* enough, appropriate notice can be given. Beyond this, things are out of hand!

Regarding last year's Cincinnati convention, Mr. Howland, I'd like you to know that the IBC officers and members of the Board of Directors (myself included) attended a board meeting at the Holiday Inn in Cincinnati the previous Thanksgiving weekend. I personally sat in a meeting room where arrangements were made for the convention, rooms, etc., with the Inn personnel. We all traveled to Cincinnati (a 600+mile trip for

us) stayed several nights and ate meals (and spent *our* good time and money!) planning and preparing for the convention . . . on behalf of the members!

Because of a comedy(?) of errors, at a very late date . . . and due to some mix-up known (as far as I know) only to the management of that Holiday Inn, we were *out!* A "Bettagram" was circulated to the membership telling of the required changes. Due to hasty, poor, last minute arrangements, IBC went over $500 in the red! The officers and board members (myself included) almost to a man contributed $25 each (on a loan basis) to bail the club out. I haven't the foggiest idea why you were told by the Holiday Inn that they never heard of this convention. I'm sure they can check their records and find over $1,000 left there by our group on that Thanksgiving weekend!

I'm pleading for understanding, Mr. Howland. I'm sure an ex-

planation exists for every snag that developed. I ask you to recognize that I, TFH, and IBC presented everything in good faith to the best of our ability. I'm sure our problem developed innocently enough through perhaps personnel changes at the Inn. Even there I assume the persons you talked to honestly were unaware of us and our problems. It cost *all* of us . . . time, money and good will.

Please accept my sincere regrets . . . and don't give up on IBC for reasons beyond our control!

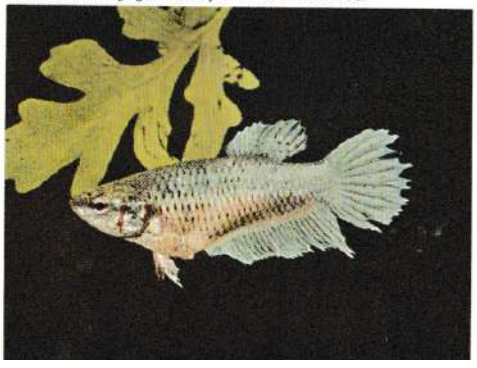
Q. 1. I raise bettas and lately have had some problems. They breed, but the eggs never hatch. I pick plump, healthy, females. Could they have fattening and if so, what could I do about it?

2. When I do have a successful spawn, the fry, when they are about one inch long, get sick. They swim with their tails up and fins folded and spend most of their time on the bottom. What have they got and what should I treat them with?

Jill Wyatt
Boise, Idaho

A. *I always hate to admit being uninformed, but I've never heard of "fattening" as you use it. If you mean that the fish might get too fat, I expect they could. An over-fat fish could be expected to have some health and condition problems, just like an overly fat person or a dog or cat. I suspect many people pick females that* look *robust but may be past their reproductive prime. If this is the case,* nothing *can be done about them.*

Not every female betta that's plump is ready to spawn. In some cases the rounded belly area in the fish might be the result of disease rather than the containment of eggs, and in other cases females that look as if they can spawn will not spawn, primarily because they are past the breeding age. Photo by Dr. Herbert R. Axelrod.



The solution to your problem lies in the selection of females with the best probability of breeding success. I would select medium-sized fish with egg-filled ovaries. The ovary shows through the sides of most females as a creamy white triangular area almost centered in the side of the fish. If you use two or three females and replace one if there are no results, you will have done about all you can do.

The young, inactive fish with folded fins could be suffering from any of a number of things. One thing they often need after the rich feeding fry normally get is a change of water (half to two-thirds won't hurt if you use properly conditioned water). A change often gives miraculous results. If they really have something, it's difficult to tell much from your description. They fold their fins for almost any reason that causes them to feel below par.

I'd try the clear water, then watch the fish closely. If they don't improve or show signs of looking "dusty" (a buff-colored minute covering), they probably have "velvet," a pesky problem with Bettas. It is tough to treat. The most effective cures seem to be with copper or formalin medications. Check with your dealer for types and concentrates, as a number are now available and I prefer not to select a "best" when I have been unable to find one. Follow directions carefully and completely. Reinfection is a chronic problem. Don't let the condition of other fish in tanks fool you: healthy-looking fish of other species may carry the organisms and transfer them to highly susceptible types like bettas.

Rift Lake Cichlids Masterpiece!

"Outstanding among these animals are fishes of the family Cichlidae, of which several hundred species are known from African lakes. A very small number of these are familiar to aquarists, to whom the family as a whole is, however, well known, but information concerning most of them is to be found only in scientific publications. It is the purpose of this book to gather together this information and, against the background of the lakes themselves, to present a picture of the fishes, the lives they live, and the biological phenomena which they so abundantly and often dramatically demonstrate."

The paragraph above appears on page 1 of *The Cichlid Fishes of the Great Lakes of Africa*, and the text and illustrations continue for another 609 pages (exclusive of the index). In those pages the authors have succeeded admirably in completing the task they have set for themselves. The information *has* been gathered . . . painstakingly, completely, with an attention to detail that could only be the product of the authors' scientific training and their great interest in the subject. A picture of the fishes and their lives and the biological phenomena they so dramatically demonstrate *has* been presented . . . with a clarity and flair that can result only from the basic writing talents of the scientist/authors involved in the project.

We at TFH were impressed with the idea behind this book long before we ever saw anything on paper. We knew that there was a definite need for a truly comprehensive treatise on the cichlids of the Rift lakes of Africa, and we knew also that there were very few people in the world who would be able to do what had to be done to create the book the aquarium world in general and cichlid specialists in particular needed and wanted badly. When we learned that Drs. Fryer and Iles were at work on compiling just such a book, we knew that half the battle had been won, because their reputations for scholarship preceded them. Then when we saw galleys of the text of the book, we knew that the battle had been won completely: we had never before seen a single effort about aquarium fishes that could match the Fryer and Iles treatment in scope or depth of detail. It was at one and the same time the most ambitious and absorbingly interesting restricted-topic fish book we had ever seen.

This book has been published in two separate editions. The respected Scottish publishing house of Oliver & Boyd did all of the

necessary preparatory work of handling the manuscript, setting the type, reading the proofs, laying out the book, etc. Oliver & Boyd then published the British edition of the book. Through a special arrangement with the authors and publisher, T.F.H. Publications was able to obtain the rights to publish an American edition. The American edition (which is also the Canadian and Australian edition) was to be the same in every respect as the British edition, except that the American edition would contain more color photos of African cichlids than the British edition. And even though we were finally unable to add as many color photos as we had planned in the first edition, the basic arrangement remained the same: the only significant differences between the British and American editions is that the American edition contains more color photos (and also a few more black and white photos) and that some of the photos are positioned within the book differently. Also, the American/Canadian/Australian edition costs less.

It would be impossible to catalogue within a few pages all of the wealth of knowledge about the African Rift lakes cichlids that this enormously instructive work contains. At best, we can simply show you a few of the illustrations and representative excerpts from the text. You can form your own opinion as to whether the authors have been successful. But we can tell you what the book is not: it is not a basic aquarium hobby reader with major emphasis on providing step-by-step instructions in the elements of aquarium care. It is basically a masterful examination of exactly what its title and subtitle proclaim it to be, the biology and evolution of the cichlid fishes of the great lakes of Africa, and its major emphasis is on the evolution of reproductive behavior in those African cichlids. It is a beautifully and usefully illustrated book, but it is not a "picture book"; most of the illustrations are in the form of line drawings, not photos. And it is not a greatly colorful book; it contains only 16 pages in color.

Incidentally, *The Cichlid Fishes of the Great Lakes of Africa* synthesizes the information gleaned from both laboratory and field exposure to the subject. Dr. Fryer, now with the Freshwater Biological Association, Ambleside, and Dr. Iles, of the Fisheries Laboratory, Lowestoft, were stationed in Africa with the now defunct British Colonial Office for some time. They and their work are familiar to and admired by cichlid fans the world over.

As the book itself says: *Ex Africa semper aliquid novi.* This is the newest and, for aquarium hobbyists at least, the best.

P. S. We just received word that Geoffrey Fryer, the senior author, was just appointed a Fellow of the Royal Society! A high honor, well deserved!

Haplochromis euchilus, an endemic species of Lake Malawi. Photo by H. Hansen, Aquarium Berlin.

Hemihaplochromis multicolor. Photo by Wolfgang Bechtle.

Two individuals of *Labeotropheus trewavasae* of Lake Malawi. The upper fish, a male, is an example of the "normal" morph, the lower, a female, of the "peppered" morph. This is another member of the Mbuna group. Photo by Dr. Herbert R. Axelrod.

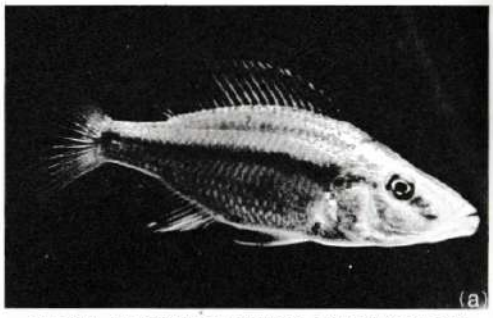


Plate 2 (a). *Haplochromis compressiceps*, the Malawian eye-biter. Photo by Dr. Wolfgang Wickler.

Plate 5 (b). Social appeasement gesture of *Tropheus moorii*. The fish on the right is giving the quiver display which is a gesture of appeasement. Photo by Dr. Wolfgang Wickler.

Plate 6(a). Fertilization in *Tilapia macrochir*. The female, with eggs in her mouth, is mouthing the genital tassel of the male, from which the sperm thread is hanging, clearly visible on the left. This later is sucked into the mouth, where fertilization occurs. Note the ventral bulging of the floor of the female's mouth, typical of mouth brooders when eggs or young are being carried. Photo by Dr. Wolfgang Wickler.

The accompanying illustrations and quoted portions of text are excerpted from *The Cichlid Fishes of the Great Lakes of Africa*, by Geoffrey Fryer and T. D. Iles.

"... Now, while young *Tilapia* occur in this very shallow water, young *Haplochromis* live further out where the water is cooler, or on more steeply sloping beaches where such thermal gradients are not established, and from which young *Tilapia* are absent. Experiments have gone a long way towards explaining this difference. Young *Tilapia* can withstand higher temperatures than can young *Haplochromis* and can in fact live in temperatures which are lethal to young of the latter genus."

"Gradually the yolk is absorbed and the larva increases in size. Its first feeble movements become more animated until finally the tail is able to thresh vigorously from side to side and, if removed from the parent's mouth, the little fish is able to swim for short distances before the yolk sac drags it down."

Rumor Planted

Q. I recently took some plants from our lake, cleaned and sterilized them, and then planted them in one of my aquariums. One of my friends tells me that they give off harmful chemicals and can kill my fishes. I do not know their name but they can be purchased in any pet shop; the only difference is that mine are wild. Can you tell me (from the drawing enclosed) the name of this plant and whether or not it can harm my fishes?

Melinda Foote
Peterborough, Ontario, Canada

A. *Obviously you are mistaken about the same plant being available from dealers or you would know that it is not harmful to fishes and they could tell you the name. You do not indicate whether you gathered the plants from an area of limited or of extensive growth, which might serve as a possible clue to whether the plant had been introduced (perhaps discarded by a hobbyist) or is a native one. It could be* Echinodorus tenellus *or a discard of the Brazilian* E. brevipedicellatus *or of any of several species of* Vallisneria. *Your drawing also suggests a* Sagittaria, *possibly* platyphylla, *but we elect* graminea. *Whatever the plant, reassure yourself regarding its reported toxicity by placing a couple of guppies or other inexpensive fish in a small tank or gallon jar containing a generous growth of the suspected plant.*

Sagittaria graminea. Photo by R. Zukal.

Turncoats All

Q. About a month ago I purchased two young (about 2-inch body length) white red-cap orandas. As a temporary measure they were put into an unheated aquarium with water between 7.0–7.2 pH and about 74–76° temperature. They have both grown well on a high protein goldfish food supplemented by freeze-dried brine shrimp and vegetable-based foods. My problem is that one of the fish has lost the red coloring of his cap and of marking on his tail fin. His cap is now a pale salmon color. Neither my dealer nor his supplier has ever heard of an oranda losing its color. Can you help unravel my mystery?

Oranda goldfish. Photo by Laurence E. Perkins.

Laura Beadleston
Weathersfield, Connecticut

A. *No color change reports on orandas can be recalled, but orandas are merely a variety of goldfish and goldfish are subject to color changes, particularly during their second summer. It is thus our guess that your fish is perfectly normal.*

Multiple Troubles

Q. Over the past thirteen years of extreme interest in keeping and raising tropicals, the mortality rate in my tanks has been tremendously high. From the articles in your magazine, plus other reading I've done over the past few years, I now know that the disease rate here is much too high. I would like to have beautiful tankscapes such as your magazine shows, but up to now the replacement of the fish has cost too much. I think the biggest trouble for me has been my under-sand filters. Do they really filter as well as they should? I would like to know if you have to clean these tanks as often as twice a month as I have recently read. Just how do you keep growing plants alive? I have yet to see growing grass plants in any of the shops in the Minneapolis area and would like to know just where I could purchase such plants.

Joan R. Emerson
Cushing, Wisconsin

A. *We have used undergravel filters and found them to be as efficient and satisfactory as the previously developed (inside and outside) type of filters. Each type has both good and bad points, and each hobbyist must choose what best suits his purposes with each set-up, sometimes using a combination. Twice annual cleaning of a tank would be reasonable (though oftener than is our practice) with undergravel filters; with more-easily removable filters, there should be no need to break down a set-up. You must be neglecting several facets of maintaining a healthful aquarium and are put to unnecessary work and are still losing fishes because of it.* Grass plants *is a term unfamiliar to us; tell*

your dealer what you have in mind and ask him about source of what you want.

Many letters are received from hobbyists who state that particular species of fishes or plants are not available in the area, and many letters reveal that the writers believe that quality of water or other condition in the area presents difficulties for aquarists. To you, as to such correspondents, we cannot offer better advice than that the best source of information on local conditions is a local dealer, and the second best source is a successful fishkeeper in that area, who almost surely belongs to a society and will be happy to see you at a meeting and to discuss your problems with you.

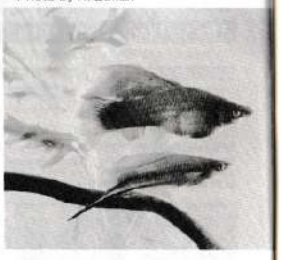
All Are Kissing Cousins

Q. Approximately three months ago I purchased a male Simpson swordtail and crossed it with a female green swordtail. Only one of the fry remains and it has looked like a green swordtail until recently but now has a few orange stripes. Has an occurrence like this every been reported? How long does it take to mature?

Steve Kavanagh
Chicago, Illinois

A. *The common swordtail is* Xiphophorus helleri *despite how many names have been given to assorted variations and to the multitude of crosses between species of the genus* Xiphophorus. *There have been so many of these crosses between the various swords and platies that it is rather unlikely that there are any unmixed members of the genus in the hobby. A swordtail customarily is fully mature in 6 to 8 months.*

Hi-fin (Simpson) swordtails. Photo by R. Zukal.

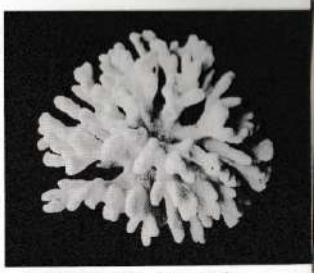


South Seas Reminder

Q. I have a beautiful piece of white coral and I would like to use it in one of my aquariums but it has not been treated and makes the water very cloudy. I would like to know what process is usual to get the salt and other water-clouding accumulations out of the coral.

John Foley
Vancouver, Washington

A. *The first thing usually done is to soak the coral for an hour or more in a sterilizing bath to assure that no living organisms lurk within. Bleach is customarily used for this purpose. To leach out the salt and flush debris from interior chambers, it is necessary to use running water; first hold the coral beneath the faucet for clearing debris, and then put it in a basin with slow-running water for several hours,*



Cured finger coral. Photo by Dr. Herbert R. Axelrod.

or to soak in a container for several days, changing the water at least twice daily. But you're still better off by keeping coral out of a freshwater tank in the first place.

Sardine Fashion?

Q. How many fancy guppies will fit comfortably in a 5½-gallon aquarium?

Sharon Ramos
Hicksville, New York

A. *How many depends mostly upon the area of the water surface; but, in any case, the mostest isn't the bestest. Age and size of fish, water temperature, whether or not you have aeration and filtration, etc. are also determining factors. No matter how few are put in, the tank will very soon be overcrowded if both sexes are represented.*

No Such Critters!

Q. I have two bumble-bee catfish. They are the same in only one way —in having the name bumble-bee. One is almost black with cream-colored bands, and has a deeply forked tail. My other one is new to me. It is brown with light brown markings, and its tail is hardly

Leiocassis siamensis. the catfish species most often sold under the name "bumblebee catfish." Photo by G. Senfft.

forked at all. It has a much bigger mouth than the other one. I think the first fish is *Leiocassis siamensis*, as it resembles the picture in *Exotic Tropical Fishes*. Can you tell me what the other one is?

Doug Haas
Crown Point, Indiana

A. *Yes, one probably is* Leiocassis siamensis; *the other could be a* Microglanis *species . . . or any of a number of other fishes besides. Since there are many irregularly patterned brown catfishes not having forked tails, we really can't say.*

Serving Iced Tea Won't Help

Q. My 15-gallon tank is on the third floor of our house, where it is extremely hot during summer. Because of this, fans must be kept going most of the day or it is unbearable. I would like to know if you think the heat will affect the temperature of the water in the tank. If so, what should I do?

Stephen Miller
Middlebury, Connecticut

A. *Any change in the temperature of the air will be reflected in the temperature of the water, though more gradually. As such change would be more gradual in larger bodies of water, it is obvious that increasing the size of the aquarium (accommodating the same number of fishes) would lessen the discomfort liability.. Placement of the tank beyond the reach of direct sunlight will also help, as will occasional addition of ice cubes, placing an electric fan to direct a breeze upon the water surface, and such other means as have been often suggested to hobbyists. A rather extreme measure we have not yet seen suggested is covering the fish tank as Mexican-Americans used to do with their ollas (water jugs); a heavy cloth (as burlap) or several thicknesses of cloth is sopped in water and wrapped around the jar. A small tank could be so covered (leaving the front open if desired); unless the situation is such*

that part of the cloth can hang into a container of cold water to keep the covering damp, it will be necessary to wet the cloth several times during the day.

Transporting Piranhas

Q. Can you bring tropical fish from one country to another country without having troubles with customs? If so, what can I use to keep piranhas quiet so they won't break the bag?

Milton Takao
c/o F.P.O., Seattle, Washington

A. *Besides customs regulations, there are often restrictions within a country (as with our states' regulations) prohibiting entry and sometimes of removal of certain animals and plants. One must check with authorities of the region concerned and also bear in mind that laws and regulations are subject to change. At the present time some of our states ban possession of certain fishes and among these are some that federal rules have since banned for importation except under very specific circumstances. Piranhas are included. Commercial shippers sometimes use drugs to quiet fishes during shipment, principally because tranquilized fishes are less active and thus require less oxygen, so that greater numbers can be accommodated in a given size container and volume of water, reducing costs.*

No More Fire

Q. Recently I purchased two 2½-inch firemouths. I kept them in my community tank for one week. After that week there was not a speck of red on either fish. I then moved them into a 2½-gallon aquarium by themselves. The temperature is 78°. After five days in that tank there is still no red. What am I doing wrong?

Eddie Hempel
Mountainside, New Jersey

A. *By now you know that nothing serious was amiss and your pair of* Cichlasoma meeki *have regained the red coloration that led to their being called firemouth. A few species of fishes lose some coloration in captivity; many species will do so when food or environmental factors are unsuitable, but a great many will suffer some temporary color loss or change when put into strange surroundings. This would be expected if your small cichlids were put into a tank containing any large fishes; bulky neighbors and a strange environment are reason enough for a period of uneasiness marked by color loss.*

Firemouth cichlid with flared gill membranes. Photo by G. Marcuse.

Pairing Up by the Numbers

Q. In order to allow me to proceed to interesting experiments in fish hybridization, I need to know the number of chromosomes of the different well-known aquarium fishes. If you are not in possession of this information, is it possible to examine and count the fishes' chromosomes with a common microscope (1200X)? Please give details of how, coloring agents, etc.

Th. Gistelinck
Dilbeek, Belgium

A. *It is suggested that you address your enquiry to J. J. Scheel, University of Copenhagen. Colonel Scheel has for some time been making microscopic examination of chromosomes of fishes, and his writings and photographs are very well-known*

among hobbyists and scientists alike. Following is a listing of the diploid chromosomal complement of a number of fishes.

Aphyosemion: arnoldi 38, australe 30, calliurum 32, calliurum ahli 36, cameronense 34, cinnamomeum 40, exiguum 36, filamentosum 36, gulare 32, labarrei 28, louessense 20, ndianum 40, sjoestedti 40, walkeri 36.

Aplocheilus: blockii 48, dayi 48, lineatus 50, panchax 36.

Epiplatys: annulatus 50, barmoicnsis 34, bifasciatus 40, chaperi 50, dageti 50, esekanus 42, fasciolatus 38, grahami 46, nigricans 34, sexfasciatus 48.

Nothobranchius: guentheri 38, palmquisti 36, orthonotus 36, rachovi 18.

Roloffia: bertholdi 42, geryi 40, guinensis 38, occidentalis 46, rolloli 42.

Carassius auratus 94, Cheirodon axelrodi 52, Cyprinus carpio 104, Fundulus heteroclitus 46, Gambusia holbrooki, 36, Heterandria formosa 46, Hyphessobrycon stictus 50, Pachypanchax playfairi 48, Paracheirodon innesi 32, Phallichthys pittieri 46, Poecilia (*formerly* Lebistes, Limia, *and* Mollienesia) 46, Pterolebias peruensis 54, Xiphophorus helleri 48, X. maculatus 48.

SUPPORT YOUR LOCAL AQUARIUM SOCIETY

Writers Wrestle with Words

Q. I have recently acquired four baby albino *Corydoras*. The dealer, who has bred this species, told me to use sand on the bottom of the tank. The book *Breeding Aquarium Fishes*, by Dr. Axelrod, says to use no sand or any other type of bottom. Which should I use?

Mike Bradley
Shreveport, Louisiana

A. *It makes no difference whatsoever, but a bare tank makes observation easier if you are interested in noting details. The book cited discusses breeding four species of* Corydoras. *On* C. aeneus *instructions are: ". . . put her with one or two males in a bare tank of at least 15 gallons." Of* C. paleatus *it is stated that they spawn exactly like* C. aeneus *and that the spawning site may be a leaf, a rock or a portion of the side glass. On* C. metae *the book statement is*

Corydoras aeneus spawning: two males nudging heavy female. Photo by R. Zukal.

that the tank should contain several large smooth rocks and spawning grass, with mulm and dirt along the bottom. Of C. caudimaculatus *it is said that spawning takes place in the usual* Corydoras *manner and that females will clean a spot on a leaf or the glass side. Except for the expression* bare tank, *once used, there is no hint of such wording as you reference, and the numerous photographs show spawning activities in all sorts of set-ups. A bare tank will serve, and has certain advantages, only one of which is mentioned above.*

Scared to Death?

Q. My new veiltail guppy female had a batch of fry a few days ago. They were all born too early and none were born alive. But instead of having live babies she laid eggs. On some you could see the figure of the fish. My first conclusion was that she had been frightened very badly although I take great care not to frighten my fish. She could have been frightened by a shopper at the petshop. Or could I have done something wrong?

Diane Howeth
Abilene, Texas

A. *Goggling customers in a shop and the normal attentions hobbyists give fishes are not likely to frighten them. Being netted for transfer from one place to another is, of course, frightening, and such an event a few days before a clutch of fry are ready for expulsion could upset a molly enough to trigger disaster. Guppies, however, are less easily upset; an environmental factor (radical difference in quality*

or temperature of water between shop and home, for instance) was most likely operative, to cause the premature dropping of fry. In some instances of premature ejection, the fry will have egg-sacs and resemble egg-layer fry. Survival of such fry depends largely upon the stage of their development. What you mistook for eggs were embryonic fish in various stages of development. Have no concern regarding this occurrence; unless your female has some abnormality, she is by this time acclimated to her environment and will produce living fry.

How About Zebras?

Q. I would like to know some tips on breeding blackstriped tetras.

Steven Dvorak
Deer Park, Washington

A. *We have heard of black tetras and black-line tetras, also of black-striped killifish and black-striped rasboras, but the name you give (sure you didn't make it up?) is one we have not heard or have forgotten where it fits into the goofy puzzle of common names. When you learn the real (scientific) name of your fish, you will probably have no trouble finding a book that tells what you want to know.*

THE NOBLE BETTA

With flowing fins
And glittering scales,
The prettiest fish
Are betta males.
Always ready
For another fight,
They only rest
In the dark of night.
If you've ever seen
A betta fight
You'll know he thinks
He's always right.
He tears and rips
With dreadful might,
Until his rival
Can no longer fight.
The betta attacks
With lightning speed,
A second chance
He does not need.
With all this ferocity
One does not doubt,
That the noble Betta
Will win the bout.

—Pam Dumpert

Continued from Page 3

April 27, 1972

PROPOSED POSITION STATEMENT ON
EXOTIC AQUATIC ORGANISMS' INTRODUCTIONS

Prepared by the Exotic Fishes Committee, American Fisheries Society.
Dr. Herbert R. Axelrod, Chairman.

Our purpose is to formulate a broad mechanism for planning, regulating, implementing, and monitoring all introductions of exotic aquatic species.

Some introductions of species into ecosystems in which they are not native have been successful (e.g coho salmon and striped bass) and others unfortunate (e.g common carp and walking catfish).

Species not native to an ecosystem will be termed "exotic." Some introductions are in some sense planned and purposeful for management reasons, others are accidental or are simply ways of disposing of unwanted pets or research organisms.

It is recommended that the policy of the American Fisheries Society be:

1. Encourage exotic fish importers, farmers, dealers and hobbyists to prevent and discourage the accidental or purposeful introduction of exotics into their local ecosystems.

a) Support legislation prohibiting all ornamental aquarium fish importers, exotic fish importers, hobbyists, breeders, dealers, governmental employees and fish farmers from releasing living, dead or dying fishes into any water system, but encouraging drywells, dikes and moats for the preservation of the ecosystem from accidental introduction of exotic fishes and fish diseases.

b) Urge the establishment of four Federal Fish Disease and Fish Culture Stations, similar to that already established as the "Eastern Fish Disease Laboratory" in Leetown, West Virginia, in or near Miami and Tampa, Florida, Los Angeles, California and New York, New York where the majority of exotic fish businesses are located, to assist exotic fish dealers, importers, etc., in the control of fish diseases, the culture and identification of exotic species, and to evaluate, control and monitor exotic introductions into these areas.

c) Urge the accurate completion of existing Federal documentation for the compliance with Customs and Interior Department regulations. Form 3-177 "Declaration for Importation of Fish or Wildlife" is grossly abused, with deflated costs and generally incorrect scientific and common names.

2. Urge that no city, county, state or Federal agency introduce, or allow to be introduced, any exotic species into any waters within its jurisdiction which might contaminate any waters outside its jurisdiction without official sanction of the exposed jurisdictions.

3. Urge that only ornamental aquarium fish dealers be permitted to import such fishes for sale or distribution to hobbyists. The "dealer" would be defined as a firm or person whose income derives from live ornamental aquarium fishes.

4. Urge that the importation of exotic fishes for purposes of research not involving introduction into a natural ecosystem, or for display in public aquaria by individuals or organizations be made under agreement with responsible governmental agencies. Such importers will be subject to investigatory procedures currently existing and/or to be developed, and species so imported shall be kept under conditions preventing escape or accidental introduction. Aquarium hobbyists should be encouraged to import rare ornamental fishes through such importers. No fishes shall be released into any natural ecosystem upon termination of research or display.

5. Urge that all species of exotics considered for release be prohibited and considered undesirable for any purposes of introduction into any ecosystem unless that fish shall have been evaluated upon the following bases and found to be desirable:

a) RATIONALE. Reasons for seeking an import should be clearly stated and demonstrated. It should be clearly noted what qualities are sought that would make the import more desirable than native forms.

b) SEARCH. Within the qualifications set forth under RATIONALE, a search of possible contenders should be made with a list prepared of those that appear most likely to succeed, and the favorable and unfavorable aspects of each species noted.

c) PRELIMINARY ASSESSMENT OF THE IMPACT. This should go beyond the area of rationale to consider impact on target aquatic ecosystems generally, effect on game and food fishes, on waterfowl, on aquatic plants and public health. The published information on the species should be reviewed and the species should be studied in preliminary fashion in its biotope.

d) PUBLICITY AND REVIEW. The subject should be entirely open and expert advice should be sought. It is at this point that thoroughness is in order. No importation is so urgent that it should not be subject to careful evaluation.

e) EXPERIMENTAL RESEARCH. If a prospective import passes the first four steps, a research program should be initiated by an appropriate agency or organization to test the import in confined waters (experimental ponds, etc.). This agency or organization should not have the authority to approve its own results or to effect the release of stocks, but should submit its report and recommendations for evaluation.

f) EVALUATION OR RECOMMENDATION. Again publicity is in order and complete reports should be circulated amongst interested scientists and presented for publication in the TRANSACTIONS OF THE AFS.

g) INTRODUCTION. With favorable evaluation, the release should be effected and monitored, with results published or circulated.

Because animals do not respect political boundaries, it would seem that an international, national and regional agency should either be involved at the start or have the veto power at the end. Under this procedure there is no doubt that fewer exotic introductions would be accomplished, but quality and not quantity is desired and many mistakes might be avoided.

Under bright lighting, the metallic violet sheen along the sides of the fish is evident and adds to the attractiveness of the species, although even under the best of conditions the scissortail rasbora cannot be called a really colorful species. Photo by Dr. Herbert R. Axelrod.

The Scissorstail Rasbora

Rasbora trilineata

BY DR. HERBERT R. AXELROD

For many years every fish in the genus *Rasbora* was considered as a very difficult fish to breed and keep alive! The basis for these judgments was the terrible experience everyone had with "the" *Rasbora*, meaning the most popular of all rasboras, *Rasbora heteromorpha*. In the old days, before 1954, *Rasbora heteromorpha* were collected by the millions in the streams outside Singapore, brought into the city and stored in huge glass bowls until one of the four or five fish buyers arrived. In 1952 I made the trip to Singapore, com-

An obviously roe-laden female **R. trilineata**. There is no great difference in the colors of the sexes, even at spawning time, but ready-to-spawn female scissortail rasboras are larger than males of the same age and so much rounder and heavier in the belly area that the sexes of well-conditioned fish are easy to tell apart. Photos by Ruda Zukal.

Above: a head-on view of the spawning pair, showing the obvious differences in body contour between the male (right) and female.

peting with Auguste Rabaut for the purchase of 250,000 *Rasbora heteromorpha*. I was able to buy them all for US $2,000, which is less than 1¢ each! I then put them into plastic lined wooden boxes on board a ship and cared for them hourly on the two month journey to America. By the time I reached Staten Island, New York I had lost about 100,000 of the 250,000. Within the next ten days, as their water was changed and changed, more were lost until, I estimate, probably 50,000 of the original 250,000 reached petshops. At that time I sold them for 75¢ each as the basic wholesale price. Of course, I had the chance to bring in many other fishes at the same time since my cost of the air conditioned, heated room on the boat was the same regardless of how much I put into it.

While collecting *Rasbora heteromorpha*, many other species are caught as well, and when the collectors separated the various species from the "money fish," a few odds and ends always escaped their quick eyes. On this particular trip in 1952 I ended up with a few hundred scissorstail rasbora, *Rasbora trilineata*. What impressed me most about this fish is that none died on the whole trip!

After selling most of the fishes I brought from Singapore, I was left with the same few hundred scissorstails; nobody who saw them wanted them. I had to sell them to someone who didn't know what they looked like, for their drab appearance certainly didn't help their cause when compared to *heteromorpha*.

When the boat docked in New York with the fishes, I usually rented an empty store and set up shop for a week until I sold everything I had. When I was left with anything, I would call up some of the larger dealers and offer them special prices. There were no takers at any price for the scissorstails. So, just as I was about to throw them into formalin and allow some of my students to study them at New York University, I received a telephone call from a friend in Florida, a fish farmer, who wanted to know if I had any "oddballs worth breeding." I almost said "No," when I saw the only fish left in the store . . . *scissorstails*. "Would you like a new *Rasbora*?" "Sure would," came the reply, "how much are they?" The deal was made and when my friend in Florida saw the fish he refused to pay me for them, and at that time I couldn't blame him.

About a year later the market was flooded with *Rasbora trilineata*. My "friend" in Florida successfully bred them and they became very popular because they were so graceful, hardy and peaceful. Just the right kind of fish to go with a peaceful community aquarium.

Even to this day, the scissorstail rasbora is the only *Rasbora* species bred in any quantity in Florida . . . or any place in the world, for that matter.

Here and on the opposite page are portrayed the spawning antics of **Rasbora trilineata**. The male, the much slimmer fish in all photos, vigorously pursues the female at all levels of the tank in an attempt to drive her into the plant thickets in which spawning will occur. The eggs are expelled in small bunches rather than all at once, and the mating activities of a healthy pair can go on for hours until all of the eggs are released. Photos by Ruda Zukal.

You, too, can easily breed this hardy, peaceful fish. The spawning tank should be small, not larger than ten gallons, planted heavily with bushy plants or artificial spawning grass. The water should be in the high 70's, slightly acid with a pH of 6.2 to 6.9, and as soft as possible. Artificially softened water is the best as that is what is used in Florida where the water is naturally hard and very alkaline. The breeders, which should be about two inches long or larger, should be easily sexed. The male is very slender both from a top view and a front view, when compared with a bulging fat female. Two males for each female is advised.

The males will chase the female into the thickets, one at a time usually, rubbing against her in a parallel head-to-head position, expelling about 20 eggs at each spawning attempt. Several hundred eggs are laid. If the breeders

Below: a side view of the pair. Photo by Ruda Zukal.

have been well fed (they eat everything), they usually won't eat their own spawn.

I usually raise the temperature of the water to about 85° to induce spawning, but this isn't necessary as many of my colleagues spawn the fish equally well without any temperature adjustments. At 85°, however, the eggs hatch in less than 24 hours, so be prepared to remove the parents the first evening whether they have completed spawning or not.

The fry do best on infusoria for a week before they are offered newly hatched brine shrimp. If only brine shrimp is available, then about 40% of the fry will be lost as there will be many which are too small to eat this relatively large food. In all cases offer your newly hatched fry only the San Francisco variety of newly hatched brine shrimp, as the Utah shrimp are too large for most newly hatched egg-laying fishes.

"MY FEET WERE KILLING ME."