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cover

Rasbora einthoveni. Photo by Dr. Herbert R. Axelrod.

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EDITORIALLY . . .

For the past five years or more, this magazine has been very closely associated with Miracle Pet Products, simply because it was owned by the same people who owned Miracle. Times have changed. As of last month's issue, the new owner of the magazine is Dr. Herbert R. Axelrod. Dr. Axelrod has resigned from the Directorship of Miracle and will devote his time to this magazine and the TFH line of pet books.

Now that we have Dr. Axelrod's talents back, you'll be getting more new fishes...more expeditions...and more tips on how to have more pleasure from your fishes. During his 43 years of life, Dr. Axelrod has introduced or popularized more than 340 new species of fishes to the aquarium hobby including, but not limited to the polka-dot catfish, the cardinal tetra, the black neon, the longfinned black tetra, the blue and green discusfishes, 14 species of Corydoras and various European-bred fishes which have found ready markets in America.

I know you will all join me and the rest of the staff in welcoming Dr. Axelrod back to the fold! Now that he can devote his considerable full-time energies to publishing projects once again, we'll soon release a flood of important new titles, books written by fisheries biologists, fish pathologists and ichthyologists for both hobbyists and students. We have already been honored with the adoption of our TEXTBOOK OF FISH DISEASES as a standard text for use in seven university courses.

Neal Pronek

Juvenile Belontia signata.

Belontia signata

By Hans Joachim Richter
(Photos by the author)

An adult male combtail. The reddish coloration of the fish deepens as it ages, while the ocellus in the rear of the dorsal fin becomes less and less distinct. Photo by Dr. Herbert R. Axelrod.

Whether simple fancier or expert breeder, any aquarist is glad when he is enabled to get a fish that has been on his "wishing" list for a long time, but which he had never before been able to acquire. His joy is even greater still if, upon receiving the fish, he is able to ascertain that his idea of the looks of the respective species is far surpassed by reality. This at least was what happened to me when, after placing two specimens of *Belontia signata* in my 87.5 gallon tank, I was able to view the fish in all their gorgeousness.

Of three I acquired, one small and weakened specimen soon died. The fish that survived had a length of four and a half inches and showed

Very young combtails, showing the distinct ocellus in the rear portion of the dorsal fin.

a yellowish basic color. I must confess that with this color, the fish at first disappointed me considerably. But within a few days my viewpoint altered.

This fish had been the dream pet of many fanciers of anabantids in Eastern Germany, who considered it the most beautiful of the group. The combtail with its wonderful brick-red coloration charms any viewer and reaches a length of about five inches. For this reason it should have a tank of generous size. Despite the fact that *B. signata* may be kept in relatively small tanks and will eat all kinds of food, its real beauty will be revealed with live-foods feeding in a roomy tank. Baby guppies fed from time to time will be especially relished.

According to the latest reports, the genus *Belontia* is found on Sumatra, Java, and Ceylon. The native range of *B. signata* is restricted to Ceylon and *B. hasselti* (Cuvier and Valenciennes) is found on Java and Sumatra. On Sumatra the latter species is popularly named "Belontya," and the name of the genus *Belontia* is thus derived. According to Bader, *B. signata* is not found in all waters of Ceylon. Bader and Geisler caught the species in the mountainous region of Sabaragamuwa, not far from Ratnapura, where the Andonwa river threads mountain valleys at an altitude of about 1000 feet. The river bottom consists of grit and sand and water of knee-high depth flows during the catching season. The river itself contained no aquatic plants, but its banks were overgrown with *Lagenandra ovata*.

The water tests made by Geisler during the collecting period yielded the following results:

Total hardness of the water	65° DH
pH value	6.68
Total contents of iron	.13 mg/ltr
Temperature of the water	83°F.

At first this water analysis will probably dismay many a fancier as being impossible to maintain without continual "tampering" to establish optimum conditions for breeding. This, however, is not the case.

In the growth and maturing of *B. signata* there occurs a fundamental change of colors. While young fish up to a length of about ¾" show a dirty-yellow basic color, the body of the adult fish is brick red, with each scale standing out nitidly. During an intermediate stage, young but already sexually mature specimens show a red basic color too, but this is displaced by a greenish-yellow hue on the chest and belly.

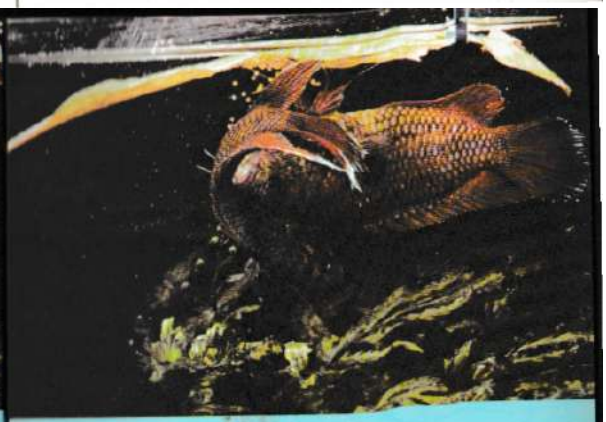
During this stage the fish also show a very pretty light blue seam about ⅛ of an inch wide on the caudal fin.

Despite the fact that many writers declare sexing them impossible, I maintain that an anabantid expert will be able to keep the sexes apart if the fish are in good condition. It is valid observation that the males seem slenderer than the females, which show a more protruding belly after feeding and before spawning. It is true, however, that sexual differentiation among specimens that are badly conditioned is nearly impossible.

The friend who presented the fish told me that they had been kept in an outdoor pool during the summer. In my opinion, their condition was not optimal, but they recovered very quickly in my 87.5 gallon tank which is well stocked with several species of *Cryptocoryne*. The water in this tank is about 28° DH, has a pH value of 6.8, and is maintained at a temperature of 72° F. I fed the fish large daphnia and baby guppies. Besides the *Belontia*, the tank contained a few *Helostoma temminckii*, *Ctenopoma kingsleyae*, *Labeo bicolor*, and *Labeotropheus trewavasae*. That the new home and food were to the liking of my new fish was shown by their constantly improving appearance. The tank offered all fishes good hiding places among the many plants and several tree roots and coconut shells and there were no serious bickerings among fishes of this mixed community.

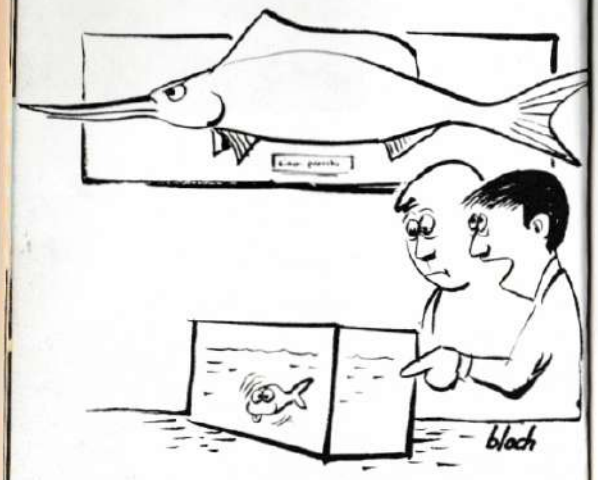
Soon I was happily aware that I possessed a pair, and the male began building a bubble nest. During this period both partners fiercely chased away all others that approached the end third of the tank selected for location of the nest. The male placed air bubbles of different sizes beneath a leaf of *Cryptocoryne blassii* growing slightly below the water surface. Several bubbles ran together and formed a "diver's bell" about three-quarters of an inch in diameter. When completed, the rather badly ordered foam nest had a diameter of about two inches. A few mock matings took place after the courting plays that are usual for anabantids (the male butting the female in the belly, both partners circling around each other, the female swimming laterally into the arch formed by the male's body, the male "embracing" the female, both fish turning over during the embrace so that the female's belly points upwards). Spawning occurred in early-afternoon. At each mating 10 to 20 eggs were released, being subsequently transferred to the nest by the male. After being expelled, the eggs float in the water and rise rather slowly to the surface. After releasing her spawn, the female had to seek shelter in a hurry, for each time the male made her understand in no uncertain manner that he did not want to see her during the next few minutes. At the end of the spawning sequence the female bore several whitish bite wounds. Despite this treatment by the male

Having chosen the leaf of a **Cryptocoryne** as the depository for the eggs and coaxed the female into the immediate vicinity of the leaf, the male (photo above) butts her in the side as a prelude to the actual spawning; below, the female begins to nestle within the folded body of the male.



Above: the expelled eggs rise slowly in the water as the male begins to disengage from the female; below: the female has righted herself and will leave the area.

during spawning, the relationship afterward became one of apparently amicable partnership. She was permitted to remain in the immediate vicinity and it seemed to be her task to insure that nobody disturbed the male while he was working on the nest. The eggs, which formerly had been scattered around helter-skelter, were now being concentrated by the male into two major groupings within the nest. This occupation was interrupted only to drive off any fish that had been able to pass the female unnoticed and encroach upon the nest area. After a few hours, most of the other fishes also showed some bite wounds on their bodies and preferred to stay in the undisputed regions of the tank.



No doubt about it—it's giving him a complex.

Meanwhile I prepared a 7½ gallon tank and late at night transferred the leaf with the spawnings beneath it to this tank. A few of the eggs floated free at this time and I noted that they were clear, of light-amber color, and in diameter about 1.2 mm (.020").

A sizable leak developed in this tank during the night. There was no time for deliberating; the tank had to be filled up completely at once in order to have the weight of the water press the glass pane against the cement, thus making the tank watertight again. In my hurry I did not pay any attention to the temperature of the tap water and testing after the refill disclosed that the eggs were floating in water with a temperature of 95° F. I could only hope that the eggs remained viable and I was reassured next morning for the fry had hatched and were hanging from the glass panes close to the surface. Except for the yolk sac, they showed a gray hue, and in the course of the next three days they turned black. Three days after hatching, the young measured about a quarter of an inch and were free-swimming. Cyclops nauplii were their first food and taut bellies showed that they were eating heartily. A rough count showed about two hundred fry, relatively few for anabantids.

Ten days after swimming free, the fry had reached a length of four-tenths of an inch, and five days later the rear part of the dorsal fin showed a dark eye spot. The first taking of air at the surface was observed on the eighteenth day of free-swimming. At the age of four weeks the young were one-eighth of an inch long and were transferred to a 37½ gallon tank. Frequent and radical changes of water and generous feeding are necessary to assure good growth of fry. My fish grew evenly; all fry that hatched have survived and no bodily deformities developed.

I would like to add an observation I made later on. If you place a pair in a small tank, within a certain time there will be hard fights between the two fish. For this reason I stuck in a separating pane of Plexiglas. Whenever the fish saw each other, their bodies showed interrupted dark cross bands, as well as the ocelus (eye-spot) in the dorsal already described as found in the young, but in this case appearing only as a dark spot. Apparently the fish take on this coloration when they get excited.

Fighting will often occur between a pair put into a breeding tank, and a pane of glass may advisably be placed to keep them apart yet permit them to meet nose-to-nose at the barrier. It is advisable to keep the separating pane in place for at least a week; by then the fish seem to have accepted each other and will probably begin courting as soon as the obstacle is removed.

Photo by Dr. Karl Knaack.

killie Corner

Robert J. Goldstein, Ph.D.

I recently received a letter from a reader asking me why killies cost "so much." I really do not accept the premise and would like to tell you why this is my feeling.

First of all, the prices of fishes have, over the years, not increased proportionally with the prices of other goods and services. In fact, within the hobby about the only items that have gone up are the national magazines. The reason is to be found in increased costs of printing labor and materials, which is in line with increases in just about everything else, and perfectly understandable. But fish farmers and manufacturers of hobby equipment have not raised their prices to any significant extent, mostly because of intensive competition and better methods of production. Imported fishes have, if anything, decreased in price as a result of greater efficiency in shipping and the generally low cost of labor in underdeveloped nations. But looking now just at the over-all prices of hobby fishes, we can see

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.

that the prices have been kept down because of efficient mass production.

Very few killies are bred commercially, because they are handled differently from, for example, pond-raised livebearers, characins and cichlids. Most of these groups of fishes are very prolific and can be raised on inexpensive foods with a minimum of handling. Not so with killies. To breed commercial numbers of killies requires the use of peat, plants or mops, and the fact that killies spawn a few eggs daily makes for a high demand for human labor to pick eggs or harvest peat, to separate fishes by size, and to keep cleanliness to a maximum. In addition, killies do not sell in the quantities of, for example, angels or swordtails, and this means that large and efficient operations tend to restrict their space allocations to fishes with a greater market demand.

Even so, the prices of commercially available species such as the lyretail or blue gularis have not

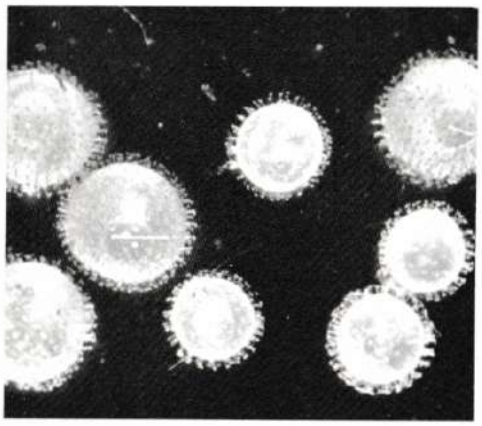
been high. If you have to pay between two and four dollars a fish, is this really more than the cost of hand-raised discus or Lake Malawi cichlids or fancy guppies or high fin swords? Of course not. And imported killies are even cheaper. And yet the demand for these other fishes far exceeds that for killies.

Thus, many killifish enthusiasts will pick up one or two species and breed them. The offspring, which are fun to raise because they require so much hobbyist participation in production, are then sold or traded. Much of the AKA interaction consists of trading species. But let's look at the prices of fishes sold among AKA members. Looking over the latest monthly list of offerings I see that most of the prices range from two to four dollars a pair, except for the very new and very difficult species, which run a little higher in line with effort and demand vs. supply. These prices are remarkably low when you consider the trouble involved to pick a good pair, pack them in double plastic bags, insert them in a home-made shipping box, which must be carefully sealed, and then carry the package to the post office or to the airport. And what of the time involved in daily care and feeding and cleaning prior to

Although prices for even the most comparatively inexpensive killies (such as the two male lampeyes, **Aplocheilichthys macrophthalmus**, shown above) range higher than those charged for many other aquarium species, the prices are not high if they are considered in relation to the relative scarcity of the species involved; killies like the albino **Cynolebias whitei** (female shown below) are considerably more expensive than lampeyes and lyretails and other of the more common killies, but the extra costs are not disproportionate when cost-influencing factors are taken into account. Both photos by Dr. Karl Knaack.

offering the fishes for sale? Personally, it's not worth my time to go all the way to the airport (about an hour's drive each way) for anything less than a large shipment, but most members of AKA do this gladly. Few AKAers make any kind of "living" from selling fishes. Generally, they try to sell just enough fishes to pay for the new ones, supplies and equipment, and thus try to make their hobby pay for itself. The few species for which high prices are asked may be generally interpreted as (1) very difficult to produce, (2) very expensive initially (this may have involved a personal importation), (3) or an oblique way of saying "I've got something good which I'd rather really trade for something equally rare." The club hit almost 1000 members in 1970, so competition and reason must play a role in killie prices.

Eggs of **Cynopoecilus ladigesi.** Because the annual fishes must be cultivated intensively, they do not lend themselves to large-scale production of the type practiced by the big Florida fish farms, and consequently the number of them offered for sale is much less than that of many other species. Photo by Dr. Walter Foersch.



cichlid nOtes

Robert J. Goldstein, Ph.D.

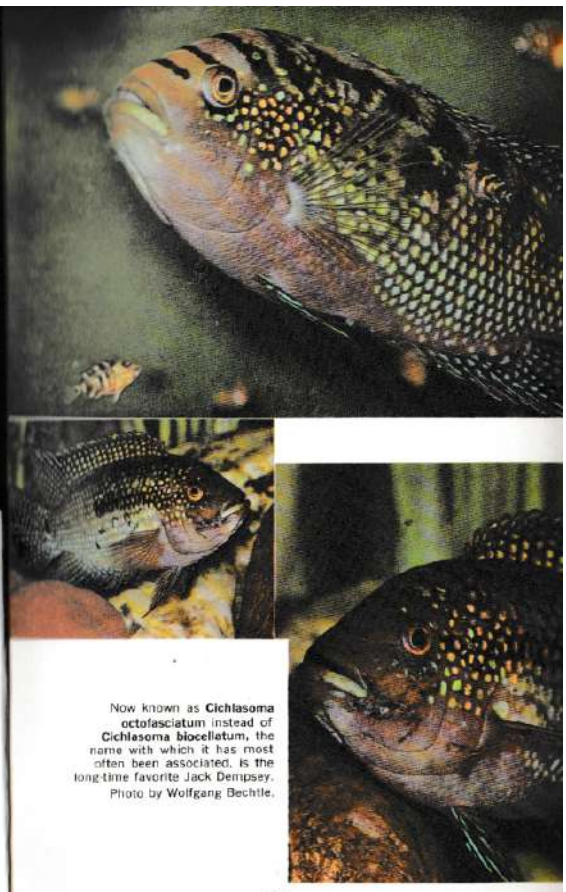
The genus *Cichlasoma* includes a large number of American cichlids, ranging from Texas clear down into South America. Most of the species, however, are to be found in Central America. Several genera were earlier defined to accommodate a small number of species, e.g., *Petenia* and *Herichthys*. Only one of these genera, *Herotilapia*, is still currently regarded as distinct, but the others are now generally considered synonyms of *Cichlasoma*.

Cichlasoma (=*Petenia*) *kraussii* has recently appeared in the hobby. It is a large-mouthed cichlid with a mean disposition and red flushing on its unpaired fins. Dr. Robert R. Miller supplied me with the identification after I sent him a pickled specimen for examination.

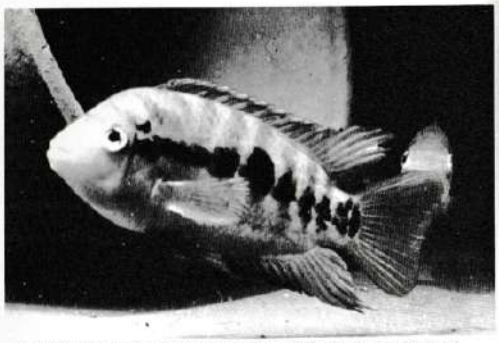
Formerly recognized as **Herichthys cyanoguttatus** but now placed within the genus **Cichlasoma** is **C. cyanoguttatum**, the Texas cichlid, the only native American cichlid. Photo by K. Paysan.

Another new one in the hobby is *Cichlasoma trimaculatum*, this identification first suggested by Jim Langhammer and verified by Dr. Miller, again from pickled specimens. This particular nasty bugger is over-all metallic green, with a series of blotches on the rear half of the mid-line. Of particular note, however, is an ocellus on the upper angle of the gill cover. The fish is easy to recognize, once you've seen a decent photograph.

A number of other new cichlids are finding their way into the hobby, and we will keep you informed with photographs and identifications, as we get them. If you have something unusual that you would like identified, send me the pickled fish or a photograph and I'll do the best I can, or I'll send it off to someone else more likely to be competent in making the identification. As I am not an ichthyologist, I can only identify fishes that



Now known as **Cichlasoma octofasciatum** instead of **Cichlasoma biocellatum**, the name with which it has most often been associated, is the long-time favorite Jack Dempsey. Photo by Wolfgang Bechtle.



One **Cichlasoma** type species that has been retained in a separate genus is **Herotilapia multispinosa**, the rainbow cichlid. Photo by Dr. R. J. Goldstein.

I have seen before, and which were previously identified, according to my notebook. I'll stick my neck out on anything except *Apistogramma*!

Photos should be taken with a single lens reflex camera on slow ASA color film (up to ASA 60), and slides are preferred. Fishes should be pickled in rubbing alcohol, formalin (one part to ten parts of water), or whiskey; wrapped in a rag; inserted in rubber-band-sealed plastic bags; and mailed in a small box to me c/o Biology Department, Emory University, Atlanta, Ga. 30322, U.S.A. Never mail specimens in glass containers! Photos will be returned if requested.

And now, thanks to the help of Jim Langhammer and Dr. Miller, I

can present a more updated summary of species of *Cichlasoma* than before. Known synonyms appear in parentheses, and suspected synonyms share identical numerical superscripts. For example, the relationships of *nicaraguense* and *baliosum* are not clear, and both names may refer to the same biological species.

LIST OF CICHLASOMA SPECIES: *adspersum, affini, alfaroi, altifrons, arnoldi, atromaculatum, aureum, autochthon, balteatum*[1], *beani, bifasciatum, bocourti, bulleri, callolepis, calobrense, centrarchus, citrinellum*[2], *coryphaenoides*[3], *crassa*[3], *cyanoguttatum, dowi (dovii), eigenmanni, elliotti*[4], *erythraeum*[2], *faletum, fenestratum, festae, festivum, friedrichsthali*[3], *gadovi, geddesi, godmani, guija, guttulatum (zonatum), haitiensis, hellebrunni*[3], *helleri*[4], *heterospilum, hogaboomorum, hyorhynchum, immaculatum, intermedium, irregulare, kraussii, labiatum*[2], *lentiginosum, lobochilus, longimanus, macracanthus (heterodontum), maculicauda, managuense, margaritiferum, meeki, melanurum, monto, microphthalmum (oblongum, milleri, caeruleogula), motaguense*[3], *myersi, nebuliferum, nicaraguense*[1], *nigrofasciatum, octofasciatum (biocellatus, hedricki), ornatum, pasionis, pearsei, poponoei, psittacum, ramsdeni, robertsoni (acutum), rostratum, salvini, severum, sexfasciatum, steindachneri (underwoodi), spectabile, spilotum, spilurum (cutteri), spinosissimum, splendida, synspilum (hicklingi), tenue, terrabae, tetracanthus, trimaculatum (mojarra, centrale, cajali, gordonsmithi), tuba (Tomocichla underwoodi), tuyrense, umbriferum,* and *urophthalmus.*

GCAS SHOW

The first International Rift Lake Cichlid Championship will be the feature of the annual Greater City Aquarium Society Fish Show and Exhibition. The show will take place May 15 & 16, 1971 in the Hall of Science of the City of New York, which is located on the site of the 1964-65 World's Fair.

In addition to the Rift Lake Cichlid Championship, the show will include a National Marine (Salt Water) Aquarium Championship; the Fifth Annual Metropolitan New York Guppy Trio Championship and 32 additional classes of competition.

For complete information and a copy of the official entry blank, write to:
Mary & Dan Carson, Co-Chairmen
GCAS Fish Show and Exhibition
P. O. Box 265
Baldwin, New York 11510

Spawning *Labidochromis coeruleum*

Photo by H. Hansen, Aquarium Berlin.

BY JIM SWINFORD

About two years ago I heard of a new cichlid from Lake Malawi (Nyasa) called *Labidochromis coeruleum*. Nobody, it seemed, had ever seen it, and nobody here had even heard of it. So when the chance came, Al Swann, a fellow cichlid nut, and I split the cost and ordered it along with two of the mottled variety of *Pseudotrophus zebra*.

When they first came in, we were disappointed, as they looked as though they were just plain fish color (blah!). When they reached home, however, their color had improved tremendously! The male's color is a bright silver blue with a dull purplish blotch in the center of the body. The dorsal is bright silver with a gold edge along the top. Just under this gold edge is a wide black line. The caudal and pectoral fins are clear, while the ventral and anal fins were blue outlined with silver. Inside the silver were the same

black lines as the dorsal has. The anal also had one bright yellow egg spot as in other mouthbrooders. The female's color more or less matched the male's but had a tendency towards a more grayish cast.

To condition them, they were placed in a 100-gallon tank along with other Nyasa cichlids (*Pseudotropheus zebra, P. tropheops, Labeotropheus trewavasae, L. fuelleborni*, etc) and fed heavily for two weeks on white worms, frozen brine shrimp, and flake food.

When conditioning was over and because we didn't know anything of their breeding habits, they were placed in a 29-gallon tank with a flower pot turned on its side, a few rocks, and a small stump of wood for the female to hide under if the going got rough.

The pH was at 7.3, DH about 2, and temperature 76°F. We have very soft water here in Atlanta, but this hasn't seemed to have made any difference in spawning any of the other Malawi fish.

Most of the Malawi mouthbrooders lay their eggs any place a male has set up, the females expelling just a few eggs at a time and picking them up immediately, but the breeding habits of *L. coeruleum* varied from those of most other mouthbrooders in that they thoroughly cleaned the flower-pot, laid the eggs in an orderly pattern, and fanned the eggs for about thirty seconds before the female picked them up. After this I had to remove the male, as he turned rather nasty.

For nineteen days we sweated out the day she would spit out the young. Unfortunately, she ended our waiting by swallowing them.

Well, as they say, back to the old 100-gallon tank. For another month the fish were conditioned, and this time Al tried his hand at breeding them. Again, the same set-up was used, but this time with no wood and more flower pots. Beautiful! they did it again. Once more we sweated out the days. On the 24th day we noticed one small fish swimming around the tank and the next day another. The female kept trying to catch them back in her mouth, but the youngsters kept dodging into every hiding place to keep away from her.

Needless to say, accidents do happen. The female missed one fry too many and apparently jumped out of the tank trying to get them back. We were left with only the two fry, both of which were only a quarter of an inch long. In a month's time they grew to only ¾ of an inch; apparently they are pretty slow growers.

In behavior, these fish are rather easy-going compared to most other Malawi cichlids, although, like most other Malawi cichlids, they can't be kept together in a small tank (and especially because in anything below a 29-gallon tank they lose all their color).

I'll predict that once these fish become readily available and a few generations are tank-raised (which seems to do a lot towards taming them down) they'll become popular.

Photo by Paysan.

GROUPER GOURMAND

I'm a big-mouth, it's true,
Though such comment is rudely specific,
My dentition is such
None mention it much
In my home in the Indo-Pacific.

Any fishes that do,
(It is hoped they're of species prolific)
Learn that jaws opened wide
Soon gulp them inside,
For my appetite too is terrific.

Lincoln Littrell

AM I MY BROTHER'S KIPPER?...

Breakthrough: Anchovies Spawned Successfully in Laboratory

Commercial Fisheries Review

As hobbyists, we sometimes lose sight of the economic importance of fishes as food, even though we know that some of the hobby-popular fish species are also popular as food in protein-deficient areas.

In Africa, for example, various *Tilapia* species form a regular part of the diet; in Asia, gouramis are eaten; in South America, certain cichlids, including the discus, are taken as food. So it does us some good every once in a while to remember that despite the enormous economic gains made by the tropical fish hobby-industry, the business of catching and processing fishes for food remains far ahead in terms of sheer financial importance. (The anchovy species reported on in the accompanying article, for instance, is expected to provide a 220,000,000-pound catch off the coast of California alone in an eight-month period. And of course we're directly concerned as hobbyists with those hormonal extracts used to insure sexual maturity in fishes... tropical or not.

Izadore Barrett, Acting Director of the National Marine Fisheries Service (formerly the Bureau of Commercial Fisheries) Fishery-Oceanography Center at La Jolla, California has reported that for the first time, an important commercial open-sea fish, the anchovy, has been spawned successfully under artificial conditions. Anchovy larvae produced from this artificial spawning fed and grew as normally in an aquarium as their counterparts in the sea. Additional batches have been produced in succeeding months and are continually being used for experimental purposes.

No member of the family Clupeidae, to which the anchovy, sardine, and herring belong, had ever before been artificially induced to spawn in the laboratory. The results offer unique opportunities to study the response of marine fish eggs and larvae to such environmental factors as pesticides and heated effluents.

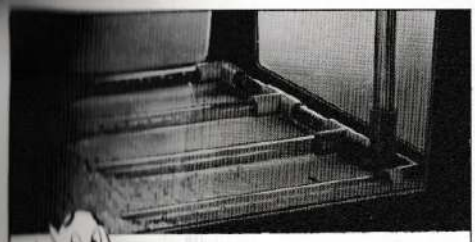
How It Was Done

Roderick Leong, N.M.F.S. fishery biologist who achieved this scientific first, has been working on inducing spawning in laboratory fish for more than a year under physiologist Dr. Reuben Lasker. During the experiments, Leong subjected adult anchovies kept in large aquaria to 4 hours of light and 20 hours of darkness for 4 months at about 15°C.

The fish were all from the same school. At intervals, they were injected with several types, dosages, and combinations of hormones. The combination that produced heavy spawning included commercial preparations of human chorionic gonadotropin (HCG) plus carp or salmon pituitary extract. In either case, it was not necessary to strip the fish to obtain sexual products, as usually is done with salmon and trout, because the fish released and fertilized the eggs themselves. The percentage of eggs hatching from these trials varied from under 19% in one trial to over 80% in others.

During the experiments, the anchovies were fed trout food and squid, supplemented occasionally by ground anchovies and brine shrimp. Not all of the injected fish spawned. Leong says it is not yet possible to synchronize gonad development completely or to recognize superficially the sex or level of sexual maturity in anchovies. Therefore, 15 to 20 fish were injected in each experiment to insure that at least one male and one female would be mature enough to spawn.

Several weeks after the induced spawning, Leong observed that one group of anchovies in a large holding tank began to spawn spontaneously. This group had been held under the same light and feeding conditions as the injected fish. New eggs were found in special collectors for several consecutive days; the percentage of viable eggs ranged from 30 to 80%. Leong is experimenting with temperature change as a method to induce spontaneous spawning, because this may be a way to obtain eggs without hormonal injections.



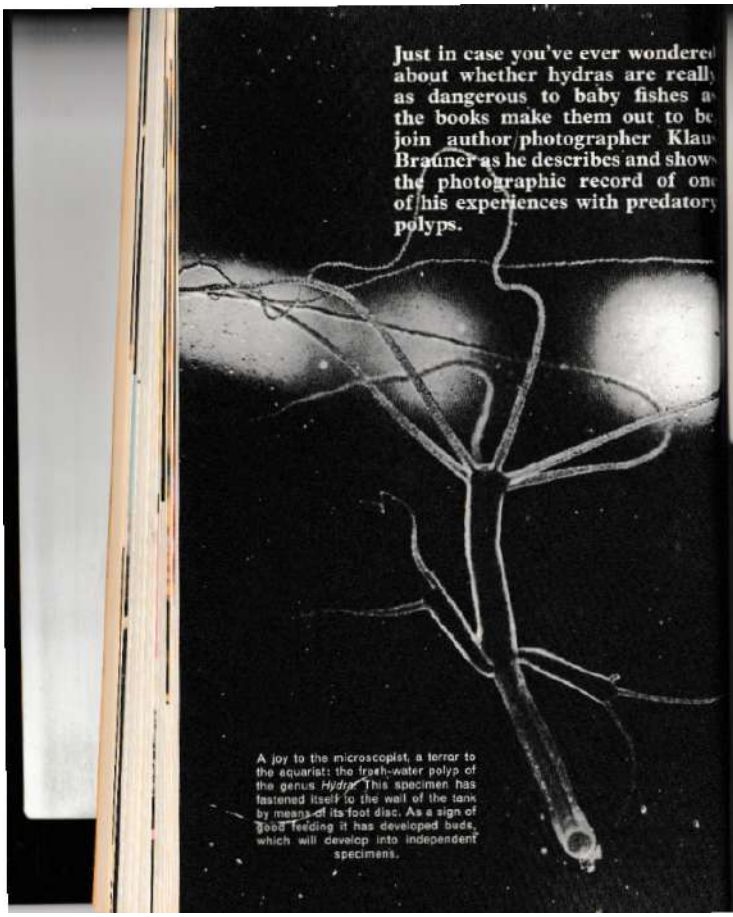
A Hydra Goes Fishing

BY KLAUS BRAUNER

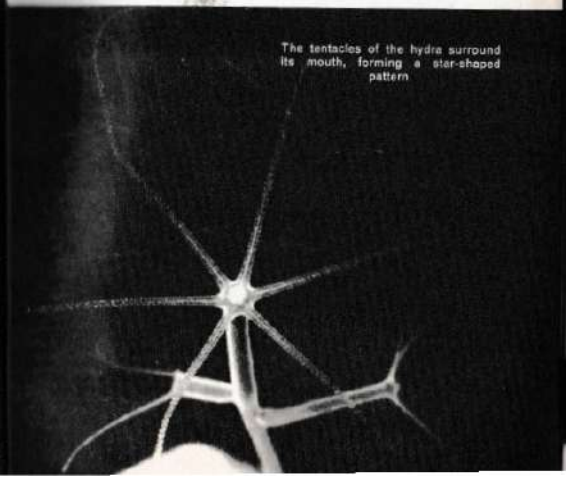
Just in case you've ever wondered about whether hydras are really as dangerous to baby fishes as the books make them out to be, join author/photographer Klaus Brauner as he describes and shows the photographic record of one of his experiences with predatory polyps.

Once during springtime I set up a pond aquarium in a classroom to use as an aid in teaching. I stocked it with a pair of sticklebacks, and the male soon started building a nest. The female spawned and was taken out. The hatched baby sticklebacks soon ventured farther and farther from their nest. When, after a few weeks, they were able to move all over the tank, the father too was taken back to the brook where he had come from. After all, we had had sufficient time to watch him while caring for the brood, and also after the fry had hatched, so there was no reason now to endanger the fry, and the father was a potential danger.

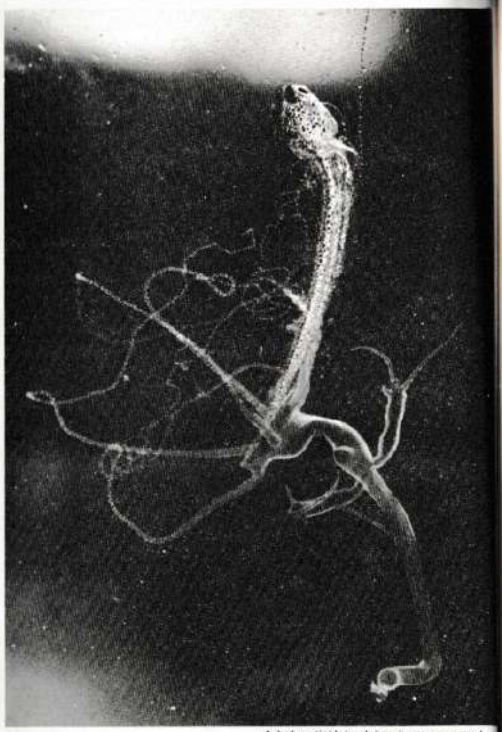
I and my pupils wanted to follow the development of the young sticklebacks in the tank. A pond in the woods supplied daphnia for food, and all of us had lots of fun seeing the dainty little sticklebacks catching their prey. But I noticed that the number of baby sticklebacks kept decreasing.



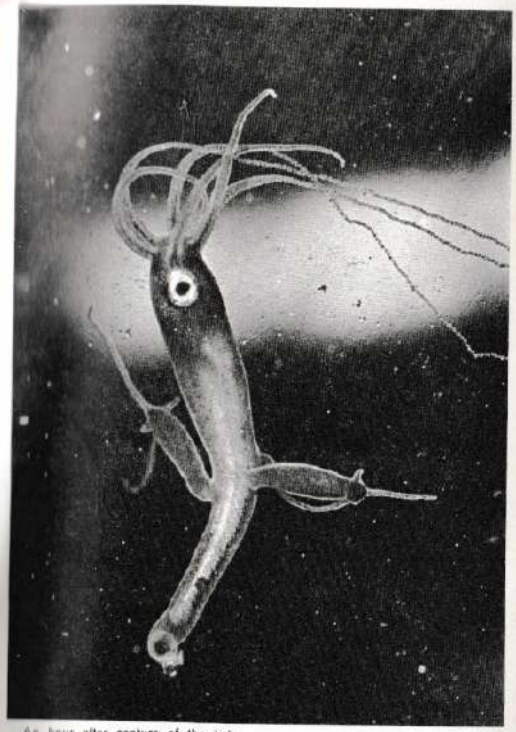
A joy to the microscopist, a terror to the aquarist: the fresh-water polyp of the genus *Hydra*. This specimen has fastened itself to the wall of the tank by means of its foot disc. As a sign of good feeding it has developed buds, which will develop into independent specimens.



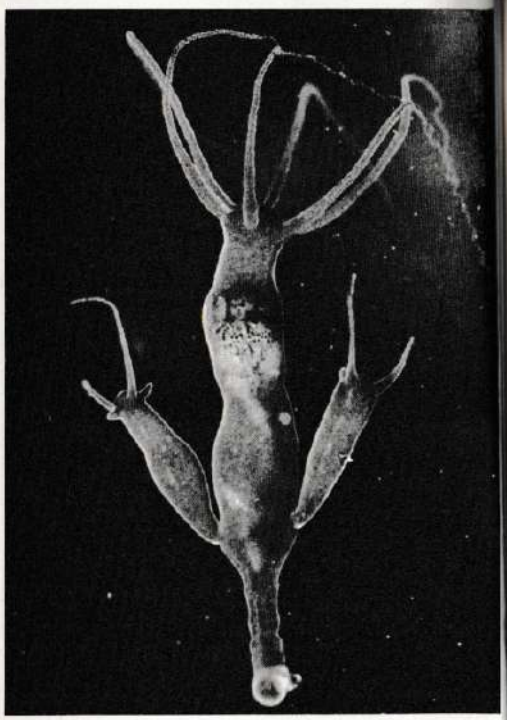
The tentacles of the hydra surround its mouth, forming a star-shaped pattern



A baby stickleback has been ensnared in the hydra's tentacles. Immediately upon contact, the hydra's stinging equipment goes to work paralyzing and poisoning the polyp's prey.



An hour after capture of the baby stickleback, the hydra has managed to swallow the fish entirely. The victim's eye shines through its captor's tissues.



The prey is being digested. The transparent body of the hydra permits inspection of the digestive process.

The cause was soon found. Together with the food, I had brought in hydras from the pond. At first the hydras sat unrecognized on the aquatic plants, but they soon started to fasten themselves to the glass panes. The fastening point on the lower part of the body looks circular. The six tentacles of the hydra stand out in star shape around the upper end of the body, the mouth, and have free play in the water. In repose they measure only a few millimeters, but when searching for prey they may extend to a length of up to four inches, even though they are extremely tenuous and hardly visible to the naked eye. The two lateral ramifications of the portrayed specimens are called "buds." They drop off as soon as they have grown sufficiently large, turning into independent hydras.

Hydras feed mainly on small crustaceans, mostly cyclops and daphnia. When the catching tentacle of a hydra touches such food animals, it casts out batteries of stinging nettles. The captured daphnia remains stuck and paralyzed and is stuffed into the body cavity of the hydra by means of the tentacles. There the tiny crustacean is dissolved and digested. In my stickleback tank, though, I had quite a different experience. The baby sticklebacks, with their strikingly large predatory-fish-eyes and measuring a little under half an inch, sometimes entered the dangerous reach of the hydras' tentacles. If a fishlet was touched by the stinging cells of one tentacle only, it generally managed to get loose again by means of jerking motions; when this happens you get the impression that the young stickleback is circling the hydra as if tied to it by a rope. But if the little fish does not succeed to freeing itself in a very short time it is lost, because through its struggling motions it is practically forced to touch the other tentacles of its enemy. These ensnare it, in fact wrap it up completely, and subject it to more intense stinging. The captured fish continues to squirm, but the tentacles of the hydra prove stronger. They embrace it over the whole area of its body, and pull it, tail first, towards the mouth of the polyp. All six tentacles are kept-busy stuffing this rather large tidbit into the body cavity.

Strong digestive juices slowly dissolve the prey, and the feeding cells within the body cavity of the polyp absorb it in small bits. During this digestive activity the hydra hangs down slackly, and the retracted tentacles hardly move at all. Digestion takes about ten hours, after which the indigestible remains of the fish are expelled through the hydra's mouth opening. Then the tentacles stretch out again in search of new prey.

Perhaps because they were being fed so well, the hydras multiplied in our school tank. The only way of saving the baby sticklebacks was to transfer them to another tank.

salts FROM THE seven seas

BY FREDRIC M. SCHWARTZ

Caught In The Net

I receive many letters asking me about the "natural" method for keeping marine fishes, so I thought I'd answer all these letters at one time with some comments on this method as compared to ordinary marine fish keeping.

The method that most of us use utilizes large amounts of filtration and no living corals and little or no live algae.

The natural method uses no filtration at all. Live corals with their associated creatures and large amounts of green algae are grown in a tank with a small amount of aeration to circulate the water.

The natural method has the advantage, its proponents advise, of being closer to natural conditions, thereby encouraging feeding and growth of delicate specimens and bringing out the natural colors of all fishes. Many have actually had fish spawn in their tanks, although no one has succeeded in raising the fry to maturity.

Scientifically, this method makes sense in that the chemical and biological balances of such a tank will more closely approximate real con-

Saltwater aquarist Lee Chin Eng, well known to readers of **Tropical Fish Hobbyist** because of his published accounts of various of the marine hobbyist developments he pioneered, is now in charge of the famous Van Kleef Aquarium in Singapore. He formerly lived in Djakarta, Indonesia.

ditions in the oceans. But this holds true *only if the tank is maintained in perfect balance.*

There are many obvious problems in maintaining such a tank. There are too many, in fact, for the average hobbyist to cope with, and the natural method is therefore to be avoided, especially by beginners. On the other hand, it should not be avoided completely. As a hobbyist becomes more experienced with marine fishes, he should try a natural tank if he is so moved.

The biggest problem in keeping a natural tank arises when some of the corals or other invertebrates die, resulting in a pollution that may kill all the other inhabitants of the tank. The "balance" required, I feel, is too delicate in a small closed system to operate efficiently unless the hobbyist is extremely fastidious, energetic and highly skilled. One might easily say that the above situation can be avoided by removing the dead specimens involved. This, however, is not as easy as it sounds.

It is difficult for most people to tell the difference between live corals and dead ones—until it's too late. It's also very difficult to recognize dead worms and crustaceans, especially when their decaying bodies are hidden in the holes of a coral rock. Therefore it would be a good idea to keep small corals, worms and crustaceans in tanks where they may be observed so one can become familiar with their habits before trying a natural tank.

This also gives one an excellent opportunity to experiment with feeding these animals.

If you are going to set up a natural tank, get the largest tank you can comfortably afford. Use a good commercial marine mix or, better still, clean, unpolluted ocean water. A combination of both is ideal. It's very important to have at least *some* natural sea water in the tank to act as a culture medium for growing algae and other plankton, which will serve as food for the corals and other inhabitants.

Use no filtration, but make sure you use an air stone for circulation. Use a stone that supplies bubbles about a sixteenth of an inch in diameter. You do not want a fine mist of bubbles or very large bubbles either.

To encourage algal growth, use incandescent bulbs or the newer bulbs recommended for growing plants. Sunlight is fine but not always available when and where you want it. Experiment with combinations of sunlight and artificial lights for best results. The duration and wattage of light will need to be varied until the desired growth is maintained.

The tank should be completely set up before any living things are added. A good growth of *green* algae should be allowed to develop all over the ornaments (dead,

treated coral rocks and fans and shells), and should cover the glass sides and rear of the tank. You can scrape the algae from the front glass with a soft sponge. Red or brown algae will invariably show up first, but this gradually yields to the green algae that is desired. Some red and brown algae in the tank are fine and add color to the tank.

The specimens to be placed in the tank should be purchased only after the tank has a good algal growth, or they must be quarantined in other tanks until the growth is heavy enough to add the corals. Each piece of coral must be thoroughly examined for dead spots or any hidden dead animals. The best thing to do is to place them in another tank and feed them with live baby brine shrimp which you can hatch yourself. Examine for and remove gray or black spots. Look for gray clouds in the water just above the coral, as this is a good indicator of dead organisms in the coral. The most accurate way to tell whether a coral colony is alive is to smell it: if it smells bad, it is bad; if it smells fresh and clean, it usually is just that. Dead spots can be removed with a hammer and chisel. A complete natural tank should have live corals, snails, worms, crabs, small anemones and, of course, fish.

It's best to use live baby and adult brine shrimp supplemented with various dried, freeze-dried, frozen and canned foods. Hopefully, the fish will eat some of the worms, corals and algae; this is one of the big advantages to the natural method.

Keep a close watch for dead specimens, clouding of the water and smelly or discolored sand (use coral sand), and remove any questionable items. Another thing to watch out for is too much algae, which will fall to the bottom of the tank and become foul when cut off from the light. This can be avoided by cutting down on the duration of light and by periodic scraping with a soft sponge.

A natural tank is especially good for butterflyfish and other fussy eaters, but it will do well with almost any fish.

A good compromise between both methods is an interesting arrangement. Use an outside filter of moderate filtration rate, some aeration and a few live corals. Grow a moderate amount of algae on the rocks, fans, shells and on the tank glass. Difficult feeders fare very well in such a tank.

YOUR FISHES' HEALTH

Ammonia

by Roger Lee Herman, Ph.D.

It is well accepted that regular partial changing of aquarium water is good aquarium management. This is true even when the tank is well acrated and equipped with filters. The frequently crowded conditions of the community tank cause a buildup of waste materials faster than the ordinary filter can remove them. Water changes and bottom siphoning help prevent the filters from being overloaded and the water from becoming toxic. Probably the most important waste removed by changing water is ammonia (NH_3).

The breakdown of protein by the fish results in ammonia as a waste product. This ammonia can be changed to urea, which is not very toxic to a fish in its blood or in the water. In nature, urea is probably the most common form of nitrogen excretion. However, it takes energy to turn ammonia into urea. In a crowded pond or aquarium, the fish needs this energy for other uses. Under these crowded conditions, ammonia is excreted from the gills, not the kidney, as is urea. The more crowded the fish are and the higher the temperature, the more ammonia is produced.

It is excreted in a non-toxic form called the ammonium ion (NH_4+), but this non-toxic form can change rapidly to the toxic non-ionized ammonia (NH_3). This change is most rapid in alkaline water. Thus ammonia is more toxic in alkaline water, especially above pH 8. It should be noted that sea water is normally pH 7.5 to 8.4. Ammonia is more toxic in marine aquaria because of this.

How does ammonia affect the fish? If fish are exposed to high levels (acute exposure) of ammonia suddenly, the ammonia acts as a nerve poison. The movement of the

operculum (gill cover) is paralyzed, and the fish become unable to extract enough oxygen, so they suffocate. When exposed to low levels over a long time, as would occur in aquaria, the gills of the fish are irritated, and a reaction in the form of an increase in the number of cells of the epithelium occurs. This increase in cell numbers, called hyperplasia, results in thickened gill lamellae, and the thickened gill lamellae make it harder for oxygen to pass from the water to the blood. In severe cases, the fish can suffocate. The lower oxygen supply in the blood slows the fish's metabolism and causes reduced growth as well as lowering the fish's resistance to disease.

Some ammonia is removed by bacteria, referred to as nitrifying bacteria. Those of the genera *Nitrosococcus* and *Nitrosomonas* can convert ammonia to nitrous acid. *Nitrobacter* bacteria turn nitrous acid into nitric acid, which combines with minerals in the water to form nitrates. Nitrates are non-toxic to fish except in very high amounts. This biological change occurs when sub-gravel filters are used. This is why they are called biological filters. Unfortunately, in the usual community tank, the bacteria are not numerous enough to remove all the ammonia produced. Mechanical filters do not remove ammonia, since it is dissolved in the water. Charcoal does not remove the toxic

ammonia, since it is not ionized (electrically charged), as is chlorine. Aeration does not remove ammonia, although it does drive off another waste product, carbon dioxide. Therefore the only efficient way we have of stopping the buildup of ammonia is to mechanically remove it by discarding part of the water periodically.

We can slow the buildup by not putting too many fish into our aquaria, by not overfeeding, by removing dead plant material (decay adds ammonia to the water also), and by keeping the pH below 8.

Signs of ammonia poisoning are generally similar to those exhibited by fish showing the effects of low oxygen in the water. Respiratory movements increase, and the fish may come to the surface. They may become violently active for short periods.

Reprint Announcement

The Smithsonian Institution announces publication of the fourth in its series of TFH Fund ichthyological reprints, *The Philippine Journal of Science*. The new reprint includes all (94) the ichthyological papers (exclusive of some papers concerned with fisheries) that have appeared in the Philippine Journal of Science. The reprint comprises three cloth-bound volumes, over 2400 pages, and includes 55 color plates. Price $30.00.

All other TFH Fund reprints are also available:

Fishes of North and Middle America, Bulletin 47, U.S. National Museum, 4 volumes, $25.00.

The Freshwater Fishes of Siam or Thailand, Bulletin 188. U.S. National Museum, $2.00.

The Philippine Bureau of Science Monographs on Fishes, $5.50.

These volumes may be purchased from the Smithsonian Institution Press, Washington, D.C. 20560.

MAIL CALL

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

CONTRARY REEDFISH

My brief experiences with the reedfish, Calamoichthys calabaricus, lead me to question Les Kaufman's statement (in your March issue) that it is..."very gentle, even with fishes that are tantalizingly bite-sized." I have twice seen my 10 inch reedfish attack a small (3 inch) spiny eel of the species called "tire track eel." On the second occasion the "tire track" lost its tail, whereupon, of course, the reedfish was promptly moved.

The reedfish appears to have poor eyesight and to find food largely by means of the two short sensory projections from the forward part of the upper jaw. Perhaps, then, it is dangerous only to species which remain in one place long enough for the reedfish to glide up and "smell" (taste?) them. Of the two attacks which I have witnessed, one definitely was preceded by such preliminary probing (accomplished in a rather slow and gentle fashion) and the other, which took place among a group of plants, may have been. Once the reedfish does attack, its large mouth and strong jaws make it a formidable assailant. For a fish that usually moves quite slowly, it can strike with surprising speed and force.

BRENT WALLIS
NO ADDRESS GIVEN

FRESHWATER INVERTEBRATES
In regard to Mr. Sprezynski's letter, published in the October, 1970 issue of TFH, about gammarus, I would like to add that adults are about a quarter of an inch long and resemble tiny, clawless crayfish. They can be fed algae (which gives them a greenish color), but protein foods such as infusoria tablets are taken readily.
I would like to ask you and the readers of TFH why freshwater invertebrates are so rarely kept for any purpose other than for their use as scavengers. Salt-water aquarists have been enjoying invertebrates for years, and I think that it's about time that fresh-water folks caught on to this exciting facet.
DAN KOSTA
WESTCHESTER, ILLINOIS

It's probably because they're not as colorful as marine invertebrates or as highly regarded for their "interestingness." Also, oddly enough, it might be partly because they are generally so much lower in cost than marine invertebrates. Some hobbyists, both freshwater and marine, tend to equate high cost with high satisfaction, and for these hobbyists the freshwater crustaceans and mollusks would have little attraction. You would have a hard time, for example, trying to get anyone to agree with you that watching a ghost shrimp is as interesting as watching an anemone or hermit crab. But you're right in maintaining that freshwater hobbyists are losing out by not paying more attention to the many invertebrates that can live in their tanks.

RAINBOW GUPPIES
Q. Are stainless steel thermometers safe for aquariums? Also, there is a variety of guppies I often see in pet centers, but never in shows. They are small with splotches of color on their bodies and little or no color on the tail. I've heard of them referred to as "rainbow guppies" and they are delightful-looking. Please tell me what their real identity is and if they are of any real value.
KAREN WALKER
NO ADDRESS GIVEN

A. 1. Yes, stainless steel thermometers are safe for use in freshwater tanks. 2. Your description corresponds pretty well to the appearance of common, non-fancy guppies, and that's what they are: guppies. If you like them better than you like the more highly developed strains, by all means keep and enjoy them. You should be able to purchase them for a lot less than you'd have to pay for fancy guppies. The price the dealers ask for them should give you a clue to their value.

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SAFE ROCKS, DANGEROUS ROCKS
Q. Could you please tell me if sandstone is safe to use in an aquarium? Also, what other types of rocks are safe?
MRS. R.M. WHITNEY
HARRISVILLE, NEW YORK

A. Sandstone, or at any rate the "mortar" that holds together the siliceous grains in sandstone, is soft, and soft inorganic materials are in general bad for use in aquaria, mostly because they are usually readily soluble in water and impart their qualities to the water. The question of what rocks are dangerous for use in an aquarium really amounts to two separate questions: is the rock dangerous because it releases substances dangerous to all fishes, or is it dangerous because it changes the quality of the water in a way that is bad for certain fishes? The mineral apatite for example, releases traces of arsenic into the water and would therefore be a type of rock that is dangerous to all species of aquarium fishes; calcite, however, is generally avoided by many hobbyists because of its tendency to change the water quality, making the water hard, even though that condition is of benefit to certain species. It is best to stick with the siliceous types of rock like granite and the other quartzes; slate and most types of shale are also safe.

SIAMESE TWINS
Q. Last night my red wagtail platy had her third lot of fry. When I looked at them this morning, I noticed a pair of siamese twins. Is this unusual?
MATTHEW HUBBARD
PRINCETON, NEW JERSEY

A. It's comparatively scarce, but it's far from being unheard of.

Siamese twin egglayer (cichlid) fry.
Photo by H. Hansen, Aquarium Berlin

Siamese twin guppies.
Photo by Jerry M. Courson.

RAINBOW CICHLID
Q. About 4 months ago I purchased a fish called a Rainbow cichlid. I have found no literature about this fish, even in EXOTIC TROPICAL FISHES. I have five books and none of them have any information About three weeks ago, she spawned on a rock in a 20-gallon tank with no male. Obviously, the eggs were infertile. Could you tell me the scientific name of this fish and what book I could get to find some information about it?
A.C. MACLEAD JR.
PORT WASHINGTON, NEW YORK

A. The fish most often sold under the name rainbow cichlid is Herotilapia multispinosa, and the reason that you can't find much in the literature about this species is that the fish has been introduced to the hobby in quantity only comparatively recently... the books for the most part haven't caught up with it yet, although the species is discussed briefly and illustrated in the TFH book CICHLIDS.

BUMBLE BEE CATFISH
Q. Last week I bought a five inch Leiocassis siamensis. It's very

Leiocassis siamensis. Photo by R. Zukal.

attractive, but I don't know what he eats. He is in the same tank with some Jack Dempseys. I feed them canned shrimp but the bumble bee cat won't eat it, so last week I bought some tubifex worms and he won't eat them either. What do you think Leiocassis siamensis would eat?
OTTO MUNOZ JR.
WEST NEW YORK, NEW JERSEY

A. Leiocassis siamensis would be happy to eat all of the live fish that it could swallow if you'd be willing to provide them. This attractive catfish is definitely a nocturnal predator, and although captive specimens often are content to eat other than live foods,

they prefer small fishes. Your catfish's lack of appetite could be more the product of its feeling strange in the tank than of a distaste for the food offered, however. The species likes seclusion, and perhaps your tank is too bright and doesn't offer enough refuge areas where your catfish can hide. Those Jack Dempseys probably don't make him feel too welcome either.

RANGE AND WATER CONDITIONS

Q. What is the condition of the water that Hemigrammus armstrongi come from? According to EXOTIC TROPICAL FISH, they come from drainage ditches of rice paddies and sugar fields, but no statistics are given as to hardness and pH. Also, since they come from British Guiana, what is the water temperature? Secondly, I have a plecostomus and I am able to feed him live foods through an eyedropper. All I have to do is open the lid of my tank and he's clinging to the side ready to eat. I tap his nose with the tip of the eyedropper and he clings to the end and I feed him. Is this unusual? I thought they only eat algae.
JOHN SCHMIDT
MORTON GROVE, ILLINOIS

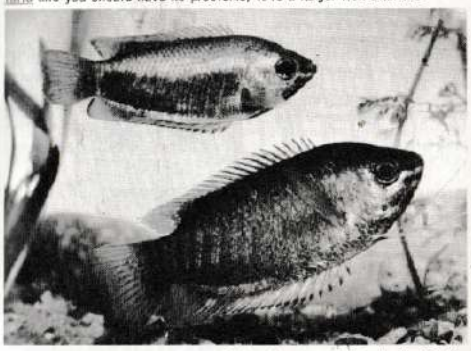
A. Usually when a fish comes from natural water sources that are shallow and subject to fluctuation in depth you can assume that the fish will be hardy as regards its capacity to withstand changes in temperature and water qualities, since shallow waters are especially susceptible to change. You can't really use the range of the fish as a sure guide to the temperature of the water it needs, and the fact that a fish comes from an area in which land temperature is high by the standards of people living in temperate zones doesn't mean that a fish from that area needs or does well in warm water. Deep waters in a truly tropical region like Borneo, for example, can be a good deal colder than shallow waters elsewhere for most or a large portion of any year.

Yes, it's unusual that your plecostomus eats from an eyedropper, but there's nothing at all unusual about the fish's eating meat. Many of the sucker catfishes regularly eat foods other than algae, and they definitely should have meaty foods included in their diet.

RELUCTANT GOURAMIS

Q. Some time ago I was able to buy a pair of Colisa fasciata from my local dealer. I have not been able to spawn the fish. I have spawned Colisa lalia and Trichogaster trichopterus, but I can not find any information on Colisa fasciata. Can you help me? 1. Is the pH a major factor? 2. Are the fry any larger than the fry of C. lalia? 3. What should the first food be for the fry of C. fasciata? 4. Is there any good book out on C. fasciata?
LESLIE E. HAILEY
FRESNO, CALIFORNIA

A. Give your Colisa fasciata the same care as you gave your Colisa lalia and you should have no problems; it is a larger fish than the

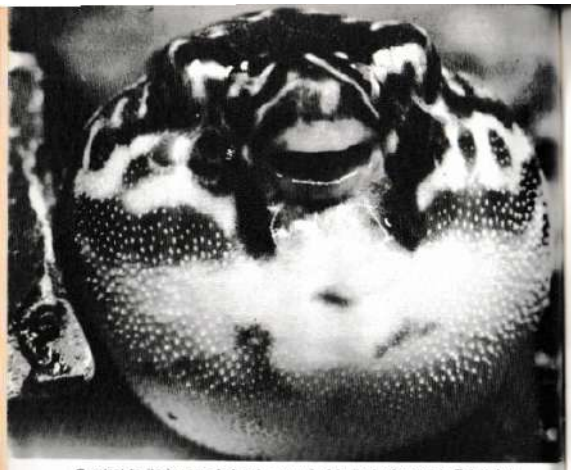


Colisa fasciata. Photo by G. Senfft.

dwarf gourami, so you might want to provide a larger tank for them, but it shouldn't be strictly necessary. 1. No, but water temperature is; to spawn C. fasciata, keep the temperature between 78 and 83 degrees. 2. They're a trifle larger than C. lalia fry, but not so much larger that they require greatly different handling. 3. Infusoria,

although some breeders start right off with newly hatched brine shrimp.

4. There is no book devoted to C. fasciata alone, but a book that will be released shortly (ANABANTOIDS: Gouramis and Related Fishes, by Dr. Robert J. Goldstein) will be of great use to anyone interested in the gourami species; presently available and of use to you is the smaller book GOURAMIS IN COLOR.



Comical to its keepers but not so comical to its tankmates is **Tetraodon fluviatilis,** shown here in the dilated condition that has been the source of some of the common names of fishes of its family. Photo by Gunter Senfft.

Tetraodon fluviatilis

BY LES KAUFMAN

The South Asian peninsulas are well known for their many species of brackish water fishes that have become successful in freshwater aquaria. Scats and monos are good examples. At the top of the list is the freshwater puffer *Tetraodon fluviatilis,* which occurs in both pure fresh water and certain brackish areas.

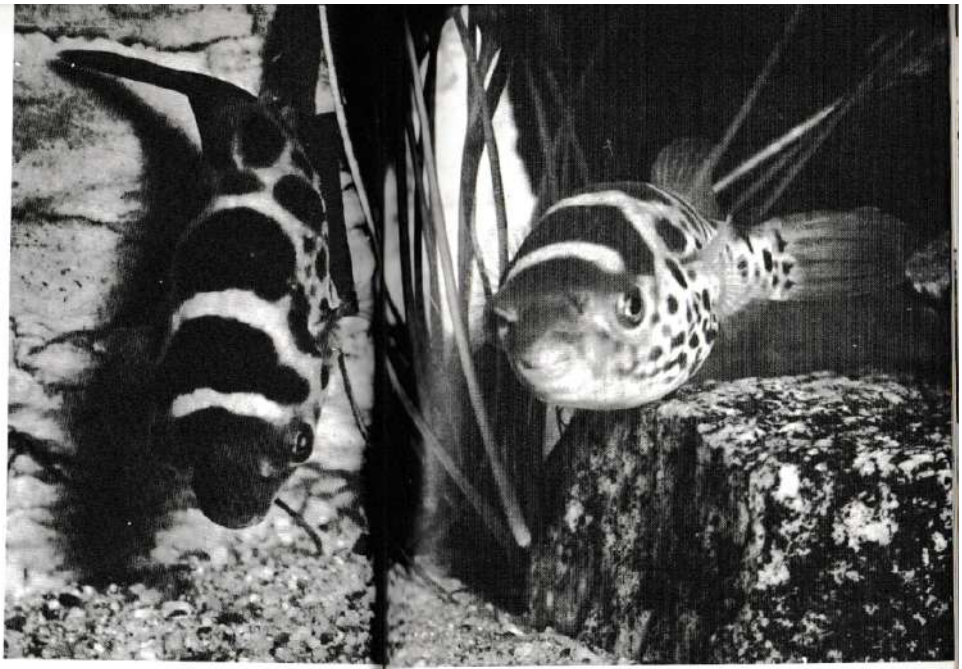
This puffer, or blowfish as it is sometimes called, has an unusual personality and a pleasing color pattern. The base color is a dusky green, with a light greenish-yellow area on the head (which is hardly distinguishable from the body). The belly is a brilliant white and is devoid of the round black spots that are sprinkled heavily on the fish's back and caudal peduncle. In a darker color phase that is not often shown, the black dots become islands in a gorgeous network of metallic green canals. The pectoral, dorsal, and anal fins are so transparent as to be nearly invisible, giving the impression of a finless fish, except for a half-moon caudal that is spread and closed like a Japanese fan while the fish is in motion.

My first tiny puffer was an instant hit with visitors and accordingly was granted a vacancy in my 10-gallon community tank along with some magnificent young veiltail angelfish, a few large swordtails with enormous "swords," and two unusually docile freshwater soles. That night my poor little puffer was huddled up in the far corner of the tank, like some pathetic little frog. Every half hour or so he would venture out, scavenge around for a few seconds, and zoom back to his corner with some very amused angelfish hot on his tail. I said a little prayer for my pet and went to sleep, not quite sure that he would be there in the morning. That night didn't go too well with me, and I was plagued by visions of the tiny fish miserably rolling his eyes and trying to escape the deadly jaws of the angelfish. But I wasn't at all ready for the sight that greeted my eyes the next morning. If the puffer had *seemed* to be missing all his fins except for his tail the night before, *every other fish in the tank was at the very least lacking its tail the next morning!*

The soles were beyond hope; their fins were bitten down to the flesh, and the poor fish never quite recovered from their encounter. The angels, while not mortally wounded, certainly seemed to have something wrong with their egos. The night before they were just a bit too boisterous. Now all but the very smallest were cowering in the corners. For some reason these tiny angelfish were left completely alone. Since then, any puffers I have kept have had their own tank and were kept only in the company of their own species.

Though small, ranging in size from one to five inches, the little river puffer is quite able to defend himself. As its Latin name indicates, (*Tetraodon* means "four-toothed"; *fluviatilis* means "from the river"), the species possesses four frontal teeth and these teeth are fused into a sort of beak. From the front these teeth, combined with the facial expression, make the puffer look remarkably like a frog. The green and black coloration only adds to the illusion.

Extreme care should be taken when one attempts to handle or hand-feed his pet puffer, as they have a habit of mouthing anything edible *before* trying to actually eat it, and this includes fingers! Normally, captive river puffers enjoy regular meals of chopped shrimp or clam, but they can be coaxed into accepting dry prepared foods if fed nothing else. Otherwise, the fish spend a great deal of time scraping the rocks in the aquarium, perhaps looking for the algae that begins to coat such objects



They're not fast swimmers, but their peculiar mode of swimming is no hindrance to the puffers in getting around their tank. Although T. **fluviatilis** usually won't pay any attention to baby snails, the species is efficient at reducing the snail population in any tank; red ramshorn snails are taken with special enthusiasm. Photo by Gunter Senfft.

after a while. One was observed to eat the blue-green algae that few other fish will touch, but whether puffers may be successfully employed in removing such unwanted algae remains to be seen.

Perhaps the most unusual aspect to this little fish, and the one that gives it its air of distinction, is the way it vibrates its pectoral, dorsal, and anal fins. (Pelvic fins are absent in most box-shaped Plectognaths, very small in all of the group with the exception of one very primitive species.)

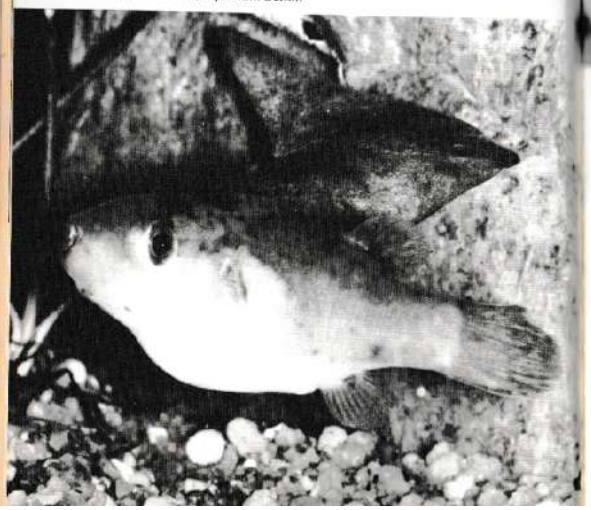
Because these fins vibrate so fast as to appear invisible, the fish begins to look like a green blob floating around the fish tank. The tail is used for actual locomotion only in extreme emergencies. At all other times it is rapidly spread and folded, serving parachute-like as a brake.

All these points, coloration, locomotion, shape and personality, lead to the impression that this fish is odd enough, distinctly different in every way from the ordinary run of tropicals. But there is one adaptation that immediately sets this fish even further apart from all other aquarium fishes. When frightened, injured, or removed from the water, the tiny fish suddenly swells like a balloon. Although other Plectognaths, and even one shark, possess this trait, few go to the extent of the river puffers. Not only are the scales blown out to form "burrs,"

but a portion of the vent is actually turned inside-out as well. If this is done out of the water, it is accompanied by a serenade of burps and clucks, the sound of the valve leading to the puffing mechanism opening and closing with each fresh breath. Although one may be led to believe that the stomach of the fish is doing the swelling, it is actually a bladder, or an evagination of the stomach. After maybe a dozen of these burps, the belly becomes hard and stiff. This condition can be maintained a little over thirty seconds. When placed in the water again, the fish blows out a stream of bubbles and drops to the bottom of the tank.

If you wish to keep the river puffer, it is well worth giving a separate small tank to the species. The author successfully kept two small ones in a 2½-gallon tank for a lengthy time and they attracted considerable attention. One young visitor informed me that he could get dozens of "tadpoles" just like them, and even drew me a picture of the sort of frog it turned into.

Tetraodon somphongsi, more peaceful than **T. fluviatilis** but much rarer. Photo by H. Hansen, Aquarium Berlin.



Tetraodon miurus, an African puffer, is less active than its more popular cousin, **T. fluviatilis**, but is much more destructive of other fish life. Photo by H. Hansen, Aquarium Berlin.

It is unfortunate that time not spent by the puffer eating or "sleeping" is occupied by chewing of the fins of neighboring fish. However, if small puffers are kept with large, non-aggressive fishes, both parties may escape unharmed. It is suggested that puffers be tried with fast-moving fishes such as barbs or large characins so that the ungainly puffer finds it too much of a job to chase them around. However, under no circumstances should small specimens be kept with cichlids, as this led to the untimely death of that first puffer. He had, for two or three days, delighted in sneaking up on a 4-inch firemouth cichlid and taking out pieces of her tail fin. After a while the larger fish got wise and quickly put an end to the prankster.

Despite its dangerously mischievous streak, *Tetraodon fluviatilis* can be the most delightful and entertaining fish one can have. It quickly becomes very tame, and will come to your fingers to feed. With just a little special attention, a small river puffer can be your star attraction for years.

Lesson in Lesions

BY LINCOLN LITTRELL

Hobbyists who have browsed extensively through aquarium literature have occasionally been reassured in print that no fish disease is transmissible to man. That this *ain't necessarily so* has become a matter of considerable discussion in recent months.

This writer dropped into a Long Beach, California, aquarium supplies shop one day late in 1968 or early 1969 and learned in the discussion that followed with Mr. Adams, the owner, that his premises were being used by research groups from two local colleges. One team was concerned with experiments to determine heat toleration of certain species of fishes; the other group was investigating a form of granuloma suspected to be of aquarium origin. My eastward trek to T.F.H. began before the findings of either group were disclosed.

A clipping from *The Pittsburgh Press* ("The Family Doctor" column by Dr. W. G. Brandstadt) recently sent to "Mail Call" states that the popularity of tropical fishes has resulted in setting up aquariums in thousands of homes and that no health hazard had been considered until publication of a report of recent studies in California. It was further stated that doctors had been seeing increasing numbers of skin infections in patients who recalled working about an aquarium at a time when having a small abrasion on the hand.

Such a break in the skin was revealed as sufficient to permit invasion of *Mycobacterium marinum*, the causative agent and an organism closely related to the species causing human tuberculosis. To quote the columnist, "When treated with antituberculosis drugs, patients all improved but recovery was slow," and hobbyists were admonished to wear rubber gloves when immersing their hands in aquariums.

What was left unsaid (that the bacteria cause tuberculosis in a fish but only a localized skin lesion in a fishkeeper) and that phrase about *slow recovery* near the end of the column could very well be alarming to some hobbyists. This unintentional effect could have been heightened by appending a dictionary definition of *Mycobacterium*: genus of non-

motile acid-fast bacteria (family Mycobacteriaceae) that are usually slender and difficult to stain and that include forms causing tuberculosis and leprosy. (To which we might add that *M. tuberculosis* and *M. leprae* appear identical under the microscope and are differentiated only by the latter's pronounced tendency to congregate in rosette-like clusters.) However, despite the bandying about of dread disease names, the hobbyist need have no great concern about this skin affliction if commonsense measures are adopted for protection against contamination of wounds.

Further reassurance comes from Leonard G. Katz, a medical doctor, whose February 1970 article in *The Wet Thumb* was reprinted in the August 1970 issue of *African Aquarist*. Dr. Katz writes that *Mycobacterium marinum* is one of the most common causes of deep skin ulcers in fishes and that infected specimens refuse to eat, the skin may turn "milky" and ulcer craters develop, that other symptoms include loss of weight, exophthalmia, spinal curvature, partial loss of finnage, and finally jerky movements followed by retirement to a dark corner to die. (Bloating and consequent protrusion of scales may also occur.)

Dr. Katz discloses that the disease organism has been found in swimming pools and that the disease caused by invasion of human cells is called swimming pool granuloma; he suggests that the condition is probably much more common than the scanty case reports would indicate. Most hobbyists become involved while cleaning fish tanks, and bacteria enter through a small cut or injury of the skin. To quote the doctor, who has not only treated swimming pool granuloma patients but also developed a lesion on his own right thumb: "The disease in humans caused by inoculation of *M. marinum* is not serious. It consists of the slow development of a red lump or sore on the hand at the point of entry. The lump begins two or three weeks after cleaning a tank and may last six months to two years. It does not spread to other parts of the body."

It is also mentioned in the Katz article that the fish tapeworm *Diphyllobothrium latum* has been found in persons who eat raw or improperly cooked fish infested with the parasites. (In like circumstances, it seems reasonable to assume that other internal parasites might possibly be transferred and be harmful.) In conclusion then, it would seem prudent to protect the hands or keep them out of open waters (aquariums, swimming pools, and natural bodies of water) when suffering any breaks in the skin which would permit entry of contaminating organisms. Normal precautions against contamination of a wound are sufficient; as for this scribbler, it is enough never to risk cleaning an aquarium while nibbling a raw fish in one hand and bearing a scratch on the pinkie of the other.

to demonstrate and encourage, doing a grand job of it, and convincing all skeptics (including me!) that tropical marine fishes are not such delicate, temperamental creatures that they should be avoided by hobbyists.

But to return to the eye-catching tank in the living room, its construction was a spare-time project. Jimmy made the all-glass tank by joining half-inch plate glass panels with an epoxy resin and then enclosing it within a framework of Formica. Several kinds of coral and sea-fans are used for decoration, and the substrate is coral-sand from Ceylon. Two four-foot Gro Lux tubes and a 100-watt spotlight serve for illumination. A concealed undergravel filter was constructed by Jimmy, and he uses several small pumps to force air through two diffusers and the subsand filter. An Ehcim filter is attached to a three-foot ultra-violet filter and an ozonizer is operated from the air lines. He uses artificial seawater exclusively, as the water in the area of Singapore is unsuitable.

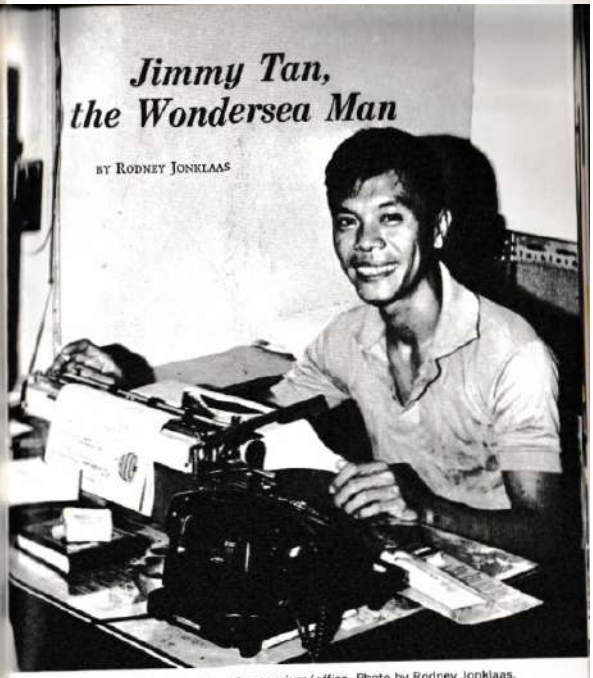
The inmates of this tank are numerous and active, difficult to inventory. No doubt I missed a few, but I noted a remora (that, I was informed, prefers to remain attached to the glass in a corner except at feeding time), a blue ring (*Pomacanthus annularis*), and a gray-blue *Euxiphipops* angelfish that frequents Singapore waters. A smaller *Euxiphipops* with more blue coloration dodged in and about the coral formations and kept well away from the blue ring, obvious boss of the community. Several large *Monodactylus argenteus* dominated the mid-water area and a pair of moonfish (*Drepane punctata*) occupied upper levels. The eye-catcher was an eight-inch beauty, *Plectorhynchus chaetodonoides*, and there were two smaller species, *Gaterin pictus* and *Gaterin gaterinus*. A twosome of large squirrelfish (*Holocentrus diadema*) lurked in the shadows, and a corner was occupied by a small grouper (*Cephalopholis boenacka*) and a *Chromileptes altivelis*. Seemingly sulking in a hollow of the background area was a rather pale lionfish (*Pterois volitans*); Jimmy informed me that this was habitual, that the lionfish seldom emerged except to feed after the other fishes had finished eating. Other members of the community included *Chelmon rostratus*, *Parachaetodon ocellatus*, *Chaetodon octofasciatus*, *Dascyllus trimaculatus*, *Diploprion bifasciatum*, and a cleaner wrasse (*Fissilabrus dimidiatus*).

The fishes are fed twice daily, or oftener, and the basic dietary item is mussel meat; Jimmy collects, opens, and washes mussels for storage in a freezer. For feeding, they are thawed and served on the half shell, and the accumulated shells are removed at about monthly intervals. Dry foods are also accepted, and boiled spinach is provided for the angelfishes, and the *Plectorhynchus*. Chopped prawns and crabs add occasional variety, and live guppies are relished by the lionfish and the groupers.

Radiating good health and vitality, this mixed assemblage of marine fishes in one of Jimmy Tan's sparklingly clear aquariums swims happily above the remnants of the mussel meals that are their major fare. Photo by Rodney Jonklaas.

Jimmy Tan, the Wondersea Man

BY RODNEY JONKLAAS



Jimmy Tan at work in his aquarium/office. Photo by Rodney Jonklaas.

The sight of that all-glass six-foot show tank in his living room was enough to convince me that here indeed, in the bustling city of Singapore, was an aquarist who certainly knew how to maintain marine fishes. Diminutive, wiry, thirty-one-year-old Jimmy Tan is the proprietor of Wondersea Marine Aquarium.

Jimmy grinned proudly at me as I gaped at his shop display. Everyone who drops in at Wondersea becomes a marine tropicals admirer, if not a convert, upon seeing these display tanks. Mr. Tan is on hand

Singapore has a considerable number of marine aquarium hobbyists, and nearly all of them are Jimmy Tan's friends and customers. All through the day and into the night fanciers drop in to gaze at Jimmy's fabulous show tank and the various smaller ones that line his living room. Besides the gorgeous fishes occupying these tanks, Jimmy maintains an assortment of unusual invertebrates. I was astonished to see some crinoids in superb condition, for I had given up on them years before, discovering that they literally fell apart within a few hours after capture. Jimmy has discovered that one species, happily a brilliant crimson one, will survive in captivity, and a number of specimens enhance his tanks.

Knowledgeable and personable, Jimmy Tan is a happy man with a devoted wife, a thriving business, and a host of friends. I call him Jimmy Tan, the Wondersea Man and look forward to my next visit.

INTERNATIONAL LIVEBEARER EXHIBITION

The third international competition for livebearing cyprinodonts (poecilids) will be held at Monchengladbach, West Germany, June 10 to June 13 at the Hotel Gerohof, Monchengladbach, Speicker Strasse 82b.

Male guppies will be judged in trios; all other species will be judged in pairs only, and competitors may enter more than one pair of any given species/type. All prize winners will receive a certificate of achievement, and all entrants will receive a certificate showing the number of points gained by their fishes. Judging will be made according to the standards of the Verien Fur Aquarien und Terrarienkunde. There is no entry fee charged for entries coming from outside Germany.

All questions and correspondence should be addressed (until May 10) to:
Wilhelm Schmitz
4050 Monchengladbach
Zeppelinstrasse 62
West Germany

"IF YOU SHOULD WANT ME FOR ANYTHING, I'LL BE IN CLEANING THE BIG TANK."