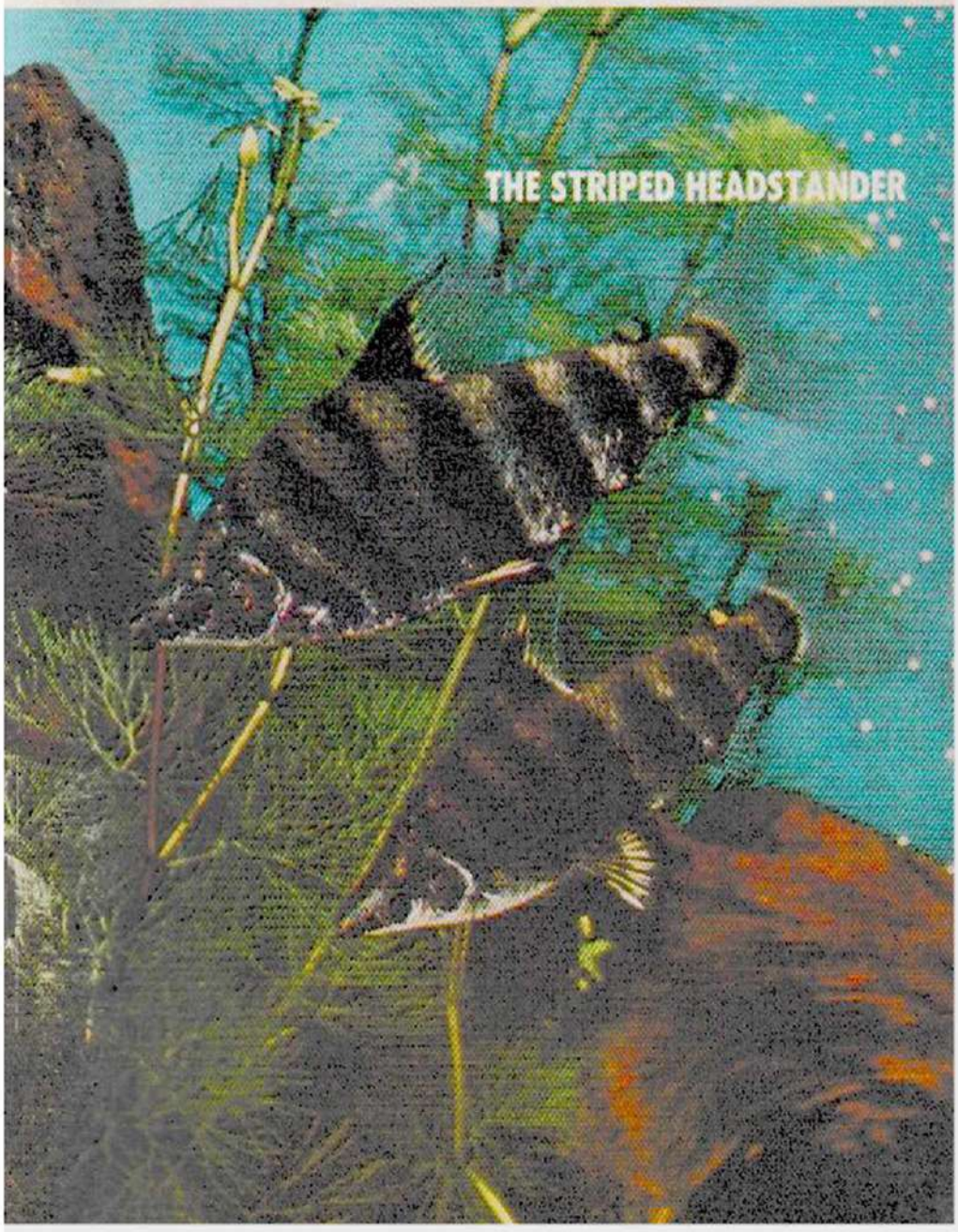
MARCH, 1969
VOL. II NO. 5

THE AQUARIUM

British Isles 2/6 DOMESTIC 35¢



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THE AQUARIUM

founded in 1932 by Dr. William T. Innes

contents

cover

THE AQUARIUM photographer, Andrey Roth, captured this pair of Abramites microcephalus using a Canon Pellix camera with a Macro lens 50mm F/3.5 on Ektachrome X film with artificial lighting. (Additional credits appear on page 69.)

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A STRIPED HEADSTANDER

by BRAZ WALKER

WHEN THE CREATOR HAD FINISHED with the characoid fishes, his imagination had been well expressed. Included are tiny pencil-shaped fishes, gaudy little tetras, shoaling flesh-eaters, pirates, game-fishes and vegetarians. There are those which practice mimicry, such as *Characidium* which seems to prefer the life of a darter to the life of a tetra.

The family *Anostomidae*, which belongs to the characoid clan also has a number of members which seem also to have a bit of the mimic in them which in their case is often fulfilled by doing what appears to be almost vari-colored impressions of cigars that might have been left over from Mardi Gras. The black and yellow banded *Leporinus fasciatus* is a prime example.

For aquarists who have kept all of the ordinary and perhaps even a few of the unmixable fishes which require isolation because of temperament or special feeding requirements, there probably comes a day when a craving develops for a community or mixed tank of fishes large enough to be seen without eye strain, and at the same time to have some noticeable character and an attractive, eye-catching appearance. Attractiveness, oddity, character, enough size to be seen and easy maintenance are all wrapped up in *Abramites microcephalus*.

Several anostomids are reputed to frequently carry themselves in a head-down position but in my experience some of these at least, including some of the *Leporinus* species which are sometimes referred to as "headstanders", seem to do so primarily under cramped or otherwise unhappy conditions. Removed to large, uncrowded aquaria with fishes their own size, they often completely abandon the headstanding attitude except as a feeding or otherwise quite temporary position.

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When swimming, *A. microcephalus* abandons the head-down attitude and assumes a horizontal position.

THE BLACK-TELESCOPE LINK IN GOLDFISH

MOST BOOKS DEALING WITH GOLDFISH include a description of the herculean task undertaken by the Orientals. The ancient Chinese are pictured as gentle artists patiently mating and sculpturing the golden fish to conform to some preconceived image of beauty. Actually, most of the exotic goldfish appear to have arisen simply by the chance matings of mutant fish whose offspring bred "true to strain". A classic example of this is the telescope eyed goldfish — a fish with grotesquely protruding stalklike eyes. For some time, it was believed that telescope eyes were purposely created by caging fish in a dark container and allowing a small ray of light to gleam from above. But, like other mutations, the telescope condition simply pops up at random in groups of fish from time to time. continued on page 8

Syngnathus pulchellus, a freshwater pipefish. This strange animal resembles a seahorse that has been "pulled straight"!

PUT THIS IN YOUR PIPEFISH AND SMOKE IT!

by WILLIAM A. TOMEY

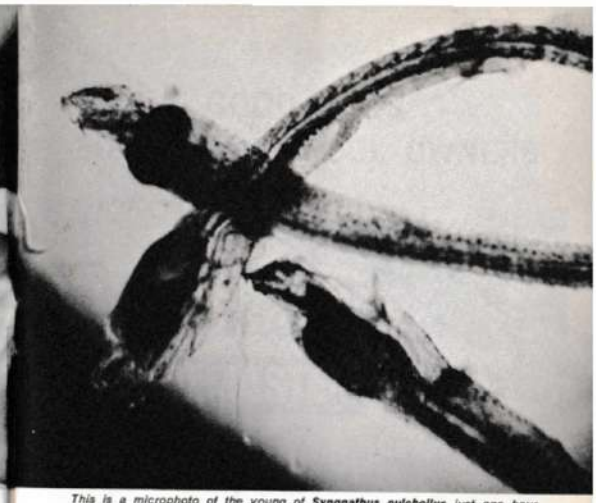
IN THE ORDER OF FISHES THAT ALSO contain the sticklebacks, we find also a Family much more familiar to the marine aquarist than to the freshwater hobbyist. This is the Syngnathidae (pronounced SIN-NATH-THEH-DEE), its chief claim to fame being that it sports the sundry seahorses so well-known to aquarist and layman alike. But where the seahorse is strictly a marine creature, the Family contains some singular freshwater fishes that are all but unknown quantities to the average aquarist—the freshwater pipefishes.

One of the most interesting in appearance of the freshwater pipefishes is the Ceylonese waterneedle, *Syngnathus spicifer*. In their native habitat they are found in slightly-to-moderately brackish waters of relatively high temperature. They are, of course, creatures with elongated bodies (up to 8 inches in length in the case of this species). Maintenance of the Ceylonese waterneedle involves only one problem, viz., what to feed them, as they do not readily eat daphnia, mosquito larvae or dwarf white worms. Their preference is for the fry of other fishes, especially livebearers, although they do take the larger form of cyclops upon occasion. In any event, the guppy fancier with plenty of culls on hand should have no problem here if he were to breed such culls solely for their fry as food for this pipefish.

The manner of stalking their prey is of decided interest. In general, they float through the water much like a dead twig, moving via rapid action of the dorsal fin. Should they approach, for example, a young guppy such that their head is bowed down towards it (its preferred attack posture), a quick flash of the mouth and the guppy is gone! The mouth resembles a trumpet-shaped quiver, but only its lower lip can be opened to form the deadly circular orifice. Prey is actually sucked into the mouth with a clearly audible sound.

Sexual differences are easily seen as only the male is provided with a long, thin reddish horizontal stripe, which has beneath it a breeding pouch consisting of a double row of scales in the form of a flap. There is a very important difference in propagation between the pipefish and most other fishes. Indeed, the breeding of pipefishes is more logically compared with the propagation of seahorses. For one thing, it is the

A male ***Syngnathus pulchellus*** *(female blurred in the background), showing a dark, elongated patch on its belly. This is his breeding pouch.*



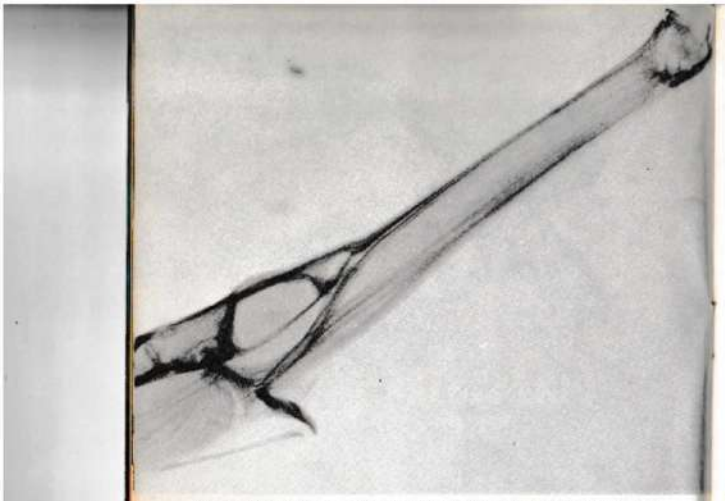
This is a microphoto of the young of ***Syngnathus pulchellus*** *just one hour after they were released from the male's breeding pouch.*

The Ceylonese waterneedle, ***Syngnathus spicifer.*** *Note that the snout on this species is very much elongated.*

male who carries the eggs after they are fertilized! Like seahorses, the female deposits her eggs in the breeding pouch of the male, who then promptly fertilizes them.

During their residence in the breeding pouch, which may last up to a week, the embryos develop. A rather high temperature is needed if hatching is to take place in less than one week, i.e., 81 to 83°F. When born, the young do not resemble their parents very much. Although longish, they are somewhat transparent and covered with many fine dots of black pigment. Their yolk sac is small and their snout is snub. In addition, they move through the water in a series of jerks. Raising them is really difficult as they do not generally take cyclops or even newly-hatched brine shrimp. It is only a conjecture, but it is thought that minute, soft algae may be required as a first food.

A prettier and smaller pipefish is *Syngnathus pulchellus* (the pronunciation of these scientific names is not hard—this one is pronounced SIN-NATH'-US PUL-CHEL'-LUS). Furthermore, if full-grown they are relatively easy to keep as they readily take daphnia, cyclops, mosquito larvae, dwarf white worms and brine shrimp. (None of the pipefishes,



A very rare photograph — the skull of ***Syngnathus spicifer*** *as it appears under X-rays. Note that the snout is nothing more than a long hollow tube.*

however, will eat anything but live foods.) Its propagation is also interesting as the males are fitted with a breeding pouch as in the preceding species, somewhat filmy on the inside, with two close-fitting rims that open during mating. At breeding time, the abdomens of both sexes are a beautiful red color.

The eggs develop in the breeding pouch and hatch after approximately 48 hours, usually either in the dark of night or in the early morning. Unfortunately, this makes it difficult to observe the birth process.

In form, these young do resemble their parents and have the same trumpet-shaped mouth (much shorter than in *S. spicifer*, however). Feeding the fry is a problem here also as they refuse even microscopic pond animals and newly-hatched brine shrimps. The best results are obtained in a tank containing minute types of algae. It may be that, in their natural habitat, they feed on the smallest of marine plankton. Although (or perhaps because) we have not yet uncovered all of the secrets of their mating or solved the problems of rearing the young, freshwater pipefishes are still among the most fascinating of our "odd-ball" aquarium fishes! ●

A beautiful pair of ***Hemichromis fasciatus.***

Of Cichlids and Names

by ALBERT J. KLEE

SOME TIME AGO, THE BRITISH aquarium magazine, *Petfish Monthly*, published an article purporting to discuss the cichlid, *Pelmatochromis annectens*. There followed an exchange of letters in that publication, which appeared as follows:

"The article by Dave Lelliott ('Spawning Success With *Pelmatochromis annectens*') appearing in the July, 1968, issue of *Petfish Monthly* immediately caught my attention as this species has not been seen in the United States for many years. A glance at the accompanying photograph and the text, however, quickly indicated that the subject of Mr. Lelliott's article (and the photograph) was not *Pelmatochromis annectens* but rather *Hemichromis fasciatus*. The latter has been seen in this country frequently, but in very limited numbers, over the past four or five years.

"*Hemichromis fasciatus* is found over a range that extends from Senegal and Gambia, in the West African 'bulge', eastward into the basins of the Tchad, Niger and Congo rivers, and southwards to Portuguese Angola and the two (formerly) Rhodesias. As might be expected with a species with such an extensive distribution, it boasts an impressive list of synonyms including *H. auritus*, *H. leiguardi* and *H. desguezi*. The fish does display a distinct resemblance to *Pelmatochromis arnoldi* (which, in turn, is frequently confused with *P. annectens*) but may be distinguished from that species by its general lack of color sexual dimorphism, by its more pointed head, by the absence of the pronounced frontal gibbosity so characteristic of the males of *P. arnoldi*, and by the absence of the cluster of metallic white scales above the vent that is especially characteristic of the females of *P. arnoldi*. *Albert J. Klee, Editor*, THE AQUARIUM MAGAZINE."

The author's reply was as follows: "Secretly I had hoped for some form of correspondence, preferably constructive, regarding my article 'Spawning the *Pelmatochromis annectens*'. Consequently I was very pleased to read this letter from Mr. Albert Klee.

"For some time I have been having interesting conversations over these fish, particularly regarding their identification. The only means of identification I have are the popular books. Most of these conversations are started by some other aquarist denying these fish the name *annectens* without offering an alternative. Others offer the name *Hemichromis fasciatus*. I am not at all sure what it should be but will point out my reasons for deciding on *Pelmatochromis annectens* until something more certain becomes apparent.

"1. '*annectens*' means 'link'; probably between species, possibly between genera? This fish seems to carry some of each of three different fish's characteristics, i.e., *P. annectens*, *P. arnoldi and H. fasciatus*.

"2. My fish spawned when 4½ in. long and are now 5 in. in size. *H. fasciatus*, quoting Sterba, grows to 30 cm., *P. annectens* reputedly grows to 5 in.

"3. *H. fasciatus* are supposedly good parents, as were my fish. *P. annectens*, being cichlids, are probably also good parents and rear their young.

"4. Colour. My fish do not carry the white scales above the vent as *P. annectens* do. The operculum spot on my fish is brilliant red; as stated (by Sterba) it should be in *P. annectens*. *H. fasciatus* carries a blue-green spot ringed with gold. The pictures of *H. fasciatus* in *Exotic Tropical Fishes* show both of the fish, male and female, carrying a large blotch on the dorsal fin; neither of my fish has this mark.

"5. My fish are definitely unpleasant by temperament and greedy, eating anything that moves or has a meaty taste. This suggests that they are *H. fasciatus* or *P. arnoldi*. *P. annectens* is of a much milder nature.

"6. All three species seem to enjoy brackish water and high

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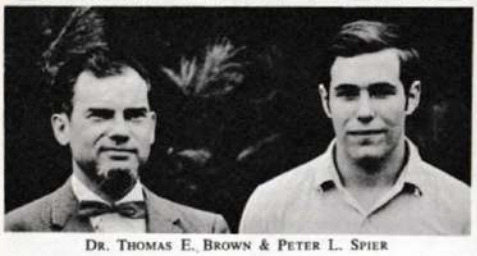
ABOUT OUR AUTHORS



DR. THOMAS E. BROWN & PETER L. SPIER

Dr. Brown resides in Yellow Springs, Ohio, with his wife and three children. A Daytonian (Ohio) by birth, Dr. Brown received a BS degree in Biochemistry from Antioch College in 1950; this was followed by an MS degree in Plant Physiology from Ohio State University, and in 1954 he received his Ph. D. in Plant Physiology from Ohio State also. He is presently Staff Scientist at the Charles F. Kettering Research Laboratory in Yellow Springs, Ohio, where his major efforts are to administer and carry out research in the field of plant (algal) physiology. Dr. Brown has also had a long and distinguished teaching career involving bacteriology, plant physiology, botany and general biology.

It would take a full issue (almost) of *THE AQUARIUM* to list Dr. Brown's professional affiliations and the many scientific papers he has written. The latter range from "Mineral Requirements for *Chlorella Pyrenoidosa* Under Autotrophic and Hetertrophic Conditions", to "Separation of Two Light-Induced Electron Spin Resonance Signals in Several Algal Species"! In the aquarium field, he has brought to bear his impressive scientific background on the problems of aquarium lighting, and has a number of aquarium hobby contributions to his credit on this subject.

Peter L. Spier is a Senior at Yellow Springs High School, a biology lab assistant and President of the Science Club. His other interests include sailing, woodworking, jewelry-making and, of course, aquarium fishes. As Dr. Brown states: "Despite the fact that Mr. Spier is still a high school student, he has an intense interest in things scientific and without him I could not have accumulated all of the data needed (for the article appearing in this issue)." ●

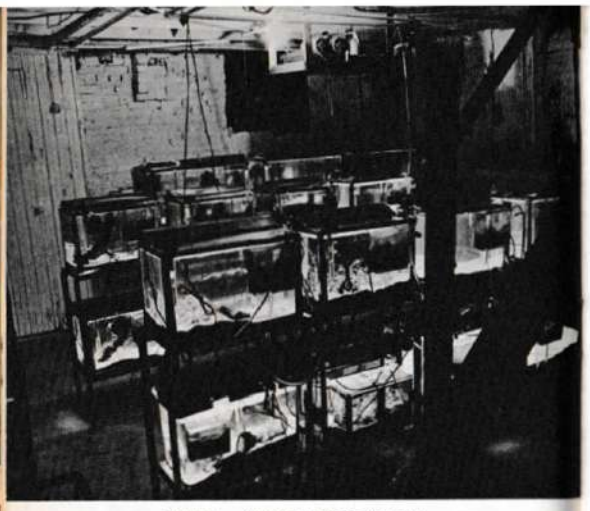


FIGURE 1 ARRANGEMENT OF AQUARIA

COMPARATIVE ILLUMINATION EFFECTS ON BREEDING OF TROPICAL FISH

by THOMAS E. BROWN & PETER L. SPIER

SINCE THE ADVENT of Gro-Lux illumination there has been an accumulation of literature questioning the use of this type of lighting. The senior author made an earlier attempt to show that there were two sides to this question[4] and this report offers data in support of the contention that the illumination from standard Gro-Lux lamps does not harm common tropical fish. More recently Sylvania Electric Products Inc. has developed a wide spectrum Gro-Lux lamp which is described by Klee[11] who states: "For sheer beauty of lighting without unnaturalness, I personally would choose Gro-Lux/WS over all other lighting sources." Other favorable comments have been made by Brandenburg[3] and Pieroni[20]. The lack of needed data has been voiced by Klee[11]. Nevertheless, several general discussions and comments on aquaria lighting have been published and the author makes no attempt to add to the excellent groundwork thus laid[5,6,12,13,14,17]. For those who would like to review the literature condemning Gro-Lux lighting, see articles by Axelrod[2], Honnold[9], Klee[10] and White[24]. Finally, for those who are additionally interested in comparative light work with plants, reference can be made to: Halpin and Farrar[7], Helson[8], Pallas[19] and Wittwer[25].

The current study was limited to a comparison between incandescent (tungsten), warm white fluorescent and standard Gro-Lux illumination. Ott[18], using guppies, compared warm white fluorescent lighting to that of cool white fluorescent. His results indicate breeding damage, similar to that found in the current paper. Simkatis comments on similar, earlier results with respect to spawn[21].

MATERIALS AND METHODS

Figure 1 offers an overall view of the physical arrangements.

Aquaria and Accessories:

All aquaria were stainless steel with full stainless steel hoods, equipped with thermostatically controlled heaters and Aqua Stock 8031 Hi-speed outside filters. They contained thermometers and feeding rings. See Table I for number and sizes of aquaria.

Lighting:

Table I indicates the adjusted energy levels for the various illumination sources. These were taken by a Yellow Springs Instrument Company —Kettering Radiometer with the probe one inch below six-eighths inch heat filter glass. Readings were taken at lamp center. Actual values were higher than recorded by an amount equal to the filter glass absorption.

All lighting fixtures were wired to grounded circuits and through a time clock. The period of illumination extended from 10 a.m. to 10 p.m. External light was omitted by blocking exterior windows.

Aeration:

Equipment for aerating aquaria consisted of three Little Giant air compressors, two operating continuously with one held in reserve. All tanks were piped with pure gum rubber tubing for filters and air stones. Air stones were only operated following spawning. Compressors operated continuously and were oiled monthly with filters being changed as needed.

Temperature:

The temperature held at 76–78°F during cold months and 78–80°F during hot months.

Filters:

Frequency of replacement of glass wool and charcoal washing varied, dependent on tank population. Filters were completely torn down and cleaned every two months.

Water:

All tanks were initially filled with aged tap water. Evaporation replacement was with distilled water.

Additives:

Well washed natural aquaria gravel was used and banked away from filter stems. Each 26-gallon tank contained two slanting pieces of slate (for spawning by angels) and to each slate were attached two rods of spawning grass. Mouthbreeder tanks (15 gal.) each contained three 3-in. flower pots banked with gravel for spawning purposes. The guppy and platy tanks (8 gal.) were each equipped with one rod of breeding grass floating horizontally.

Tank Cleaning:

Fronts only were periodically scrubbed.

Illumination source	*Contaminent*
Gro-Lux	heavy growths of dark green filamentous algae on walls.
Warm White fl.	light to heavy growth of red-brown unicellular algae on walls.
Incandescent	light growth of green filamentous and unicellular algae on walls.

Snails were absent from angel and mouthbreeder tanks due to being consumed but became numerous in all others.

Health of Fish:

The guppies had an initial bout with Ich which was readily controlled. During the study only an occasional fish became Ich infested (4–6 for the entire year).

Fish:

All fish were initially of breeding size except mouthbreeders.

common angels
blackjaw mouthbreeders
gold wag platys
common guppy

Table II lists the fish—aquaria relationships used. Each time fry reached adult stage this set-up was repeated. Old adults and sexed extra fry were removed. Fry and eggs (except for mouthbreeder eggs) were removed from parents within 12 hours. The situation with mouthbreeders was due to limitation of available aquaria and the expectation that they would care for their young based on previous experience. However, in each case, for each illumination, a significant number of fry were eaten.

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adversaria

ADVERSARIA is a column of controversy, dedicated to the uninhibited exchange of relevant opinion. Contributions to *ADVERSARIA* from readers is encouraged.

"When a thing ceases to be a subject of controversy, it ceases to be a subject of interest". William Hazlitt.

To The Editor: In the October 1968 issue of *THE AQUARIUM*, I noticed that you have pictured *Gymnarchus niloticus* with his backbone bent in a U-position (page 59)! This he could not do if he tried for in order to keep his electric field aligned, he must keep his backbone straight (see "Electric Location By Fishs" by H. W. Lussmann, *Scientific American*, March 1963). *Harry Rosenthal, Houston, Texas.*

Reply by Braz Walker: Although I have not kept Gymnarchus personally, I have kept perhaps twenty or so species of morymyrids (Morymyridae) and gymnotoid eels or knifefishes (Gymnotoidei) which use similar electronavigation and electrolocation techniques. As for your statement that ". . . he could not do it if he tried. . .", I seriously doubt its validity.

In Dr. Lissman's article to which you make reference, it is merely stated that *"Gymnarchus*, the gymnotids and skaltes all share one obvious feature: they swim in an unusual way." He explains further on: "They all keep the spine rigid as they move". A subsequent experiment led him to believe that the purpose of this rigid normal swimming position was to keep electric organs and electroreceptors in alignment. This "alignment" is achieved by the unusual propulsive systems, the long, rippling dorsal of *Gymnarchus*, the long, rippling anal of gymnotoids and the wing-like, flapping pectorals of the skates.

However, he clarifies his observations by explaining that the ordinary tail-thrashing propulsive system of most fishes would cause the misalignment. "A mode of swimming that keeps the electric field symmetrical with respect to his body most of the time would therefore offer obvious advantages".

The fish uses his electrical system to gain information. Often, the information requires a quick reaction, possibly a quick left turn to avoid smashing his nose on a stump. To make such a turn requires bowing the body, and this doubtless creates a TEMPORARY misalignment. The point here is that the body *can* be bent, and as a matter of fact often is, at least in the case of the knifefishes as you are no doubt aware if you have kept them and observed them closely. Since Dr. Lissman makes equal reference to their rigid spine attitude, to imply that the position would be physically impossible would necessarily include them also. At this time I have a 15-inch *Rhamphichthys rostratus* in a tank only 10 inches from front to back, and he makes his turns quite easily. This is an electric fish (gymnotoid). Other gymnotoids have bitten off their own tails at times!

To The Editor: We feel that Robert J. Goldstein is not writing book reviews. He is writing book critiques. These critiques are not aimed at the potential purchaser of the book (as a book review should be), but are aimed at the author and publisher. The style of writing and documentation chosen make the critiques very difficult to read. We feel that less than one per cent of the readers would try to struggle through, and those would do so because they are interested in what Dr. Goldstein's crusade is about rather than in the usefulness of the book.

A reviewer can honestly express his opinion about a book, not pull any punches and present information that is pertinent to those readers that are interested in the review. Why would any reader be interested in a book review? We think that the reader is interested in the purchase of the book and that he is looking for guidance as to its usefulness.

Without re-reading the critiques Dr. Goldstein wrote, our thoughts dwell on the endless typos which were listed. We feel that a few were important, but the majority were nonsense, added only as a poor attempt at a "snow job". True, a prospective buyer needs to be aware that there are typos in a book and probably a reference as to where the correct spellings can be found.

We do want to stress that book reviews may be caustic or recommend not purchasing the book, but it should be so presented that the reader is aware of the book's limitations rather than the limitations of the book reviewer. *Ed Symmes and Howard H. Jones, Jr., Atlanta, Georgia.*

Editor's reply: Dr. Goldstein's two book reviews (October 1968 and December 1968) were re-read once again, with a view towards the points made by Mssrs Symmes and Jones. In the matter of guiding the reader to the usefulness of the book under review, I cannot in honesty find Bob Goldstein anything but "Not Guilty". In his October 1968 review, he devotes a lengthy paragraph headed, "For whom is this book written?" This is followed by another lengthy paragraph in which he defines the aquarist's interest in the book. In his December 1968 review, he even goes to the trouble of advising aquarists as to whether the first or the second edition is a good buy.

As to the matter of "review" versus "critique", Symmes and Jones definitely take it on the chin here. My copy of Webster's Seventh New Collegiate Dictionary defines "review" as: "a critical evaluation (as of a book or play)". As Maxwell Smart says, "Sorry about that, fellas!"

It seems that the real bone of contention is in Dr. Goldstein's apparent preoccupation with typos, misspellings, etc. It should first be noted that the two books under discussion are centered in Dr. Goldstein's field (he is a parasitologist by profession). Indeed, a copy of his remarks re the Hoffman book were forwarded to Dr. Hoffman himself. This is a somewhat unusual situation and I would not think that too many technical books would be reviewed in the course of a year in this magazine. In any

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THIS IS MY PROBLEM

by HELEN SIMKATIS

From: Coonrod Aquatics, Fremont, Ohio

I fill my tank with hot water at 140 degrees F. It kills all the snails and you cannot hold your fingers in it for very long. Will this sterilize my tank for fungus and ich? If not, does the water have to be boiling (which would break my glass)? I feed rabbit pellets for greens to my fish and they eat it eagerly once or twice a week. Is this good procedure?

Answer: Using hot water as you do seems the hard way to get rid of snails. Water at 140 degrees F may discourage fungus and ich if it is present at the time of application, but snails, fungus spores, and ich might be introduced into your aquarium all over again as soon as it is once more in operation. All three pests are a threat as soon as you introduce carriers into your aquarium. Snails are brought in by plants, and infected fish are carriers of either fungus or ich (or both). To prevent snails from gaining a foothold in your aquarium, you should treat plants before introducing them into your tank. There are a number of ways of doing this. A time honored way is to mix a teaspoon of alum in a quart of water. A five-minute bath in this solution will kill baby snails that often hitchhike into aquariums by clinging to newly acquired plants. This will not kill snail eggs, however, and we can only recommend removing them by hand. The best way to avoid ich and fungus is to isolate all newly acquired specimens in an isolation tank for a week or two. Any disease they may be carrying should show up in such a period and you can treat them without fear of infecting the established fish in your aquarium. As to your question of feeding rabbit pellets to your fish to add vegetable matter to their diet, there is no reason not to unless, of course, the pellets tend to turn your aquarium water cloudy. Perhaps you have overcome this by use of a good power filter.

From: Craig Hasson, Perryville, Maryland

I changed a great amount of water in my 20-gallon tank. I had let the water set for four days before I used it. For some reason my clown loach died within three hours after the water was changed. Could I have scared him while changing the water or are they touchy to water changes? P.S. I changed the water because a few of my fish had ich and I had just finished treating them.

Answer: Your P.S. probably reveals why your clown loach died. This species is extremely prone to ich. Because it is sensitive to chemicals, it is best to treat it for ich by raising the temperature and adding methylene blue to the water. We would guess that either your fish was a victim of ich or to the medication you used in the aquarium.

From: Jimmy Holmes, Rohnert Park, California

I have some blackskirt fish and I would like some information on how to spawn them. I have been unable to find literature on them.

Answer: By blackskirt fish we assume you mean the black tetra (*Gymnocorymbus ternetzi*). The male is more elongated than the female. When the female becomes rounded with eggs, prepare a tank (10-gallon) by filling it to about 6 inches of water. This should contain either fine leaved floating plants or an artificial spawning medium. If the female is ready, spawning will take place the morning after they were placed in the tank. Water temperature should be about 80 degrees F. The tank should be dim except for one end. The eggs are scattered among the plants and will hatch in about 24–36 hours. Remove parents when they have finished spawning. The babies are free-swimming the third day and are ready for infusoria in a week. Brine shrimp, newly hatched, should be added to the diet the second week. After that, microworms and a dry food supplement should be offered.

From: Richard Goodman, Florissant, Missouri

What kinds of metals are safe in the aquarium? I have heard that all metals are poisonous to fish but in pet shops they say that products made of stainless steel are harmless to fish—is this true?

Answer: More or less. However, this writer once had occasion to write a number of stainless steel manufacturers regarding this question. Not one company would guarantee that its product would not give off metal salts if immersed in water over a period of time. It is true that stainless steel of good quality will not oxidize as quickly as steel or other metals, but to be on the safe side, it is best to keep all metals out of aquarium water including lead (which is toxic in soft, acid waters).

From: Bernard Katz, Brooklyn, New York.

I found myself on the way to giving up my tropical fish hobby due to two problems which I can't seem to overcome. My main fish tank is a 29-gallon tank equipped with one underground filter, one Dynaflo Motor Filter (outside), two airstones, plastic and live plants (75 percent plastic), nineteen egglaying fish and nine livebearers, ten catfish, shale rock and gravel. The water in this tank is always on the acid side (6·4 or 6·6), while I would like to have a pH of 7·0 or 6·8 to insure the survival of my livebearers and egg layers but seem unable to achieve this. I have tried adding sodium bicarbonate daily to no avail. The second problem is that my live plants never grow, but eventually die, despite my giving them 10 to 12 hours of fluorescent light daily and mineral trace plant food.

Answer: Rooted plants often take a while to become established in a tank with an underground filter. Once the root system is sending out new rootlets, the plant does very well with this type of filtration. If you are impatient to have plants, you might try setting a few in your tank planted in low plastic containers. They do not require any feeding in your aquarium which is at least 10 fish over its complement. The rule an inch of fish to a gallon of water is a loose one, but no matter how much aeration you supply, you are not stretching the size of the tank. Fish need uncluttered swimming space. This also accounts for the acid condition you would like to remedy. The more unused waste

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The Livebearer That Ain't

by B. F. CHHAPGAR

IN THE PLACID WATERS OF SOUTH AMERICA there exists a tiny fish going by the name of *Tomeurus gracilis*. Popularly, it is known as "long Tom". While "Tom" is obviously derived from *Tomeurus*, the word "long" refers to the extreme length of its gonopodium as this is more than one-third the length of the fish. It is surprising that half the world away, in the brackish waters of India, there is a similar looking, but different, fish.

The scientific name of this fish is *Horaichthys setnai* (pronounced HOR-RA-IK'-THIS SET'-NA-EYE). Though not very pretty to look at, it is *the* fish for the aquarist searching for the unusual! The fish is found in the estuaries and backwaters for up to 100 miles north and south of Bombay, in salinity ranging from 13,000 to 43,000 ppm. Though they have been kept for over two months in fresh water (after which they usually die), they are not vigorously active. They swim at, or close to, the surface of the water and feed on copepods, diatoms, etc. In the aquarium, they can be fed on *Daphnia* or brine shrimp nauplii. They breed easily in captivity.

It is a puny dwarf, being less than one inch even when full-grown. The body is transparent with minute black dots scattered all over. Like *Tomeurus*, it too has an upturned mouth, a dorsal fin set far back along the body, and very small ventral fins. However, the most striking similarity is the long gonopodium, obvious even to the casual observer.

As in livebearers, the gonopodium is a modification of the anal fin rays—in this case, the first six rays. However, unlike the poeciliids, the organ is so massive—over two-fifths the length of the fish—that it would be impossible to introduce it into the female genital opening during mating. *In fact the fish is oviparous, laying about three-dozen eggs in each batch!*

The male organ, although parallel to the body when at rest, is slightly

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Societies at Work

By
HELEN SIMKATIS

THE GREATER CITY AQUARIUM SOCIETY introduced its publication, *Modern Aquarium*, in November, and if Volume 1, No. 1 is a promise of things to come, a new bulletin will take its place among the first-rate aquarium society publications in the United States. *Discovering How to Spawn the Neon* by Walter Klaus, appearing in this issue, is the kind of adventure and success story that tickles the fancy of any hobbyist who has struggled to find a way to breed what may at first seemed to have been an "impossible" species to spawn in the home aquarium. Author Klaus first came upon *Hyphessobrycon innesi* in 1934. It was a bright newcomer to the hobby at that time and had been brought into the United States by zeppelin from Germany. Without hyperbole, the author tells us how he tried to match the description he received of the species' natural habitat; how he watched the fish every chance he had; and how he winced through one disappointing failure after another. Once while watching a specimen eat snail eggs off the side of the aquarium, the author deducted that the species came from water that was somewhat alkaline. It would have to be, he reasoned, if the species accepted snail eggs as a natural food. This occurred some eleven years after his initial introduction to *H. innesi*. This led him to change the pH of the water to 7.2. He collected water from a creek in a park near his neighborhood. After filtering the water, he once more set up a tank for his fish. It was a bare 30-gallon aquarium and after he brought the water up to a pH of 7.4, he added some fine willow tree roots that he had picked up while collecting the creek water. The fish were placed in this tank and early the next morning he watched the fish go into a little action but no spawning occurred. Later, he separated the males from the females and placed them in small tanks. After washing the willow tree roots in the water in the 30-gallon tank, he began to siphon the water off into 5-gallon jugs. The last bottle was only partly filled with water taken off the bottom of the tank. Two weeks later, he decided to try again, using the water he had stored. When he came to the last bottle, he held it up against the light to see if it was clean and he saw 5 baby neons in it. This piece is more of a study of tenacity than one of method, but we are given some of the fine points of his procedure. We name some of these as follows: A pH of 7.4 is desirable; the spawning season starts in December and ends in May; neons will not spawn in a bright light; spawning takes place between 7 and 11 a.m.; the fish seem to prefer a rainy day; neons are egg eaters; the good eggs, once removed from whatever they are adhering to, rise to the surface of the water and then sink to the bottom while the bad ones remain floating; bad eggs should be removed; the fry are very tiny and the eggs take about 42 hours to hatch. When success came, the author went through a painstaking exploration of methods for handling the eggs and finally became so proficient at the procedure that he sorted out as many as a thousand eggs a night. He studied the breeding habits of the species so thoroughly that he could spawn his fish at will. He frowns on the use of distilled water and regrets an article attributed to him in which by way of suggestion, the editor recommended it. Accompanying the article are some excellent photographs of the author working with a microscope and working in his fish room. *Modern Aquarium* is a well-designed publication with excellent typography. Along with club news, it contains some reprinted material and original articles. Write to *Modern Aquarium*, P. O. Box 265, Baldwin, New York 11510 for information regarding the society and its publication. The club meets, incidentally, on the 2nd Wednesday of each month with the exception of July and August at 8:30 p.m. in Ridgedale Hall, 64-19 Myrtle Avenue, Glendale, New York.

Erich J. Zwolfer discusses *Wonder Drugs for Tropicals* in the October issue of *The Informer*, published by the Green Water Aquarist Society. His breeding pair of Discus developed what he calls the protozoa disease and after relating his problem to a pharmacist, he was encouraged to use a compound containing Tetracycline and Nystatin, the trade name being Tetrex-F manufactured by Bristol Labs. The capsule used contained 250 mg tetracycline with 250,000 units of Nystatin. One capsule in a 20-gallon tank and one-half a

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A HISTORY OF THE AQUARIUM HOBBY IN AMERICA PART 16

by ALBERT J. KLEE

AMONG THE AQUARISTS OF NOTE active during the 1910's was Jacob Merget of Milwaukee, Wisconsin. Merget was an accomplished writer on the subject of tropical fishes, especially up to the year 1919. He described the breeding of many species of fishes prior to this time that weren't really bred with much commercial success until the 1930's. In later life he became a famous fish show judge and indeed, his death in 1935 occurred of a heart attack shortly after completing the judging of the Third Annual Show of the Milwaukee Aquarium Society.

In 1916, J. Louis Troemner joined the Aquarium Society of Philadelphia, William T. Innes being President of the group at the time. As we have mentioned previously, tropical fishes were then competing actively for attention with goldfish in that city and a number of feuds sprang up, even to the point of a separate goldfish society splitting off from the parent club. Efforts to iron out their differences and to recombine the two groups failed, and Troemner started a middle-of-the-road society hoping that all would join this and forget past differences. This goal was not attained but the other two clubs ultimately disbanded, leaving the the group Troemner founded, the Pennsylvania Fish Culturists' Society, as the sole survivor. This club exists even today.

In 1920, Troemner established a monthly leaflet published by the club, called *The Pennsylvania Fish Culturist*. For years this remained a very high-quality publication for its size. Troemner specialized in characins, rare ones especially, and for years the greenhouse attached to his home was a mecca for visiting aquarists on weekends.

Among those prominent in the business end of the hobby we include Bernhard Berkitz, the founder of the Aquarium Stock Co. of New York. Berkitz was proprietor of a business specializing in medicinal leeches and drug sundries, but in time he carried as a side line a stock of goldfish and aquarium supplies. His real entry into the tropical fish business occurred in 1917 when the firm moved to a new location to deal in aquarium fishes and supplies exclusively. The Aquarium Stock Co. has been, of course, a landmark in New York City for years. Berkitz had, in succession, two

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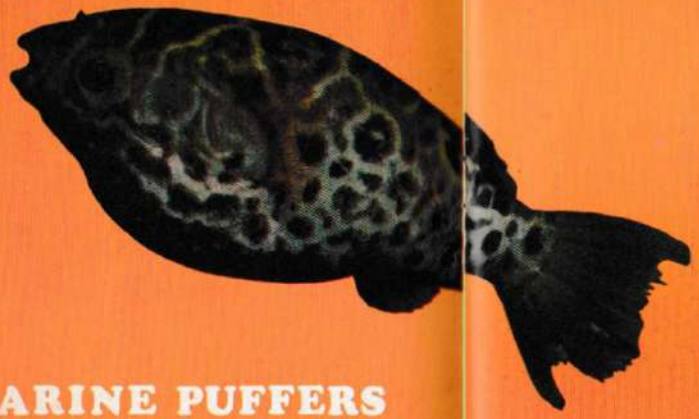
Bernhard Berkitz, founder of the Aquarium Stock Company.

Otto C. Beldt of St. Louis, founder of Beldt's Aquarium and Hatchery.

J. Louis Troemner, founder of the Pennsylvania Fish Culturists' Society, and pioneer aquarist of Philadelphia.

A trio of pioneer aquarists. From left to right: August M. Roth, William Schaumberg, and William T. Innes.

MARINE PUFFERS AND THEIR ALLIES



*This striped puffer, **Arothron reticulatus**, grows to ten inches.*

by B. F. CHHAPGAR

PUFFERS, ALSO KNOWN AS globe or blowfishes, are the most popular members of their group. Many of them, especially when young, can be acclimated to freshwater. Moreover, their ability to puff up when taken out of the water makes them delightful pets. When disturbed, air is noisily sucked in with about a dozen gulps, the fish blowing up like a balloon, and then floating upside-down for a few minutes. Or, the fish can also inflate itself by swallowing water. In nature this serves as a mechanism of defense against predators as the inflated fish becomes much more difficult to swallow.

***Top:** The sharpnosed puffer, **Canthigaster valentini**, from Ceylon is a welcomed fish in any aquarium. He is known for his peaceful disposition.*

***Center:** A **Canthigaster jactator** shows his ability to puff-up when taken out of the water.*

***Bottom:** A cow among roses! This curious cowfish, **Ostracion cornutus**, investigates a hydroid colony, **Tubularia**.*

*The so-called "freshwater" puffer, **Chelonodon fluviatilis**, is also found in the sea and thrives in pure marine water.*

When distrurbed, the striped puffer inflates itself and forms a ball in the process. In this form, it makes itself more difficult to be swallowed.

In the aquarium, puffers are reasonably peaceful, except when very large, but if carelessly handled the powerful tooth plates in each beak can give a sharp nip. This "beak", consisting of two fused tooth plates in each jaw, are used for crushing bivalve or snail shells. The male, in courtship, also uses them to clamp onto a female.

Feeding is not difficult as the puffer is an active fish and not finicky in its choice of foods. Puffers swim at all levels of the aquarium and also rest on the bottom for long intervals. Swimming is characteristically slow, being achieved by the pectoral and dorsal fins assisted by a sculling motion of the tail.

It is not generally known that one of the most potent poisons of the world, tetrodotoxin, is found in the liver and gonads of puffers. In fact, in Japan a cook in a public eating place serving puffers as a delicacy, is required to have a diploma from a licensed school specializing in the technique!

The balloon lamps found in any "Chinatown" are actually the inflated skins of the porcupine fish, *Diodon*. This fish is related to the puffer but only has one tooth plate in each jaw and further, its body is studded with long spines, normally folded parallel to the body but which stand erect when the fish inflates itself. In disposition this fish is like the puffers, in spite of its rather ferocious appearance.

The boxfishes have their body enclosed in a bony box with holes for the fins and tail. In the cowfishes, there is an additional pair of "horns" over the eyes. Although they are peaceful, their slow, sculling swimming and small mouths do not enable them to compete well with their tankmates in getting food. Also, beware of disturbing them unduly for when alarmed, they discharge a powerful mucous toxin from their skin which, in the confines of a small aquarium, will kill all other fishes in it and, ultimately, themselves also.

The triggerfishes, although colorful, are inveterate bullies in an aquarium. They will nip each other and other species, and make life miserable. The only way to keep them is to have a large number of equal-sized fishes. The triggerfish, once seen, is easy to identify. A big head, with hog-like snout, triangular-tipped soft dorsal and anal fins, absence of pelvic fins, and a characteristic notch at the vent are the distinguishing features. Of course the character which gives the fish its name is the locking mechanism of the first two spines of the dorsal fin. When the first long spine is erected, the smaller one behind it locks it into place. This device is used by the fish to jam itself into crevices of coral.

Allied to but more peaceful than triggerfishes are the filefishes. These have a longer body and their dorsal spine is far forward, over the eyes. They are so named because of their rough skin. Though docile, they are difficult to keep in a community aquarium as they are slow feeders with small mouths, and do not defend themselves well against other inmates.

By far the most suitable of the group for a community aquarium are the sharp-nosed puffers belonging to the genus *Canthigaster*. They look like a glove, tapering to a spindly mouth at one end and a tail at the other. Coming in a handy size (about four inches), they swim in a leisurely fashion much like the boxfish. All are prettily colored and have a peaceful disposition. Feeding should, however, be watched carefully as they have small mouths also.●

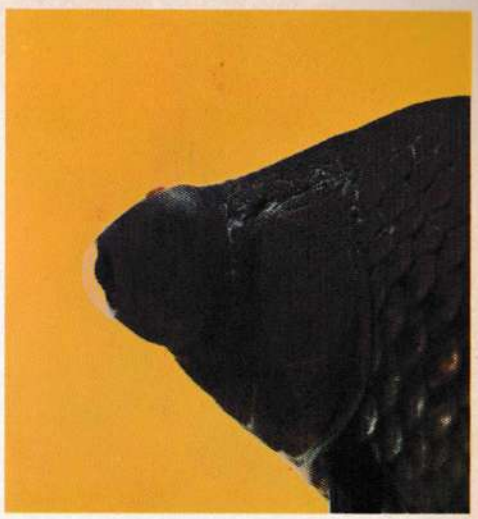
Neither black color nor telescope eyes are perceptable after birth. Two or three months elapse before telescope eyes and the black color emerge.

Roberts: continued from page 7

R. T. Hance (1924) appears to have been the first investigator to attribute the telescope anomaly to simple mendelian causes but S. Chen, in 1929, was the first to pinpoint the actual genetic factors when he demonstrated that a single recessive gene (t) in the homozygous state (present in two doses) was responsible for the condition. Chen arrived at the recessive gene hypothesis from the following mating tests:

1. Telescope mated to Telescope → 100% Telescope
   (tt) (tt) (tt)
2. Telescope mated to Normal Eye → 100% Normal Eye
   (tt) (TT) (Tt) (F-1 Generation)
3. F-1 mated to F-1 → 75% Normal Eyes; 25% Telescope
   (Tt) (Tt) (TT, Tt, Tt) (tt)

The telescope fish seemingly has a biological patent on solid black body color. It is strange that none of the early investigators in goldfish genetics mentioned this obvious link between the protruding eyes and the inky black color. Even the scientists in the early 20's who dealt specifically with the genetics of telescope eyes failed to report the phenomenon. It took a fish fancier to recognize the obvious! W. T. Innes noticed the peculiarity and wrote:



Since the eyes are distorted, the effect of light stimulation may partially account for the unusual color of the fish.

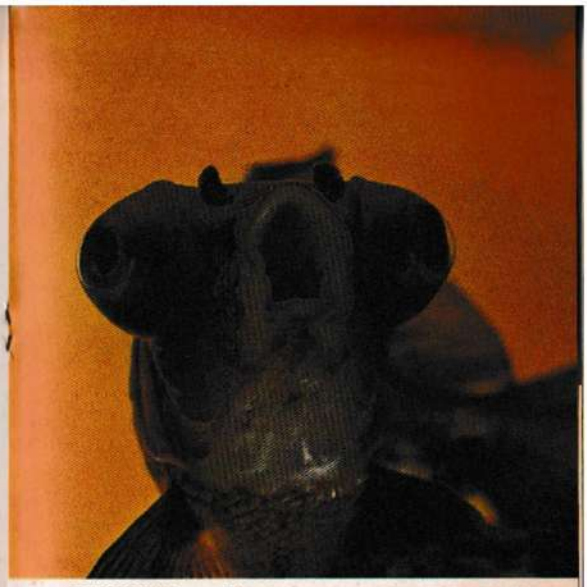
"Solid black is a color which for some unknown reason is confined exclusively to the telescope goldfish . . . the writer has never seen a good black goldfish without telescope eyes although a number of cases have been investigated."

It should be mentioned that neither the black color nor the telescope eyes are perceptible for some time after birth. Normally, two or three months elapse before telescope eyes emerge from normal. *Black color develops simultaneously.* The synchronism of eyes and color was first noticed by the author while selecting young black moors for initial eye

These fish have the ability to move each eye individually as is clearly seen in this photograph.

development. It was found that the task could be lightened if one discarded those fish that retained the greenish-gray wild type color. Without exception, they had yet to develop telescope eyes but after two months of further maturation, all had grown the stalk-like eyes. Immediately afterward, they began turning black.

Telescope eyes, in some way, seemed to be a causation of solid



***PLEIOTROPISM** is a condition when one gene produces an anomaly which in turn creates another deviation. This would seem to explain why these telescope goldfish are solid black in color.*

black color. A condition such as this, when one gene produces an anomaly which in turn creates another, is known as *pleiotropism*. Pleiotropism seemed to be active here, but the possibility remained that a gene controlling black color was closely linked on the same chromosome with the telescope gene. If this were the case, segregation of eyes and color would be expected in a few fish, and black color should be present without telescope eyes in a few fish. The following experiment was devised to test the possibility of a separate gene controlling black color.

Several F-1 normal-eyed fish, all of whom were descendants of one telescope parent, were mated to telescopes. As was expected, 50% of the progeny expressed the telescope condition on maturity. All the fish with telescope eyes were black, while those with normal eyes were greenish-

gray (Table I).

Since large numbers of fish were examined, it seems that the telescope eye is in some way responsible for the black color. It has been found in several animals that the retinal area of the eye is intimately connected with melanin (black pigment) production. It goes without saying that black moors have an excess of melanin, and it seems reasonable to suggest that as the retinal area of the eye enlargens, more melanin is formed, accounting for the inky black body color.

It has also been shown that the size of the pigment cells in goldfish is affected by the amount of light entering the eyes. Since the eyes of black moors are distorted, the effect of light stimulation may partially account for the unusual color of the fish. The melanophores of black moors are considerably larger and more dendritic than those in other strains of goldfish.

Thus, the beautiful ebony color found in telescopes seems to be linked to the elongated eye. The ancient Chinese would have undertaken quite a chore had they attempted to breed a fish with a body color to match the velvety black hue brought about by the telescope eye!●

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TABLE I

Results of mating F-1's to telescopes.
Note the link between black color and telescope eyes.

	Black Body and Telescope Eyes	*Black Body and Normal Eyes*	*Greenish-Gray Body and Telescope Eyes*	*Greenish-Gray Body and Normal Eyes*
EXPERIMENT A Telescope Male mated to F-1 Female	317	0	0	324
EXPERIMENT B Same as A	184	0	0	201
EXPERIMENT C F-1 Male mated to Telescope Female	360	0	0	359

***A. microcephalus** is a strikingly attractive and desireable creature although completely out of place in a tank with angelfish and other longfinned fishes.*

***Walker:* continued from page 5**

Abramites, on the other hand, is a "true" headstander in every sense of the word, and actually seems physically unable to stay for any length of time in either a straight-ahead or head-up position without a great deal of exertion. This is a much heavier-bodied fish in proportion than many anostomids, and the rather tiny head which seems to lead the way for the rest of the fish may look a bit ridiculous at first. As a matter of fact, the specific name, *microcephalus*, means "small head". Because of the built-in tilt of *Abramites*, feeding from the bottom obviously is more convenient, but this is an active, intelligent species in spite of the small hat-size, and individuals will quickly adapt to almost any type of feeding. Dry food will even be eaten from the surface or as it floats downward, and lettuce or celery tops will be picked at as they float at the top. Since all of the *Anostomidae* are at least partially vegetarian, greenery of this sort should be given regularly.

There are quite a number of anostomids and all possess teeth. The dental characteristics are very important in the identification of these fishes since many are quite similar in other respects. Although the teeth of *Abramites* may be less obvious than some of the others because of the small mouth, they are capable of nipping little plugs out of lettuce leaves, grazing off rocks or plants from which algae might be growing and just as efficiently removing bite-size pieces from the fins of other fishes.

Unfortunately, despite the excellence of these striped headstanders as outstanding show fishes, their hardiness and their remarkable adaptability to various aquarium situations, they are just about as sneaky

A copper center adorns the adipose fin in a healthy and contented specimen.

and mischievous as a wide-eyed and innocent-looking creature can be. Possessing the ability to immediately assume an unbelievably innocent "Who, me?" expression after just having made a fish three or four times its own size almost jump out of the aquarium, the aquarist not familiar with *Abramites* may find it hard to believe that this fish (which looks almost as surprised as the victim involved) could possibly be to blame. Specializing in rear-end sneak attacks, so skillful and unhurried is the approach that some fishes never seem to learn to avoid them. Sometimes the situation is repeated so regularly that eventual removal of the headstander or headstanders is necessary, but in other situations a standoff may be eventualy worked out. When *Abramites* is kept with slow-moving fishes, however, complete harmony is rather unlikely ever to result.

As for a color description, for healthy and contented specimens "black-and-white-striped" tells most of the story; a copper center adorns the adipose. In crowded tanks containing belligerent fishes which may have the headstanders a bit more retiring than usual, the pattern is somewhat suffused with a grayish overcast. This is sometimes the coloration of the fish when in the dealer's tank, for *Abramites* does not appreciate frequent disturbances such as chasing around its aquarium for other fishes with a net. The fact that disturbances can make this fish look completely different from its ordinarily bold appearance, even to the point of looking rather uninteresting, sometimes causes the species to be overlooked by aquarists who would surely find its "other self" more appealing.

Although the teeth of ***Abramites*** *are not obvious, they are capable of removing bite size pieces of food including fins from other fish!*

Unhampered by their stubbiness and by being aimed in the wrong direction, like all anostomids *Abramites* is an amazing jumper. Fortunately, this headstander is less inclined to jump for the shear pleasure of jumping or for curiosity than many other fishes, but uncovered aquaria or open corners invite disaster.

Feeding this fish is no problem at all. As stated earlier, a periodic feeding of lettuce, celery tops or spinach would seem advisable because of the partially vegetarian nature of the creature. From there; floating, sinking, dry or wet prepared foods, oatmeal, fine-ground beef heart, dog food (not canned*), or just about anything you might be using for your other fishes is suitable.

There is one point I would like to make. It may seem at times that I characterize a fish as an undesirable acquisition for the aquarist. This is not my intention at all; I am simply trying to let the potential buyer know what to expect from a given species according to my own experience. I have kept the fishes which I write about, and where I have found a given species to be possessor of characteristics which might prove undesirable for certain situations, these will be used to complete the picture.

Abramites microcephalus is a striking, attractive and desirable creature. Although completely out of place with such tempting victims as angels and other longfinned fishes, in an aquarium of other anostomids, medium sized cichlids and other species with similar dispositions and weaponry, few fishes could better fit or be more easily managed.●

* Some aquarists use canned dog food; I do not.

THE AQUARIUM QUIZ

We hope you'll find quiz #3 as enjoyable as its predecessors. For answers to quiz #3 turn to page 69.

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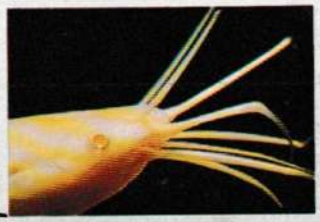

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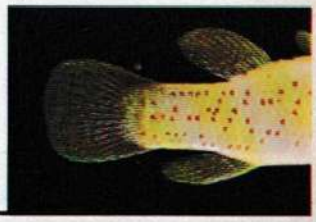

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Klee: continued from page 32

assistants who later became very important commercial figures in the aquarium hobby in their own light; Marius Kramer, later with Paramount Aquarium, and Richard Buettner who (with Carl Mertens) established the Empire Tropical Fish Co. in 1929. Both Paramount and Empire were to become two of the most influential importing firms in the aquarium hobby.

Another commercial figure of importance was Otto C. Beldt who emigrated to the United States from Hamburg, Germany, in 1913. Beldt struck out for St. Louis where he learned the baking trade. However, as a child Beldt was introduced to the hobby as a consequence of his father's fish (food, not aquarium!) stand where aquarium supplies were sold as a sideline. After school, young Otto collected daphnia for a tinsmith who made aquariums, and was "paid off" in kind. Within a short time, he was the owner of an impressive collection of fishes and an accomplished breeder.

The hobby carried over into his life in St. Louis where he married in 1918 and made an aquarist of his wife. The couple soon filled a three-room apartment with tanks. This necessitated the purchase of a house from which a greenhouse full of aquariums soon sprouted. With time, it turned into a full-time business that became famous throughout the country. Beldt was one of those rare creatures—a commercial figure in the hobby who never once lost his native love of breeding unusual fishes.

In January 1919, a new but fairly short-lived fish magazine appeared on the scene. Its name was *The Daphnian*, and it was published by the Boston Aquarium Society. Although technically a periodical, it was not so much a magazine as an annual. Only three issues were published: 1919, 1920 and 1921, but the publication was a letterpress effort with photographs, taking it out of the "club publication" class.

Although the President of the Boston society at the time was C. L. Hauthaway, *The Daphnian* was the work of its Secretary, Walter H. Chute. Chute was later to become the Director of the famous Shedd Aquarium in Chicago. Apparently the publication was not sold but was included in the yearly membership dues of $2.00. It carried the advertisements of the firms and aquarists of the day, such as the Aquarium Speciality Co., Herman Rabenau, Charles E. Visel, William Tricker, Earnest Leitholf, Harry P. Peters, August Obermuller, and others. Of interest was the fact that Chute himself advertised as a "breeder of tropical fish", and offered white worms and ground shrimp for sale, and also an aquarium set-up and maintenance service.

Many of the articles were written by Chute himself, and dealt with general aquarium topics. *The Daphnian* represents a historical curiosity in the development of our hobby.

One of the ads in *The Daphnian*, i.e., Crescent Fish Farm of New Orleans, offered *velifera* mollies for $4.00 a dozen (about $12 in today's

***The Daphnian,** published by the Boston Aquarium Society. It first appeared in January 1919, and was edited by Walter H. Chute who was later to become Director of the Shedd Aquarium in Chicago.*

currency). The man behind Crescent was William Schaumberg, one of the pioneers in the development of the black sailfin molly and one of the most famous "fish farmers" in the business. Starting as a hobbyist, Schaumberg found conditions in New Orleans to be favorable to fish farming and soon had acres of water under cultivation. A very modest man, to whom the hobby owes much for his work in livebearer development, Bill Schaumberg retired because of ill-health in 1941 after over 25 years of commercial activity in the aquarium hobby.

In August of 1920, the pioneer aquarium writer in this country, Christian J. Heede, passed away. As William Poyser said of him in his obituary, "He combined the characteristics of the naturalist with those of the fancier, and his original research work coupled with an extensive first-hand knowledge of the literature of the subject in several languages, placed him in the front rank among aquarists."

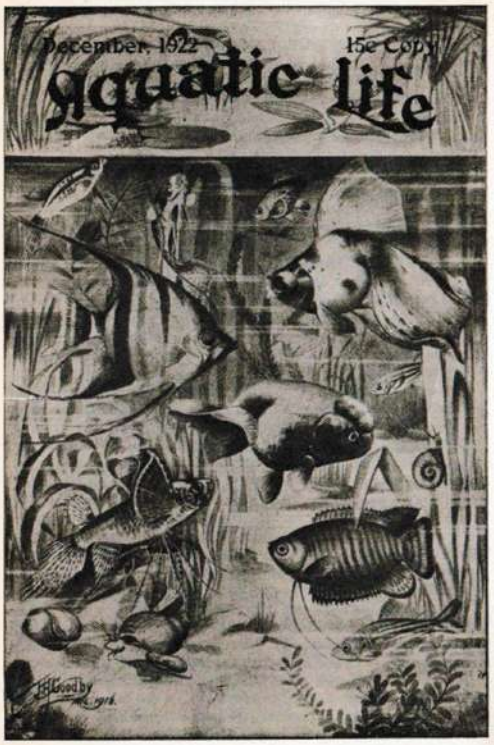
In 1919, due to difficulties in the publishing world in general, *Aquatic Life* began to experience difficulties of its own. The issues for October, November and December 1919 were eliminated. In 1921, the magazine was again in trouble and issues for February through July were eliminated. At this time, the publication was down to a very thin 12 pages. In 1922, the magazine suspended publication and for four months, did not publish. However, the publication was sold to August M. Roth, and reappeared in October 1922 (as a combined July-to-October issue). Roth published the magazine from Baltimore, Maryland.

Roth, as we have introduced previously, was a printer-publisher. He began publishing information regarding the aquarium hobby in *Pet Stock World* in 1914, and we have already mentioned the short-lived *Aquatic World*. For many years Roth also published *American Bantam Journal*, *Small Animal World*, *Cage Bird World*, *Caidom* and *Pet Shop News*, as well as many books on these subjects. His first act upon obtaining ownership of *Aquatic Life* was to reduce subscription rates (from $1.25 to $1.00) and advertising rates. The rehabilitation of the magazine was painfully slow; in 1923 it reached 16 pages; in 1926, 20 pages; and in 1929, 28 pages. In the second issue put out under Roth's editorship, the title carried the subtitle, "and the Aquatic World", carried to this day in its masthead.

Under August Roth, the magazine changed considerably. An extensive use of pseudonyms was made, e.g., articles were written under the names of "You're Welcome", "Fishdom's Lecturer", "Em-En", "Mar-Nur-Si", etc., but the magazine published the material of many famous writers of the day such as Shufeldt, Beldt, E. Calver Bayliss, etc. A radical departure was the inclusion of many foreign articles (translated), mostly of German origin. Some issues were almost entirely authored by foreigners. The magazine improved, however, over what it had been during the dark days of the early 1920's. Indeed, Roth's practice of scattering informal paragraphs on miscellaneous matters throughout the magazine, made the publication more "human" than it had been under Poyser's editorship. Unlike Poyser, Roth used editorials freely.

For many years, throughout the 1920's and the early 1930's, there were many large shows given by clubs, mostly in the eastern States. August Roth faithfully attended these and published many photographs of aquarists, awards and exhibitions. During the 1920's, *Aquatic Life* was practically the *only* publication available to aquarists, although we shall mention some minor ventures later in this series. In a sense, *Aquatic Life* held the aquarium hobby together during these critical times.

Roth ventured into the commercial fish business as a wholesaler, but this was a failure. In the early 1930's, his brother, who worked in another print shop but who came at night to help put out the magazine, died. Roth was devoted to his brother and the latter's death affected him



Aquatic Life, *as it appeared in 1922, shortly after August M. Roth assumed its republication.*

Aquarium News, *published by the Ridgewood Aquarium Society of Ridgewood, Long Island, N. Y. Its first issue appeared in September 1921.*

deeply. Afterwards, he became more or less of a recluse but continued to publish the magazine even as he does today, i.e., setting every line of type by hand as he did-almost forty years ago. The hobby owes a great debt to this kindly, deeply religious man. His accomplishments were remarkable and we shall return to August Roth and *Aquatic Life* again in this series.

In 1921, as *Aquatic Life* underwent some of its most severe difficulties, the Ridgewood Aquarium Society of Ridgewood, Long Island, N.Y.,

Aquatic News, *Canada's first aquarium magazine. It was published by the Toronto Gold Fish Fanciers' Society of Canada, and first appeared in 1925.*

found the available publications inadequate for the hobby, and started a publishing venture of their own. Their magazine was called *Aquarium News*, the first issue appearing in September 1921. Its editor was Christof H. Berneburg, the Chairman of the editorial board (and also society President) being Hugo C. Nelles, a well-known fish breeder and author of the period.

The magazine consisted of 12 pages and sold for 15c a copy, $1.50 for a one-year subscription. Most of the well-known firms of the day in the New York–New Jersey area were advertisers as well as many from out-of-town (such as Crescent Fish Farm). A good many of the articles were written by Nelles himself, but other authors contributed as well. Although an excellent little magazine, in the style of the Brooklyn Aquarium Society *Bulletin*, like that publication the burden to the publishing society proved too great and *Aquarium News* soon passed from the scene.

It is also appropriate to mention here the appearance of *Aquatic News*, published by the Toronto Gold Fish Society of Canada. This eight-page magazine appeared regularly between 1925 and 1926. A yearly subscription was $1.00, although copies went free to members of the society. Its articles were on all subjects, not just goldfish. William Innes was one of its contributors, as was E. Calver Bayliss. The magazine was supported reasonably well by advertisers, and the quality of the publication was excellent also. Unfortunately, like other society publications it, too, proved too much of a burden for its sponsors and passed from the hobby into history.

To be continued

Brown & Spier: continued from page 20

Feeding:

Flavor Flakes were provided daily in a.m. and frozen brine shrimp in p.m. to all except fry. Fry were initially fed Foster Fry or infusoria twice daily—later Baby Manna and brine shrimp. Algae or duckweed were provided weekly to mouthbreeders.

RESULTS, DISCUSSIONS AND CONCLUSIONS

It appears obvious that the effects of different types of illumination are somewhat species dependent. However, the study shows also quite obviously that Gro-Lux lighting is not the harmful thing that the literature has led us to believe. It appears to be virtually equal to incandescent lighting with the added two advantages of being cooler and providing wavelengths which enhance the colors of most fish and decorative backgrounds. On the negative side this study seems to show that warm white fluorescent lighting should not be used when optimum breeding conditions are desired. Lamps high in red energy emission appear to be the best. Incandescent, to a very great extent, and Gro-Lux, to a lesser extent, emit such energy with both of these doing so to a greater extent than most other fluorescent lamps. The blue emission peak of Gro-Lux adds mainly to the beauty of the lamp.

This study leaves unanswered what the effects would be after many generations for any of the illuminations tested. Due to the harmful effects on inbreeding, aquarists seldom desire to raise generation after generation from continuously inbreeding populations. Therefore, the question is not a practical one. This study does answer the question of the effect of three common illuminations on average aquaria stock over a reasonable length of time. Table III presents a summary of the data. The following observation notes on guppys are representative of those taken with all fish studied.

Guppy (*Gro-Lux*)

Activity:	Growth, health, activity and feeding were excellent.
Spawning:	First generations 1/21–3/15/17 Second generations 4/4–8/25/67 Third generations 9/17–11/30/67
General Remarks:	No apparent problems.

Guppy (*Warm White Fl.*)

Activity:	Growth, health, activity, and feeding were good.
Spawning:	First generations 2/13–3/8/67 Second generations 4/12–8/26/67 Third generations 9/29–11/17/67
General Remarks:	These were the poorest of the guppies.

breeder data where no statistical difference can be found. The only experiments for which the statement appears to be true are those involving angelfish. It is recognized that the two authors have remarked upon the poor quality of guppies produced under warm white fluorescent lighting. If this was true of the other species studied as well, this fact should have been stated more clearly.

It should be noted that the Brown and Spier angelfish and mouthbreeder data certainly are interesting from another point of view. In the case of the latter, where eggs and, to a lesser extent, fry are shielded from the light, the type of lighting appears to be irrelevant—just what one would expect. With angels, however, where such protection is not present, the type of lighting used has an enormous effect. It would be most useful if these experiments were repeated using danios, tetras, bubblenesters, or other cichlids as well.

Finally, Messrs Brown and Spier are to be congratulated on a very fine example of aquarium experimentation. They have done precisely what we need to do more of in this hobby. Perhaps others will follow their leadership. ●

Societies: continued from page 31

capsule three days later cleared up what he describes as a wormy discharge and the medication did not interfere with the pair of fish who were spawning at the time. Tetrex-F, of course, is a prescription item but we hope those that have a need for it will have a sympathetic and interested doctor who will find a way to make the drug available for aquarium use. *The Informer* is a well-produced bulletin containing original material, club news, and well-chosen reprinted material. Write to the society in care of Jack Manning, President, 8320 Hillcrest Drive, Orland Park, Illinois 60462. This, incidentally, is a new address for this society.

Water World, published by the Suburban Maryland Aquarium Society, is published on a bi-monthly basis, and, although it made its appearance in January 1968, we have only had the pleasure of seeing two issues. Both of these, however, excel in readability and layout. The November-December issue contains several original articles reflecting a cooperative and talented membership. Fred Buscher, a scuba enthusiast, talks about *Sharks* and offers a rundown on several infamous species. This piece is attractively illustrated by the author with black and white drawings. Shirley Joseph fills us in on *Labeo bicolor*. According to her, the fish has been commercially bred in Hong Kong and Singapore for a number of years. The species will accept a variety of food but vegetable matter should be supplied such as cooked spinach. She considers the fish a good candidate for a community tank but suggests that an area of seclusion be provided. Each specimen likes to have a place to call his own. She favors a temperature of about 78 degrees F. and a slightly acid pH. Breeding information is as follows: Condition a pair in a 15 to 20-gallon tank and provide a slate for receiving the eggs, placed in a position so as to make the underside accessible to the fish. After spawning takes place, remove the female and allow the male to take over, unless, of course, he shows no interest. If the latter be the case, remove him, too, and place an airstone near the eggs so that a current moves over them. The eggs hatch in 3 days at a temperature of 80 degrees F. and a first food is newly-hatched brine shrimp. Algae should be present for the fry. Those interested in *Labeo bicolor* for breeding purposes should read this article firsthand as we have only touched on the highlights of the piece here. Garrett R. Hyde discusses *Filters for Home Aquaria* to some length in this issue, pointing out and comparing the various kinds of filtering media available, the designs of filters, and finally, setting forth his personal findings and opinions of the different types of filters available. Edward Peterson, Assistant Curator of the National Fisheries Center and Aquarium, reviews *Disease Problems*. This is Part II and is subtitled: Some Parasitic Fungi Affecting Aquarium Fish. *Ichthyophonus hoferi* is pinpointed as an unwelcome guest in home aquariums and although some controversy exists as to whether it is a fungal rather than a bacterial organism, the author considers it a fungus. It enters the host by way of food containing the spores of *Ichthyosporidium*. General symptoms are described as emaciation, skin pallor, thrombosis, and sometimes loss of fins. If the nervous system is infected, loss of equilibrium may be noticed, and it can be the cause of "popeye". It also shows up as ulceration under the skin. Although there is no definite cure for this infection, it is helpful to the hobbyist to be able to recognize it. Specimens showing symptoms should be, of course, isolated. Chloromycetin or terramycin, 5 to 10 p.p.m., can be used in a prolonged bath. Para-chloro-phenoxetol at 10 p.p.m. has proved effective in early stages of the disease. Outbreaks of *Ichthyosporidium* may be arrested by slightly acidifying the aquarium water and bringing its temperature up to 85 degrees F. Prevention is, the author frankly admits, the best medicine. Avoid the use of contaminated live food or fish products which can be sources of infection. Aquarium soil that has been used with infected fish is another source. These are some of the fine articles appearing in the November-December issue of *Water World*. The publication is priced at 15 cents per copy and further information regarding it and the publishing society may be had by writing Suburban Maryland Aquarium Society, 6027 Springhill Drive, Apt. 201, Greenbelt, Maryland 20770.

Braz Walker opens his article entitled *Occelated Featherback*, appearing in the November issue of *Anchor* (published by The San Francisco Aquarium Society), with a discussion of the title "king of the Aquarium." He points out that the "discus is a sort of undisputed king of the aquarium" but that it has begun to lose some of its magic as did the predecessor to the title, the angel. He regrets that the discus has become more of a "status symbol" than a "heart's desire." This is thoughtful interpretation but, of course, "king of the aquarium" is relative and we are sure that betta buffs as well as fanciers of guppies would question the right of any species holding the title other than that to which their efforts are directed. Braz Walker nominates *Notopterus chitala* suggestively, pointing out that this knifefish is breathtakingly beautiful after it has attained its adult coloration, and has a "retiring majesty." Over 4 inches in length, *Notopterus chitala* is basically brown to copper and above the anal fin there is a row of ocelli "which would make a peacock jealous." Although small fishes and insects make up the natural diet of this species, it will accept beef heart or frozen brine shrimp. Because the species is striking, has a pleasant personality, and is easy to feed, the author believes one or a pair will be worthy of a 50-gallon aquarium on a permanent basis. Excellent drawings of this exotic by Kappy Sprenger appear on the cover of this issue of *Anchor* and show the species in the juvenile, young, and old adult stages. This piece with its accompanying drawings should stimulate a great deal of interest in a species that is worthy of attention. *Anchor*, published by the San Francisco Aquarium Society, is an exciting bulletin containing original material, news pertaining to aquatic matters, and many excellent regular features. Write to *Anchor*, San Francisco Aquarium Society, California Academy of Sciences, Golden Gate Park, San Francisco, California 94881 for information regarding both the society and its publication.

We learn from *Buntbarsche Bulletin* No. 13 (published by the American Cichlid Association) that Linda Gale has accepted the post of Editor for the Bulletin devoted exclusively to cichlids and that information pertaining to the Association should be directed to Guy Jordan, 6546 Celia Vista Drive, San Diego, California 92115. The American Cichlid Association operates similar to the American Killifish Association in that it is a national society depending upon the written word for communication among its membership. Upon reading its *Buntbarsche Bulletin*, we are impressed by the dedication expressed to highlight cichlids in all phases, stressing identification, behavior, care, plus acquisition of species. Bob Goldstein, who has contributed

many worthy articles both in the slicks and society bulletins, discusses the "rainbow cichlid" in his piece entitled *Tidbits* in this issue. He points out that Albert Klee has identified this fish as *Herotilapia multispinosa*, and goes on to explain that an error made some time ago in identifying *Cichlasoma centrarchus* as *H. multispinosa* has caused the "rainbow cichlid" to be mis-called until Mr. Klee's work, and that the similarity between the two species makes proper identification difficult. He also tells about his visit to Beldt's hatchery which is under new management and praises the two young men who run it as "knowledgeable aquarists." Kappy Sprenger is also concerned with proper nomenclature in her article *Pseudotropheus tropheops* but goes into a detailed description of the conditions under which her pair spawned. This writer is most articulate in describing behavior and procedure, and her material is seldom less that first-rate for reference stockpiling. *Buntbarsche Bulletin* No. 14 includes a section called *Trading Post*. This is a listing of available cichlid species for which Editor Linda Gale takes on the clearing-house responsibilities. Trading, of course, is limited to members of the American Cichlid Association, but readers who constantly write their complaints that they can not purchase certain species from their local shops should take note that acquisition of hard-to-find species can be remedied by becoming a member of an association devoted to specialized areas of the hobby. Those with more than a passing interest in cichlids will do well to investigate the ACA and can do so by writing Guy Jordan, 6546 Celia Vista Drive, San Diego, California 92115.●

***Adversaria:* continued from page 23**

event, I rather suspect that what are being referred to as "typos" are, in reality, mostly errors of content. Certainly such errors should be brought to the attention of the reader. In the more lengthy review of the two (i.e., the Duijn book), Goldstein states clearly that he has ". . . two real gripes with the book . . .", one of them being "the biology". His review is mainly concerned with "the biology", and what better concern can there be with a book that is primarily a biological book? *AJK*

To The Editor: Would you consider it ethical or proper for an aquarium society to import fish and sell them to their members, or to purchase expensive aquarium equipment and again sell to members at cost or at dealer's prices, bypassing the local dealers who must purchase all types of licenses to operate their businesses? In some instances several hundred dollars worth of fish are sold at a meeting which is held in a public place. This doesn't sound quite right to me. Your opinion please. *Robert P. L. Straughan, Miami, Florida.*

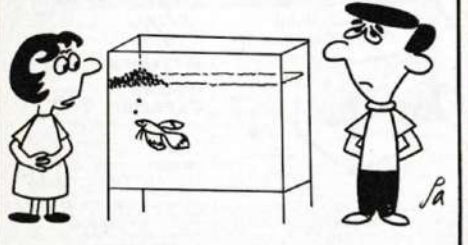
Editor's Comments: It seems to us that the ethical concept deals with a code of behavior which, as far as the aquarium hobby is concerned, presently exists neither for aquarists, dealers or manufacturers. If ever such a code is developed, it must encompass all three groups for a code interpreted one-sidedly is but a meaningless semantic ploy. Society chiseling is but one aspect of the total picture; misrepresentation in advertising, price-fixing, and inferior merchandise are others. If we agree, however, that what is sauce for the goose is likewise for the gander, we may then fairly restrict ourselves to discussion of the problem to which Mr. Straughan directs his attention.

In our opinion, the question of what is "proper" can be determined on the basis of the answer to the following question: "Is the purpose of the society's involvement in such activity: (a) to raise funds to support the society in its goals of advancing the hobby; or (b) to obtain livestock or equipment at reduced prices for its members?

If the answer is (a), then we find absolutely nothing wrong with the society's involvement. For example, at the conclusion of the American Killifish Association's most recent annual convention, it auctioned off 200 small-sized tanks, the proceeds of which are to be used for next year's affair to pay for staging, programs, awards, etc. These conventions advance the hobby, returning considerable publicity with attendant benefits to local dealers and killifish fanciers alike. This is clearly a legitimate activity of such an organization.

If the aswer is (b), then we seriously question the society's involvement. This principle is also clear: *What harms the dealer, harms hobby and hobbyist also.* Our concept of an aquarium society is one of an organization dedicated to advancing the knowledge of aquarium fishes and related fields, pub-

SMALL FRY!



"He's foaming at the mouth. Does he have rabies?"

licizing the hobby, and defending it from its detractors. Any goals which would reduce the society to the role of bargain-basement arbiter, prostitutes the very name "society".

On the other hand, should an aquarium organization secure an agreement with a local dealer to purchase livestock and equipment *through him* at a reduced rate, where the basis for such a discount is clearly a legitimate one (such as quantity buying, special promotional activities, etc.), then this also is a legitimate function of the organization and should so be recognized. We invite readers to present their views on the subject. AJK ●

Problems: continued from page 25

material that collects in your aquarium, the more acid the water will become. Only frequent changes of a portion of the aquarium water would lessen the acid condition. Moreover, the addition of plant food has compounded your problem. True, your plants would have a better chance in neutral water, but your hope for this condition is exploded by the over-populated tank, and plants that are not growing. Plants that are in decline add to the carbon dioxide that is present in aquarium water. No buffering agent will permanently raise the pH in your aquarium but the condition can be changed by better maintenance. Your first step should be, obviously, the reduction in the number of fish. To improve your plant growth immediately, use the planter system for several healthy plants. The remainder of your plants can be installed in the aquarium proper and should be pampered along until they form good root structure. The natural waste products from the fish will be nutrients enough for them. Do not add plant food of any type.

From: Jack Quarbicio, La Porte, Indiana

I have a pair of zebras. The female has been quite fat and heavy on the bottom. I expected eggs soon so I spread marbles all over the bottom of my tank. All the fish were removed except for the pair of zebras. After a week, nothing happened so I returned the other fish to the tank. It has now been about four weeks since then and still no eggs. I have tried putting the female into a breeding trap but after two days nothing happened. She is now in the tank swimming around as though she will never lay her eggs. What's wrong? I saw a picture of a female zebra in a book that was filled with eggs. My zebra isn't that fat but what's slowing her up? I also heard that infusoria often chokes baby fish. Is this true? *Answer:* Although it may be that your female was not quite ready for spawning, there are some other aspects to your spawning procedure that might be commented upon here. First, the aquarium should have been filled only to a depth of 4 or 5 inches with fresh aged water. Second, forget the marbles. Use thickets of *Nitella* or, better still, nylon mops anchored to the aquarium floor (you can use a few of the marbles if you wish). The female should have been introduced to this tank first. One or two males could have been introduced two days later. Often these fish spawn on a sunny morning. After spawning takes place, the female will be slim again and both parents can be removed. The eggs hatch in about 24 hours. In about a week, they are ready for infusoria, or, infusoria should be supplied when the youngsters are free-swimming. Incidentally, you don't seem to understand the purpose of breeding traps. These are not for egg-laying fish. They are used for livebearing females. As soon as the livebearer such as a swordtail or molly gives birth, the slots in the trap allow the babies to sally forth into the aquarium proper. The mother fish is restrained from following her young and perhaps eating them. Of course, the breeding trap has been used in other ways. It can be a kind of solitary confinement cell for a tank bully, or can be a place for safe custody for a fish that is being bullied by another. It is not used, however, for an egg-laying female as you said you employed it. Your question regarding infusoria might be answered by noting that in nature the newly free-swimming young of many species feed on infusoria as a first food. It may be that some choke on it but, for the most part, baby fish do very well on it. It is true, however, that commercial products substituting for infusoria are often easier for the hobbyist to handle. ●

Answers to THE AQUARIUM QUIZ.

1. SILVER HATCHETFISH — Gasteropelecus sternicla 2. PIKE CICHLID — Grenicichla saxatalis 3. ALBINO CLARIAS — Clarias batrachus 4. GIANT COLOSSOMA — Colossoma nigripinnis 5. GOLDENEAR KILLIE — Fundulus chrystotus 6. BLUE GOURAMI — Trichogaster trichopterus.

CREDITS

PHOTOS:
W. Tomey, P. 8-12; B. F. Chhapgar, P. 34-37,-78; G. Wolfsheimer 2 photos on P. 35; THE AQUARIUM, A. Roth, P. 4-7, 38-47.

FISH:
BLACK - TELESCOPE GOLDFISH supplied by Grassyfork Fisheries, Saddle River, N. J.; QUIZ FISH supplied by Dade County Fisheries, Bronx, N. Y.; Floridian Tropical Fish Farm, Sebastian, Florida; HEADSTANDER supplied by Paul's Pet Shop, East Paterson, N. J.

Klee: continued from page 15

temperatures and all come from about the same area.

"7. Finally I have shown these fish at open shows on several occasions and twice have won awards with them, once a first in class. The judges in each case have never corrected the name or approached me over them on any count, which would suggest they agree with my choice of name!

"I have named these fish *P. annectens* because of the facts I have presented in this letter and because the dealer who sold them to me named them *P. annectens*. I will therefore be very pleased to hear from anyone who can ensure their identification positively. I hope in the future to be able to approach the British Museum with some of these fish for positive identification. *Dave Lelliott*."

As can be seen, the letters did not do much in the way of settling this matter for British aquarists!

On the cover of the January 1968 issue of THE AQUARIUM, we depicted the cichlid, *Hemichromis fasciatus*. However, the source from which the fish was obtained took issue with that identification. Finally, during my attendance at the *American Killifish Association* convention in St. Louis in September 1968 I was asked to identify a particular cichlid in the collection of a local wholesaler. As it was the same fish that appeared on the cover of THE AQUARIUM, my reply was that it was *Hemichromis fasciatus*. The dealer dissented, however, and said that the

Hemichromis fasciatus

fish was *Pelmatochromis arnoldi*. He took me to another tank containing what I perceived to be the same fish and proclaimed *it* to be *Hemichromis fasciatus*. Clearly, it has not been my day!

It became apparent then, that it was necessary to secure specimens and to conduct a detailed examination of both the fish in hand and the pertinent scientific literature. To this end, the cover specimen was pickled (much to the dismay of our photographer, Audrey Roth!), as was also one of the young of the *Pelmatochromis arnoldi* secured in St. Louis.

It is, however, useful to return to the seven points elucidated in Mr. Lelliott's letter, and to comment upon them one by one. Point 1 is surprisingly clever in view of the fact that Mr. Lelliott had not consulted the scientific literature in this regard. The term "annectens" does mean "link", and indeed that is how the author of the species intended it, but the linkage was within the genus *Pelmatochromis* and had nothing to do with *Hemichromis*. Concerning Point 2, Sterba does quote *H. fasciatus* as reaching 30 cm. (about 12 inches) but this is close to maximum; aquarium specimens are usually much smaller and *H. fasciatus will* spawn at four or five inches. Point 3 is not helpful in this matter; the same statement is made of two species.

Point 4 contains an argument in favor of *H. fasciatus* (absence of white scales above the vent), and one against (red opercular spot versus the blue-green spot mentioned by Sterba). The color of a spot, however, frequently has little or nothing to do with the identification of a fish. As I pointed out in my letter, *H. fasciatus* is extremely variable (note the synonyms for it); some specimens have red opercular spots, others have

Pelmatochromis arnoldi

blue-green spots. As for the picture of *Hemichromis fasciatus* in *Exotic Tropical Fishes*, I can well understand Mr. Lelliott's dilemma—the fish pictured is a *Tilapia*, not a *Hemichromis!*

Point 5 is an argument against *P. arnoldi*, and Point 6, like Point 3, contributes no information whatsoever. Point 7 illustrates precisely the problems in amateur fish identification today. Mr. Lelliott maintains that since on several occasions judges did not correct his name, he must be right. Heaven save us from this sort of logic!

A detailed examination was made of the cover fish (shown in the accompanying photograph), identical with Mr. Lelliott's fish. The results are shown in Table I where they are compared with *P. annectens*, *P. arnoldi*, and *H. fasciatus*. The fish is clearly *Hemichromis fasciatus*. It is remarkable how closely *H. fasciatus* and *P. annectens* resemble each other in certain basic counts, and in appearance. However, the aquarist can easily tell them apart by the longer snout and straight-to-concave head of the former (see the accompanying diagrams of the three species).

To an ichthyologist, of course, the teeth are the important thing. Indeed, it is in the matter of dendition that we primarily differentiate the genus *Hemichromis* from the genus *Pelmatochromis*. Most species of *Pelmatochromis* have two to four series of teeth in each jaw; *Hemichromis* generally have one to two. However, the two median (middle) teeth in *Hemichromis* are enlarged (see diagram), both looking like incisors. Another important difference is the presence of a nipple-like pad in front of the gill arches in *Pelmatochromis*. *Hemichromis* does not have such a pad (nor did the specimen I examined). Obviously, these are matters with which the average aquarist cannot cope. What is needed is specialized equipment for such examinations, and access to the proper scientific literature.

The fish I secured from St. Louis was very young and no detailed examination was made. However, the teeth structure clearly confirmed

Pelmatochromis annectens

it as *Hemichromis fasciatus*. In conclusion, THE AQUARIUM cover fish and Mr. Lelliott's fish are correctly identified as *Hemichromis fasciatus*. Although identification from photographs is sometimes a risky business, the fish illustrated in *Exotic Aquarium Fishes* as *Hemichromis fasciatus* appears to be a *Tilapia* species. It certainly is not *Hemichromis fasciatus!*

●

TABLE I

COUNTS AND MEASUREMENTS

Item	Aquarium Cover fish	*P. arnoldi*	*P. annectens*	*H. fasciatus*
Dorsal	XIV 10	XV-XVI10–11	XV 9–10	XIII–XV 11–13
Anal	III 9	III 8–9	III 7–8	III 8–10
Scales, long.	29–30	28	28–29	29–32
Scales, lat. line	16/11	10/8–9	18–19/9–10	15–19/10–15
Scales, trav.	2½–3½/9½	2½–3/10–11	2½/10–11	3–3½/10–11
Depth in length	3·1	2·5–2·7	2·6–2·75	2·25–3
Length of head	2·65	3	2·8	2·5–3
Eye in head	4	3·5–3·7	3·5	3·5–6
Eye in interorb.	1·72	1·3–1·5	1	1·25–1·75
Scales on cheek	5	3–4	3–4	4–6
Pectoral in head	0·57	0·75–0·8	0·75	0·5–0·7
Snout profile	straight to concave	concave	convex	straight or concave
Snout to eye	snout longer	snout = eye	snout = eye	snout longer
Teeth	2 incisor teeth in median position; minute teeth in second row, separated from outer row	teeth small, in three series	teeth in three or four series; outer rather large	2 incisor teeth in median position; minute teeth in second row, separated from outer row

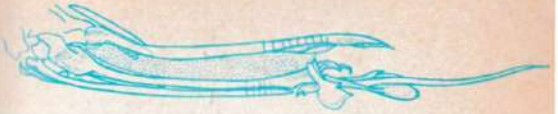
*The Indian "long Tom", **Horaichthys setnai.***

***Chhapgar:** continued from page 28*

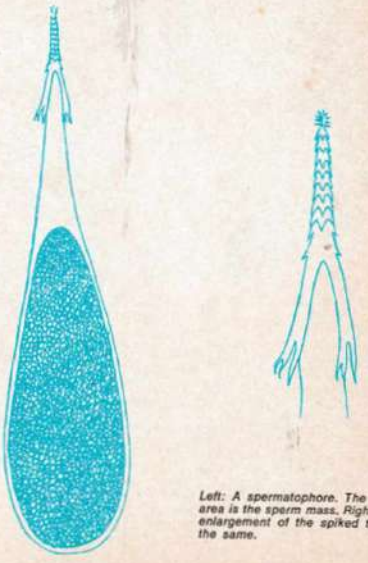
bent so that it can jut out to the right of the fish. The right ventral fin in the female is missing (except in very rare instances), while the genital opening (which is distinct from the anus) is displaced a little to the left (in 60% of the females that is; in 20% it is displaced to the right, and in 20% it is right in the middle). These adaptations in the two sexes apparently help the male to approach the female from her left, and transfer his sex products without the necessity of twisting the gonopodium.

The sperm is packed into spermatophores, each of which is spindle-shaped with numerous barbs at the thin end. When the gonopodium momentarily brushes the fleshy genital pads around the female genital opening, up to eighteen spermatophores are shot out and stick like darts The sperm can live inside the female for at least two weeks, and since eggs are laid again after 11 days, one impregnation can fertilize successive batches.

About three dozen eggs are laid in a batch, but the interval between laying varies. Thus, a female has been observed to eject two dozen eggs in the first fifteen minutes, and then complete laying up to 44 eggs in 18 hours. The rounded, transparent newly-laid egg, about a millimeter in diameter, looks as if it is fungused but this is only due to the presence of hair-like filaments all over its surface. At one end these are much

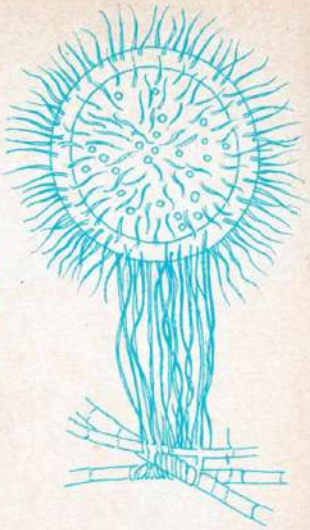


The peculiar gonopodium of the male; nevertheless, the fish is an egglayer!



Left: A spermatophore. The dark area is the sperm mass. Right: An enlargement of the spiked tip of the same.

The belly of the female, ventral area, showing the fleshy genital pad and ridges, missing right ventral fin, and two spindle-shaped spermatophores.



*An egg of **Horaichthys**, showing it attached to an aquatic plant by means of special, elongated threads.*

longer and serve, by twining around weeds, to attach the egg. Hatching takes place in three weeks when the larva are four millimeters long. Breeding in nature takes place throughout the year, but the peak is in the rainy season (July-August). In the aquarium, of course, they breed year-round.

Combining features of both the livebearers and the egglayers, *Horaichthys* must be considered one of the strangest of all aquarium fishes! ●