

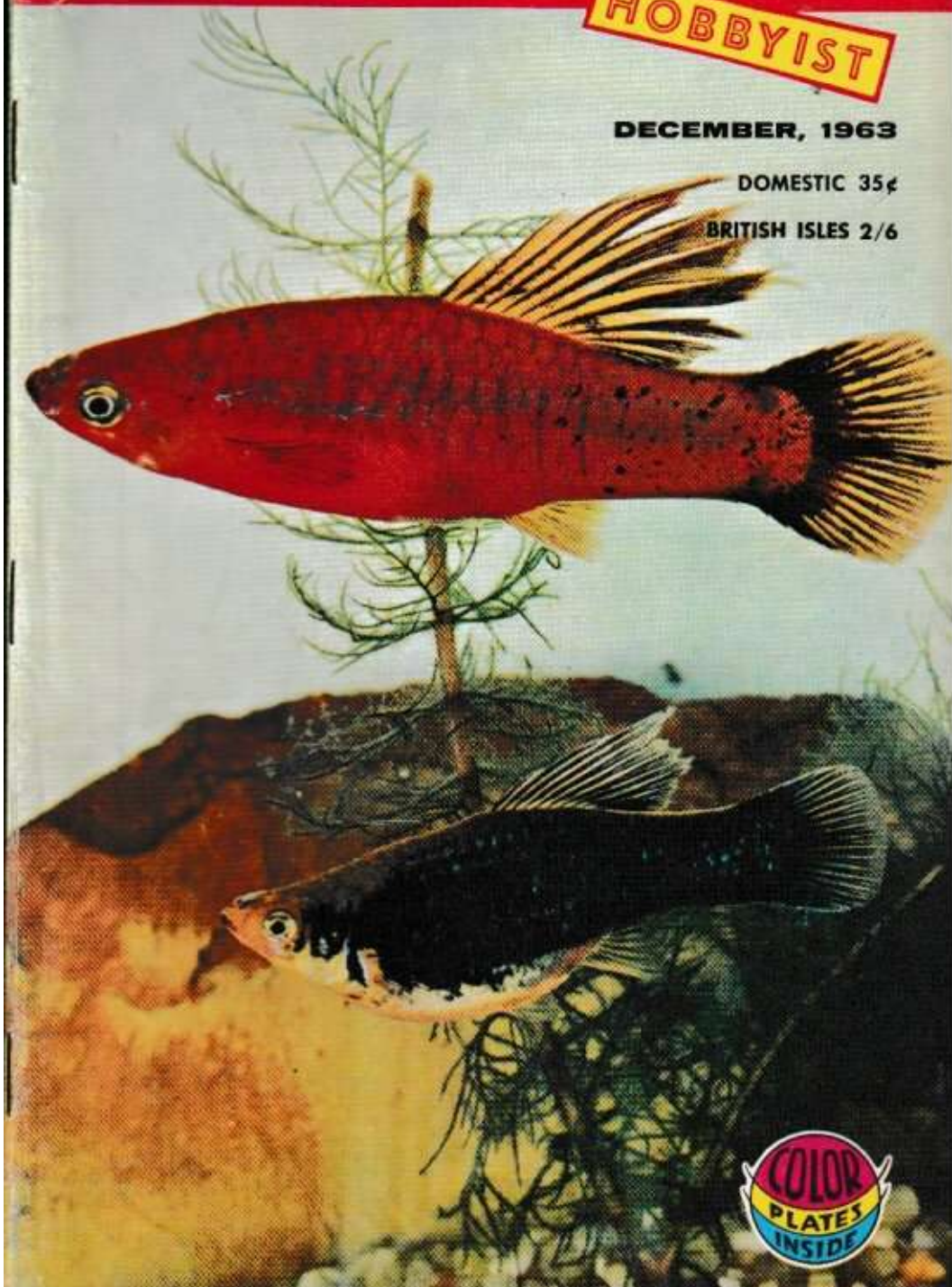
TROPICAL FISH

HOBBYIST

DECEMBER, 1963

DOMESTIC 35¢

BRITISH ISLES 2/6



COLOR
PLATES
INSIDE



Platies and Moons.
by Wilfred L. Whitem.
50¢ from your dealer or direct from TFH.

PLATIES AND MOONS is a new book devoted to a complete coverage of two of the most popular livebearers, *Xiphophorus maculatus* and *Xiphophorus variatus*. Information is given on all phases of the successful keeping of Platies of all varieties, with special emphasis on the differences between varieties.

Intended as a practical guide to raising these colorful and prolific hobby favorites, author Wilfred L. Whitem's book gives concise, easy to understand treatment to such topics of vital importance as foods and feeding, plants and planting, hybridizing, and selective breeding. Under this last category the author discusses a point which has so far presented many problems for the livebearer enthusiast: how to detect and separate the sexes before they are old enough to breed indiscriminately.

The separate section on diseases and medicants lists the major fish ailments encountered and describes the most effective and simple treatments. Moreover, this section is of special benefit in showing not only how to diagnose and treat, but also how to avoid, these diseases. Diseases covered are white spot, fin and tail rot, mouth fungus, velvet, and others.

For hobbyists who have long wanted to develop and raise their own distinctive Platy variety, but who have no desire to wade through the complicated mechanics of the principles of genetics, PLATIES AND

TROPICAL FISH HOBBYIST

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COVER	
On the cover this month are two of the new livebearers originated by Philip MARRACCIO at the Summerland Tropical Fish Farms. Through recent crosses between Hi Fin Swordtails, Hi Fin Variatus, Nebian Variatus, and Red Wing Platies, some beautiful new strains have been developed. Read Mr. MARRACCIO's article, beginning on page 5. Cover photo by Dr. Herbert R. Axelrod.	
EXOTIC TROPICAL FISHES SUPPLEMENTS	
Pages 23 and 34, 39 and 46. These pages are prepared for easy removal and reference to fit into the Limited Edition of EXOTIC TROPICAL FISHES.	

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December, 1963

EDITORIALLY . . .

"You can't spawn Oscars in a 3-gallon tank;
Try it and you'll only rue it!"
But the reader so smart is of very stout heart
And the fish go ahead - and they do it!

"Guppies and Mollies will not hybridize;
Your ignorance is stupendous!"
But the Guppy and Molly just laugh at my folly
And the number of young is tremendous.

"If you put salt with Neons they surely will die."
Thus I, the oracle, speak.
But the reader will chime, "I use salt every time,
And my Neons spawned twice last week!"

If fish could but read, so they'd know what to do,
What a wonderful world this would be!
They would know how to act with the greatest of tact
And not make a big ape of me!

William Vanderwinkler

Tropical Fish Hobbyist

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December, 1963



One of the new Hi Fin Swordtail-Variatus hybrids produced by Summerland Tropical Fish Farms. This male carries his black ensign with pride. Photo by Dr. Herbert R. Axelrod.

A fish breeder's unexpected bonanza.

Breeding the Black Helmet Variatus

BY PHILIP MARRACCIO
Summerland Tropical Fish Farms
Miami, Florida

The year 1960 should be long remembered by tropical fish hobbyists the world over as the year of outstanding introductions. Two livebearers, one from the Far East, the exquisite Lyretail Molly, and one from the West,

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the unbelievable, unusual Hi Fin Swordtail, are both a complete departure never before imagined in livebearers.

Not only do these two mutations constitute valuable and beautiful additions in themselves but their unique forms, when fused into the already established standard strains, are capable of adding embellishments heretofore unseen by the coterie of appreciative aquarists the world over. Whenever an outstanding mutation is fixed we must recognize that a whole new vista is opened to serious fish breeders. It is as if another color were added

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to the artist's palette and a new tool were forged to help create new eye-arresting strains.

The actual hybridization techniques are excellently delineated in the T.F.H. booklet *Platies and Moons* by W. L. Whitem. However, creative fish breeding is to my interpretation a rather personal art, and selection must be always paramount in the selective breeder's mind. He must always be on the alert and on the lookout for something unusual and at times capitalize on the unexpected. The resultant crosses are not always good; some are downright inferior, not worth the time and effort that went into their creation. But occasionally a beautiful new strain is developed, and this is gratification enough to make one keep on trying.

I purchased a half-dozen pairs of Hi Fin Swords which were shipped to me via Air Express. I was delighted to receive them, and after they became acclimated and at home in Miami I initiated the following hybridization experiments. I selected two males and placed them in a small shaded pool containing some immature Red Wag Platies. I also put two other Hi Fin Sword males into a little pool containing some young Sunset Variatus.

After checking this setup several times daily and feeding the fish choice live foods to build up their size and increase their vigor and drive, my

A Hi Fin Swordtail-Red Wag Platy mating produced this female. Photo by Dr. Herbert R. Axelrod.



The chance crossing of a female Nubian Variatus and a male Hi Fin Swordtail produced the crisp black large dorsal possessed by this female. Photo by Dr. Herbert R. Axelrod.

patience was finally rewarded when I noticed several young fish in the first pool containing the Red Wag Platies. I waited until these grew to about an inch in length before I netted them out. As I had anticipated, most of the young fish did not sport luxuriant "high fins" but the few that did were simply out of this world for dorsal fin size. They were also highly colored, with black tails and fins plus black stippling on an intense red body background. These I put by themselves in another small pool; I discarded the rest, as tank and pool space is at a premium these days of rising costs. Incidentally, my children have a gray tomcat who understands the word "fish" in four languages and will find me no matter where I am on the fish farm, as long as I shout the magic word.

Now let us return to the second pool, the one of primary interest in this story. The other two Hi Fin Swords hybridized as was expected with some of the Sunset Variatus Platy females, and as some had the coveted high fin, my joy knew no bounds. I commenced the selection and separation ritual, placing the young Hi Fin Variatus hybrids in a pool by themselves. I counted about two dozen desirable specimens and silently I congratulated myself on the success of this cross when, to my disappointment, I spied a female Nubian Variatus lazily sunning herself at the top right hand

Continued on Page 13



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The Pathological Origin of the *Stratum Argentum* in the "Brass Tetra."

BY DR. J. GERY AND J. DELAGE

For many years, aquarists and some zoologists have been asking themselves about the reason for the coloration of certain small Tetragonopterinae (family Characidae) from South America. These fishes, whose species mostly show an intensely silver reflection, mixed with some yellow, were given the common names of Gold Tetras, Brass Tetras, Bronze Tetras, etc. (in English, the name "Brass Tetras" prevails). The interesting fact does not lie precisely in this coloration, which is more frequently found in other fishes than in the Characins, but in the fact that it is not phenotypic, that is to say that it is not linked to a gene. In fact, when this species reproduced (it is possible to have them do so in the aquarium), the result was individuals which were absolutely plain in color, without the brassy gleam. They appeared to be of a different species whose appearance was masked by this coloration.

As soon as this was understood, explanations were offered for this phenomenon. Ours (J.G.) written in 1959, follows: "The Brass Tetras, where there are some considered as non-hereditary local variations, seemingly because of the nature of the water (?) or their nourishment (?)." The presence of the question marks shows very well that these vague explanations are not satisfactory, no more than was written by Axelrod (1957) about the Golden Tetra (*Hemigrammus armstrongi* Schultz and Axelrod 1955): "Many readers and breeders asked me for live specimens of the fish and I try my best to supply them. No sooner did I give them the fish than the reports started to pour in: 'What kind of fish are these? The parents are beautiful and golden, but their offspring are just plain silver fish!' Time after time I verified these findings myself but could never come up with the answer. Many people offered suggestions. Some said the fish required a certain kind of water or food that was only available in their habitat. Some even suggested that the fish were dyed!"

We think that we can show that this coloration is due to an involuntary reaction of the host to a parasite which we have been able to place in evidence, and that the nature of the parasite is such that it is rarely (if ever) transmissible in the aquarium.

We are happy to thank Dr. Axelrod, who furnished us with the material, conveniently preserved, necessary for the verification of the hypothesis made by one of us (J.G.), and the Laboratory of Comparative Pathology of the Faculty of Medicine which, under the second author (J.D.), was in charge of

Continued on Page 14

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Breeding the Black Helmet Variatus

Continued from Page 9



This male is the result of a cross between a Hi Fin Variatus and a Sunset Variatus. Photo by Dr. Herbert R. Axelrod.

corner of the pool. Needless to say a vituperative outburst followed, then a calm retracing of the steps in my breeding technique. I finally deduced that a sabotaging bird must have acted as a marriage broker by dropping this young female Nubian into my pool. Luckily I had the presence of mind to keep her there, because I noticed a Hi Fin Sword male playing up to her, courting her with a frenetic quivering of his king-size dorsal. Being satisfied with the Hi Fin Sunsets and reassuring myself that there was nothing to lose, I ruled in favor of awaiting results.

Several weeks later I knew that I was the recipient of a fish breeder's unexpected bonanza, the start of the sparkling, crisp innovation, the Black Helmet Variatus which was in one of my pools waiting to be fixed and put into production.

The Pathological Origin of the *Stratum Argentum* in the "Brass Tetra."

Continued from Page 11

histological interpretation. Finally, when the advice of a parasitologist became necessary, Professor Robert-Fh. Dollfus has come to our aid with his habitual good grace: a hearty "thank you" to him.

1. The parasite and the reaction of the host.

This is the test of a quite important specimen of *Hemigranmus*¹ which comes from the upper Amazon (Loreto District in Peru) which is the original of the hypothesis mentioned below. Among the individuals, the greater number had a faint silvery tone, as is proper for the sexes, others showing "spots" (more or less numerous and more or less confluent) which were extremely brilliant. Under the binocular microscope with a strong magnification, it turned out to be a stuffing of shining threads, located under the scales and resembling (at this magnification) glass wool. This deposit, composed of crystals of guanine, appeared mostly on the sides, near the lateral line, coming to a more or less segmentary distribution on the caudal peduncle, the nape, and also at the base of the unpaired fins. When the brilliant spots grow larger, they become more or less confluent and finally cover the entire body, the fish being of a striking coloration and resembling a medallion. This was the case with the 27 specimens examined which showed such a color: 15% had no spots whatever on the body, 18% showed a certain confluence of the spots, 36% were very brilliant but with certain regions more preserved, and 37% were entirely covered with a sort of "coat" of guanine crystals. It is pointed out that the specimens preserved in alcohol had this coating purely silver: in effect, the dissolved pigments of yellow and red (carotenoid) which colored them were dissolved in the alcohol. These pigments are not at all responsible for any more than a part of the general coloration (going from brass to copper); the principal factor of this tone is the guanine, where the crystals, by refraction, also probably participate in the formation of the color.

There remained to be found why the guanine deposits occurred in different parts of the body in this manner: an examination at very high magnification showed that these deposits are always concentrated around a tiny "cyst" from 0.2 to 0.4 mm in diameter, clear in the middle, with a black border, situated shallowly in the skin or superficially on the muscles, just below the scales. The cyst is always hard to see when it is on a dense bed of guanine; neverthe-

(1) This species of the genus *Hemigranmus* is specifically difficult to distinguish from *Hemigranmus armstrongi* from British Guiana, which in its turn, as suggested by Dr. S. Weitzman, is very close to *H. rodwaysi*, if not co-specific. As for the implied resemblance of *H. rodwaysi* with *Cheirodon piaba* (or *C. interruptus*?) which has given rise to much aquarist literature, it is entirely devoid of foundation.

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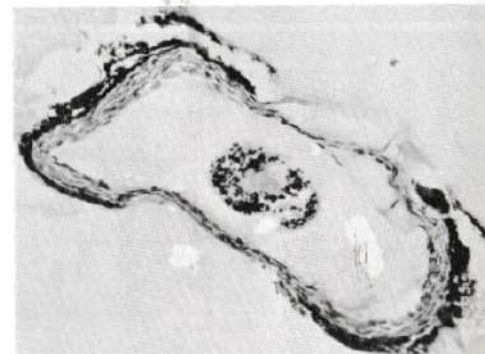
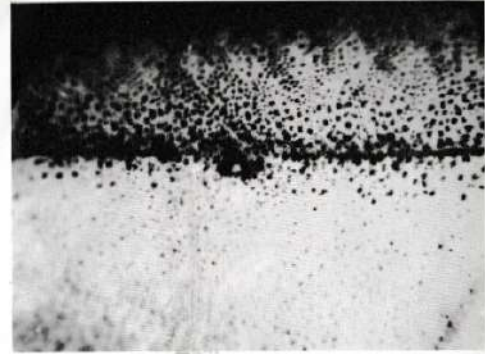


Fig. 1. Above, parasitic cyst surrounded by a heavy bed of melanin, with a very light deposit of guanine (X10, photo by Gery). Below, microphotograph of the same cyst (X400, photo by Ginsburger); explained in the text.

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less a count of all the visible cysts shows that there exists a correlation between their number and the occurrence of the guanine deposits. In 27 individuals, the 15% with tiny spots had only three cysts, the 18% with larger spots had from two to four cysts, and the 30% with the guanine deposits which were mostly confluent had between three and six cysts, and the 37% which were sparkling all over had from four to six visible cysts. It is possible that the infestation was really greater, because of the impossibility of counting all the cysts which were hidden by the coating of guanine, and also because a certain percentage of these cysts had "healed" by releasing the parasite, thanks to the defense mechanics of the organism. In any case, as long as the importance of the local deposits of guanine is not such that they can by confluence cover the entire body of the host, we must admit under the title of assumption that in a certain sense it is possible that a *general reaction* is produced. This reaction is perhaps secondary to an injury of the hypophysis which we have reason to think plays a part in the catabolism of guanine: the hypophysis seems particularly vulnerable, the nape being one of the first regions presented for such deposits (where such an infestation could certainly be localized).

As for the nature of the cyst, a histological examination has shown it to be *parasitical*. According to the rare preparations where the cut passes exactly through the middle and where the parasite has not died, Professor Dollfus thinks that it is probably caused by a digenetic trematode whose precise determination must await more material, the inter-tropical species being numerous and difficult to determine. It is known that with the forms which attack fishes, these are merely the auxiliary hosts, because the trematode has a complicated cycle which involves three hosts. An egg laid by an adult, fixed to a definite host, develops in the water into a free phase and a miracidium, which then becomes attached to an intermediary host and transforms itself into a sporocyst, then a spore; this intermediary host is a freshwater mollusc, generally an air-breathing snail. Then it survives a second free aquatic phase in which the spore, transformed into a cercarian, proceeds to infest the second host, a fish or more generally a crustacean, actively. Once attached to the auxiliary host, the cercarian becomes a metacercarian which cannot develop into an adult unless the auxiliary host is in its turn ingested by the final host, which is always a vertebrate, sometimes a mammal. Sometimes the sporadic stage disappears and the sporocyst results in a cercarian, such as a little moat. In any case, it can be understood why the parasites cannot pass, in a closed aquarium, from one generation to the other. In the aquarium the final host is missing which would permit the development of a new cycle. Also most of the metacercarians which were encysted would die in the host's tissues, with only the reaction of the organism remaining visible, which is what would interest us here.

Continued on Page 55

18

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A New *Echinodorus*

BY VLADIMIR SADILEK
Brno, Czechoslovakia

The species of the genus *Echinodorus* are beautiful aquarium plants, very useful for decoration, even though there are not many of them that are well known enough to be considered

popular. Most of the common *Echinodorus* species come from South America and are generally grouped under the name "Amazon Sword-plants", which grouping includes



The new *Echinodorus muricatus*, from British Guiana. Photo by Vladimir Sadilek.



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241	24 1/2"	17-8	20 1/2"
251	26 1/2"	18-8	18 1/2"
		20-8	20 1/2"
		21-8	21 1/2"
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E. vesalius, *E. intermedius*, *E. brevicaudatus*, and *E. paniculatus*. Besides these species, we also occasionally see *E. radicans* and *E. longistylis* in our tanks, and fanciers of these plants are fond of other species, such as *E. ramunculoides*, *E. grandiflorus*, *E. nympheifolia*, *E. rostratus*, and *E. martinii*. Buchenau, in his monograph on the plants of the family Alismataceae, mentions 22 species and 11 subspecies of *Echinodorus*; the 11 species given thus far above are the only ones to have become popular to any degree with aquarium hobbyists.

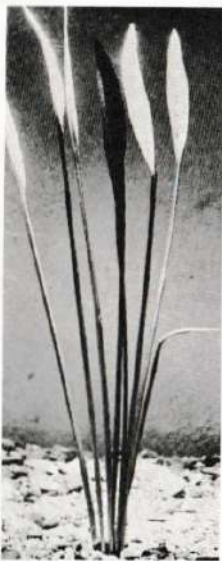
Almost every *Echinodorus* is a New World plant, although two species,

E. humilis and *E. ramunculoides*, are of African origin. Some species are found even in southern Europe, near the Mediterranean, but it is likely that they did not come from there originally.

Two years ago I received a shipment of some of the rare *Echinodorus* species from Rio de Janeiro. As the plants arrived in poor condition, with leaves and roots mostly rotted, it took a long time to regenerate them. By sowing seeds I got better results, as the seeds sprouted very well. Most of the plants bloomed and propagated, and I was able to have them identified precisely. Of all the plants thus received from Rio, the



The inflorescence of this Swordplant, which is very much like both *E. longistylis* and *E. berteroi* in appearance, is visible at the center of the plant. Photo by Vladimir Sadilek.



An *Echinodorus* species not yet completely identified, with long stems and markedly narrow, spearlike leaves. Photo by Vladimir Sadilek.

most beautiful was *Echinodorus muricatus*.

This plant is mentioned in Duchenu's monograph as one variant of *E. macrophyllus*. *E. muricatus* is a perennial plant which has a vertical root system and grows to a height of 2 feet. The stem of its submerged

form is about 16 inches long and 2 to 4 inches wide, rounded but narrow, with a fairly pointed top and between 5 and 7 collateral veins. The leaves of the bog form of this plant are only a foot long but between 8 and 10 inches wide, with more collateral veins (11-13) but still with the sharpened top. Under good lighting young *E. muricatus* have brown leaves with irregular lighter spots; the spots disappear with age.

This plant has never bloomed for me indoors. So far it has developed bloom only when kept in a hothouse, in water which is lowered until the plant begins to assume its bog form. Even then it takes between two and three years to coax into bloom.

Echinodorus muricatus is a beautiful plant for large, heated aquaria; at temperatures below 68°, the plant stops its development. It is advisable to keep it in gravel only, without any soil. If not replanted too often it will grow nicely, although propagation is difficult, being possible almost always only through the development of seed. Culture of the seed is best done during spring.

All in all, *Echinodorus muricatus* is a very nice new "Swordplant" for the aquarium.

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Hydra-Phobia

BY DIANE SCHOFIELD

One day you may be peering happily into one of your tanks and all of a sudden you may observe something with a start. "Say now", you may say to yourself, "Darned if that doesn't look like a new variety of algae!" Ten to one those little greenish-gray half-inch-long hair-like objects that you've spotted aren't algae. As a matter of fact, no matter how they look, they aren't even members of the plant kingdom. Each of the little organisms waving their little "arms" at you are animals. Not the kind of animals that are desirable or that you've gone out and purchased as you have your fish, but animals none the less. The chances are very good that you have a first class case of hydra. And the chances are even better that you introduced them into your tank yourself while innocently feeding *Daphnia* one day, or even possibly by that new plant you got from a questionable source a short time ago. You can get hydra without even half trying. Easy is the word for it.

Hydra is a perfect name for them. The Hydra of Greek mythology was a gigantic monster with nine heads, the center one being immortal. The destruction of the Hydra was one of the twelve labors of Hercules. Finding that as soon as one head was cut off, two grew in its place, he burned out the roots with firebrands, and at last severed the immortal head from the body and buried it under a rock. The arrows dipped by Hercules in the poisonous blood or gall of the Hydra inflicted fatal wounds. The parallels between the mythical Hydra and the aquatic one are many.

For one thing, like the legendary monster, the aquatic hydra can recreate itself. This is done by the growth of little buds along the "stalk" or the main



Tenacious of life and diversified in their reproduction, hydra can be the scourge of an aquarium, devouring fry and even harming larger fishes with their stinging tentacles. Photo by Heimerl.



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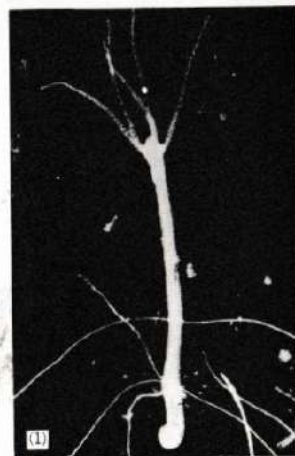
trunk of the hydra. These little buds break off and establish a new individual, a process known as "budding". A hydra can be cut into a number of pieces and each piece can become a separate hydra. But that's not all. In one experiment, a hydra was turned inside out and what had been its stomach lining became its skin! Even if only a piece of its tentacle is severed, this is enough for a start of a new hydra. If it gets tired of the budding bit, it can produce eggs on occasion, and all by itself, since each animal contains both sexes. This method of reproduction is rarer. Do you begin to see the similarity between our hydra and the Hydra of Hercules? It isn't difficult to see why Hercules got more and more frantic as he kept slashing away at it and it kept up with him nicely by popping up with a new head just as he thought he had the whole situation whipped!

I can remember during the long lab sessions in college, when I was majoring in zoology, drawing in minute detail all of the insides of a hydra slit down the middle and of further observing both live and dead stained corpses of hydras under the microscope. Frankly, they did nothing for my day, but then I never thought that I'd ever be put into a position where I would have to wage hand to hand—or hand to tentacle—combat with them.

If a strong magnifying glass is used and an individual hydra is closely observed, it is plain to see that a single hydra looks much like a tree. There is a thick "trunk", or body, firmly anchored to the sides of the tank, rocks, or plants. At the top are the leafless "branches", or tentacles, waving around. This, more's the pity, is a movable tree, too. Just because the hydra looks pretty stationary there on his perch, don't think that it can't get around to suit its every whim. No, it won't make a wild dash hither and thither, but there is a slow but certain process of inching along. To further show their versatility, they can even "walk" on their tentacles. There are usually 5 to 8 of these gracefully waving clutching fingers of death. These are hollow and are connected to the body cavity. Inside each are groups of poison cells or capsules. Actually these little nematocysts are present on the entire body, but they are more concentrated on the tentacles. These show externally as little "hairs", and are a kind of trigger arrangement. When touched by a prospective dinner swimming by in the form of a small fish, the "hair" releases a mechanism to shoot out a poison-filled whiplash filament that penetrates the body of the fish. It then shoots poison from the poison sac into the fish, paralyzing it completely. Here we find another point of similarity with our friend Hercules.

When a suitable repast is procured in this manner, the hydra pulls it toward its mouth, which is in the center of the top of the "trunk" or body. The victim is then digested alive. It's so greedy and versatile that it can be digesting one piece of resistance while it is holding one or two other prospective victims in readiness in its tentacles for eating later on.

Since the hydra is rather low on the totem pole of animal life, the mouth



In photo #1, the hydra waits, tentacles extended, for a morsel to come within its lethal grasp. In photo #2, brine shrimp shown surrounding the hydra in photo #1 have been engulfed, and the animal is distended. In photo #3 the brine shrimp have been almost completely digested. Photos by Dr. C. W. Emmers.



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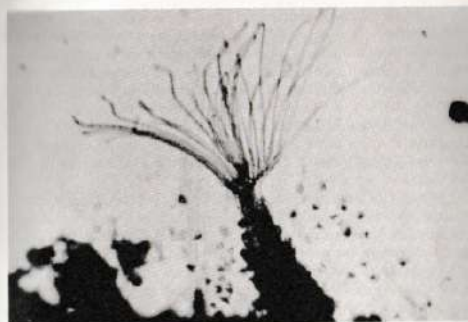
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This is a bryozoan, one of the most animals that live in colonies like the hydra. It catches living prey, but it is harmless in the aquarium. In many cases the brown "algae" found on the glass of an aquarium are actually a colony of bryozoans. Photo by Helmert.

also serves as an exit for the rejected portions of its food. That's not very neat of the hydra, but that's the way it's constructed. When the hydra is munching on the food, it gets a chunkier or chubbier look to it and doesn't look so long and lean as it does normally. Also, if it is alarmed about something it can contract, much as a sea anemone does. Actually the hydra is a freshwater polyp and as such is a cousin of the anemones and the corals. However, it never forms colonies, as the corals do.

Unless you're a squeamish soul, these little bits of life won't do you any harm if the tank that they have made their appearance in contains only fish that are at least one-half inch long or longer. They may sound like something that a science fiction writer dreamed up, but they can only snag fish that are up to a quarter of an inch in length. Oh, they can latch onto a few *Daphnia* too, if you are in the habit of feeding live *Daphnia* to your fish. Where they are really black death is in a tank containing the fry of egg-layers. Within a few days, a tankful of hydra can eat their way right through all the fry.

Hercules had to burn out the roots of the Hydra with firebrands and then bury the head under a rock, but this seems like a bit of a bother. There are several much simpler methods to get rid of aquatic hydra. The most simple by far is to enlist the co-operation of several ravenous Blue or Pearl gouramis. Oh, they'd probably much rather eat *Daphnia*, but lacking this, hydras do nicely.

Tropical Fish Hobbyist

Naturally, if the tank containing the hydra also contains fry, this arrangement won't do at all, because the fry are likely to go right down their hatchlings along with the hydra. In this case a chemical purge must be used. There are several, but one of the most effective ones is to first dissolve 4 grams of ammonium nitrate in warm water. This should be sufficient for a tank of 10 to 15 gallons. Add it to various portions of the aquarium and agitate the water carefully by moving an airstone around slowly to distribute the chemical throughout all parts of the tank. Then elevate the temperature from 5 to 10 degrees. The hydra won't die off immediately, but within a few days the tank should be free of hydra.

If your fish are large enough to be netted out of the tank, there is another chemical "sword of Hercules" that can be wielded. One teaspoonful of household ammonia to five gallons of water can be added. After this has stood for two hours or more, the water can be changed, and the tank and plants rinsed well. In this hydra cure, the snails should be removed along with the fish.

Just removing the fish and snails and raising the temperature over the 100° mark for an hour or two will accomplish the same purpose and then the water needn't be changed, but care must be exercised to see that the temperature has come down to the same level as that in which the fish have been biding their time before again adding them to the tank.

Another chemical that can often do the job is ammonium sulphate; ½ of an ounce is used for a 20-gallon tank. Here, too, the inhabitants must be removed until the cure is completed.

A radical and risky method is to add a piece of copper to the tank, but here one must walk a tightrope. The copper can also kill off the fish if it is left in too long.

Other chemical "swords" are ½ grain of potassium permanganate to a gallon of water. Again, remove the fish until after the treatment.

With so many exits available for your hydra, it isn't necessary to get hydra-phobia should they happen to crop up in your tanks one fine day.

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MAIL CALL

If you have an aquarium question and cannot find the answer in any of the standard reference texts, send it to MAIL CALL. Each month this column will publish the most interesting questions received and their answers. Letters containing questions cannot be acknowledged or answered personally. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., 245-247 Comission Ave., Jersey City 2, N. J.

Gouramis and Weatherfish. Q. 1. In one of your books it is stated that the male Gourami should be left in the spawning tank for a week. Does this mean a week from the actual spawning time or a week from the time the young become free-swimming?

A. 1. In a 15-gallon community tank I have a pair of 3-spot Gouramis.

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5. In your Tropical Fish Guide it is stated that: "The female may get a little bruised from the over anxiety of the male, but it is rarely the case where they must be separated."

2. Is the male Dwarf Gourami like the Siamese Fighting Fish in that he is unable to eat his young due to a "physiological closure of the esophagus"?

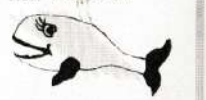
3. Just as the young Gouramis that I recently spawned began to hatch, the male made another nest and seemed to move the original nest bubble by bubble over into it. Why is this?

4. Is it possible to come out with a partially loaded female, even though she has been in the tank for more than 2 or 3 days after spawning? I was unable to move the female because I was on a trip.

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One of them is unusually mean and has two open sores. One of the sores is at the base of the caudal fin, while the other is at the base of the dorsal fin. I have isolated him and used a teaspoonful of salt per gallon, but after a week he was still no better. I took a chance and put him back in the original tank. He got somewhat better (the other fish nibbled at his sores) but now the fins are split.

7. When conditioning fish, why is it necessary to separate the fish? Why is it better for them to still see each other?

8. Is the Japanese Weatherfish more popular than the Spotted Weatherfish for predicting storms?

Diana Erickson,
Rochester, Minn.

A. 1. This would be a week after the actual spawning. Once they have left the bubbles and are free-swimming, the male's work is finished.

2. I have never heard of either a Gourami or Beta being unable to swallow young for this reason.

3. Who knows what goes on in a Gourami's mind? Probably he felt that he wanted to have his nest elsewhere because the old spot seemed unsafe to him.

4. No. A male Gourami does not stop until he has gotten every last egg out of a female.

5. You can't make any general statements about all Gouramis. Generally the first statement applies more to the smaller ones of the Colisa species, and the second more to the larger Trichogaster species.

6. Keep your fish separated until those sores heal. Instead of using salt, try using acriflavine.

7. So that your fish can see each other, but not get at each other and

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spawn before you are ready for them. The story comes to mind about the famous Polar explorer (Sir Hubert Wilkins, if memory serves me) who on all of his voyages took along a picture of the homeliest woman he knew. Every day he studied this picture closely. When she began to look attractive, he knew that the time had come to come back.

8. I have yet to meet anyone who ever said: "My Weatherfish were very active this morning. We're going to get a storm this afternoon." Truth of the matter is that a coming storm is only one reason for a Weatherfish's activity. I'd much rather believe the people who give us the weather reports on television!

Mystery—find the murderer!

Q. 1. Something has been killing off my fish in 3 separate tanks. The fish come to the top gasping for air. Their swimming is otherwise normal. There

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is a very slight loss of color, no marks on their bodies, and they don't get bleated. Soon they can't reach the top and die. I have noted that on some of the dead fish their eyes were slightly cloudy. I use undergravel filters; the water is real clear. I change 50% of the water every two months. The pH is 7.0. The tanks are well planted and the plants are thriving greatly. In all my tanks I place 1 teaspoonful of salt per gallon of water. First to go was my 10-gallon which had 8 small young Gouramis and 2 Bronze Cats. They just died overnight. Later that day my 3-gallon tank with 16 Guppies and 2 Bronze Cats was hit. I removed the 8 surviving Guppies and replaced them after cleaning and sterilizing the tank. I treated them with 50 mg terramycin a day. They seem OK now. Just yesterday I noticed in my 26-gallon tank 2 dead Monos, and the other fish hanging near the top. In this tank I

had besides the Monos 2 Black Tetras, 3 Zebras, 3 Giant Danios, 2 Rony Barbs, 2 Tiger Barbs, 2 Clown Barbs, 3 Cherry Barbs, 1 Algae Eater, 2 Schwannfeldt Barbs, 2 Redfin Sharks, 2 Head and Tail Lights, a Black Sailfin Molly and 2 Feather Fins. The tank didn't seem overcrowded. I immediately treated the tank with 150 mg terramycin, 140 mg aureomycin and 52 drops of methylene blue. This morning all fish were dead except 3 Cherry Barbs, the Molly, 2 Giant and 2 Zebra Danios, 2 Redfin Sharks and 2 Feather Fins. I removed the surviving fish out of the infected tank into the new clean 10-gallon tank. Part 1

Giant Danios



bathed them in a 2 1/2% solution of salt in 2 quarts of water with 3 drops Methylene Blue. They seem OK now. My tanks are covered by reflectors and I use air line filters from my pumps. The fish are fed a varied diet of dried foods and frequent feedings



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of frozen brine shrimp. The water has never been fouled and is very clear. What's doing it? How can I prevent it? What can I do for it?

2. Here in Hawaii I find it impossible to maintain a temperature of less than 80°. The temperature ranges from 80° at night to 86-88° during the day. Is there any way of cooling the tanks and maintaining a temperature of 75°? All my tanks are in the coolest spots in the house.

Alvin Brockway,
Ewa Beach, Oahu, Hawaii.

A. 1. There seems to be little doubt that your fish were poisoned in some way or other. We will rule out the food, because you seem to feed quite carefully. This leaves the tank, the air and the water. There is a possibility that contact with the metal has contaminated the water. But you had three tanks go all at once, not just one. Although you use air line filters, it is possible that they have become overloaded and do not work at top efficiency. A fairly heavy spraying of the room with an insecticide could pick some up through the pumps and pump a lethal mixture into your water. When a room is being sprayed or there are any fumes such as paint, etc., the tanks should be well covered and pumps turned off for a time. A change of about 25% of the water is

a good thing once the fumes are gone.

2. This is a problem which also plagues us during the summer months. Installing air conditioning is the expensive answer, of course, but you can bring the water temperature down somewhat by replacing the glass covers with frames which hold plastic screening and using additional aeration by putting in an extra airstone. It is especially important during hot weather to avoid overcooling the tanks.

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1. I have read that Neons must be spawned in a dark, unlighted tank. Would it be all right to tape black paper over the glass sides of the tank?

2. Would it be all right to use Hygela water in the tank, as the tap water is very alkaline and almost impossible to make acid?

3. Would it be all right to use a 10-gallon tank as the spawning tank and leave the baby fish in it until they are large enough to put in the community tank?

4. While the fish are spawning would there be any danger in putting in an airstone with them?

**Stephanie Solnick,
Lubbock, Texas.**

A. J. Yes.

1. I presume that Hygela water is spring water sold for human consumption in water coolers, etc. Yes, this is excellent, but you must be careful when transferring your fish. Do it in a few stages to give them a chance to adjust to it, or the shock could kill them.

2. Yes.

3. An airstone is not necessary for two fish in a 10-gallon tank, and the noise might distract them.

Answer to Mr. Oka.
Q. I read with great interest the questions and answers in the August issue of *Tropical Fish Hobbyist*, especially Mr. Oka's question about *Microgobius porocheilus*. I can certainly appreciate his problems with this fish, which most books say grows to 2 inches and is said to be a peaceful community-type scavenger. After buying one from a local dealer, I can qualify as an expert on this particular fish. I placed it in a 30-gallon community aquarium when it was about 1 1/2 inches long, and seldom saw it or paid it much attention. About 6 months later I noticed that some fish were jumping out of the tank and others were simply missing. I tried to eliminate fish by fish those that were

not good community members, finally coming to Mr. Bumblebee, who had been sold to me as an African Catfish. By this time I had lost an expensive lot of fish and began to realize that my Bumblebee Catfish might be the culprit. I relegated him to a tank of his own to get him away from the expensive diet he had been having. After about a month of solitary confinement, I placed a 5-inch Clown Barb in the tank with him. He immediately chased the Clown Barb all over the tank, snapping at its tail with his large mouth. The Barb tried to jump out of the tank, so I removed him. In order to keep the Bumblebee alive, I would place bits of food on the end of a planting stick and wave it in front of him, but he eventually died of starvation when he did not get any live fish. This fish would stay in his cave until the light was turned off and then would simply swim up behind a sleeping fish and eat it. It was especially fond of Clown Loaches and Bettas; some of

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these were nearly as big as himself. Based on my experience with it, it is not a fit fish for any community tank.

**Alex P. Beard,
Salisbury, N.C.**

A. Thank you, Mr. Beard, for setting us straight. This explains another part of Mr. Oka's question where he mentioned that his fish were jumping out. I had suggested that it was "something in the water." Now we know that the

"something" was the Bumblebee Catfish. It is always a good rule never to trust a big-mouthed fish.

Self-caught fish.
Q. 1. My family is living at a lakeside cottage for the summer. My younger brother caught a baby painted turtle (named "Casey") and my father caught a small crayfish. What do you think of the idea of setting up a 10-gallon aquarium, filtered and aerated, with

the turtle, crayfish and one or two small (2-inch) Sunfish?

2. If this is OK, would a floating raft be enough "land" for the turtle?

3. Could I use plants from the lake or would plants from a pet-store be better?

**Sally Ludwig,
Grand Rapids, Mich.**

A. 1. Yes. When the time comes to move home again you can decide whether or not you want your fish and other friends with you. If you do not, no harm done by freeing them.

2. Yes, as long as it floats when the turtle is on it.

3. The store-bought plants would be better. They are acclimated and more likely to survive tank life.

Unusual behavior.
Q. 1. I have recently bought a large Oscar about 6 inches long, and in with him I have a Jewelfish. All goes well in this tank except that my Oscar chases

away every time he sees the Jewelfish, which isn't natural, because the Oscar is twice his size.

2. In my other tank there is a Black Shark 5 inches long and an *Anostomus anostomus* 4 inches long. Frequently the Anostomus swims over to the Shark and starts nipping him, but the Shark just stays there; when I try to break it up, the Shark and the Anostomus pay no attention. Can you explain these unusual acts?

**Michael Beckstein,
Woodmere, N.Y.**

A. 1. That's easy. The Jewelfish is only half as large, but twice as nasty!

2. The Anostomus goes over plants and rocks this same way, picking algae. Evidently he has not found enough to please him and has developed the dangerous habit of picking at the Shark's slime. As long as the Shark does not object, no harm done.

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Guppy Corner



By Paul Hahnel

with white. My most beautiful male has a frosted white line down the dorsal area of the body. They have nice size dorsals and tails. I intend to breed for better size and finnage.

Pat Lee,
 Honolulu, Hawaii.

A. It seems to me that the Half-Black Guppies have also found their way to Hawaii.

You mentioned besides that some of your fish had leopard spots, etc. Somewhere along the line your Half-Black was exposed to a Red Guppy.

Half-Blacks.

Q. About 6 months ago I obtained some rather unusual Guppies. They are called "Black Guppies." The entire body, excluding the head and dorsal fin, is black. The tail is black, the dorsal a sort of grayish white. The pectorals are also black. The head area is dusky olive. The gonopodium and ventral fins are stark white. The females also have some black up to the anus. The tail on some is black, on others clear with black markings. I have had several litters from them and they apparently breed true.

They are very beautiful. I have some babies with white tails and leopard spots on them. Some have a little red in the tail. Quite a few of them have a red ruby spot just behind the eye, ringed

Seemingly overdue female.

Q. I have a large veiltail male Guppy whose tail colors change greatly, varying from light yellows to deep blues. I first noticed this a few hours after several new females had been introduced into the tank. Is this coloration due to courtship activities, or is it simply a normal part of the life cycle?

A. One of my female Guppies has been gravid and extremely plump for some six weeks. She has been in a 3-gallon heavily planted tank, temperature 75 degrees, and I have been feeding her liver paste, dried foods and chopped earthworms. I tried cutting down on the amount of food, but her abdomen remained quite large with little change. She is quite active and,

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as far as I can tell, very healthy. What is the cause of her condition?

Bruce Williamson,
 Susanville, Calif.

A. 1. Many fish are known to change their colors, not only Guppies. This is due to excitement, health, temperature and other conditions in the tank.

2. This happens quite often. There is the possibility that the food you fed her was too rich. This could cause egg-binding when her reproductive organs are surrounded by fatty tissue.

Long-tailed Guppies.

Q. Is there any way to tell the long-tailed Guppies from the other ones?

Jeffery Mueller,
 Chicago, Ill.

A. When they are young they all look alike; it is that you mean? Let them grow and in six months you will see the difference.

Coffman Guppies.

Q. I would like to know if Coffman Guppies are a good strain. I can't find them in my fish book. I will have more Guppies than I can handle in a few weeks. I have been to several pet stores and they won't buy them. I live near San Diego; do you know who will buy them?

Tom Henry,
 Encinitas, Calif.

A. In every locality Guppy breeders name their fish by an individual name. There is a well-known strain here in the East known as the Kayman strain, which you may be mispelling. As to the second part of your question, it is well known that one pair of Guppies will produce thousands in a year's time, at every new generation breeds at the age of six weeks. Try to keep only the best-looking ones and discard the others. Pet shops will always take well-shaped adult Guppies, but they must be fully grown.

Salts From The Seven Seas



By Alfred A. Schultz

Q. I have been a steady reader of your column for quite some time, and I attribute the complete success of my first marine tank to advice received there. I anticipate building a home in

the next few months, and I would like to build several large marine tanks into my house (upwards of 6 feet in length). I was reading your "Caught in the Net" column in the March '62 issue. You mentioned the use of concrete tanks with glass only in the front.

1. Do you feel this type of aquarium would be more economical and practical for me than standard construction?
2. If so, should I use any special cement mix or reinforcements for the tank?
3. You mentioned the concrete takes the place of the buffering agents used in commercial salts. Does this mean I should leave something out?
4. If I were using the formula "Instant Ocean" mentioned in Mr. Kelley's article in the September, 1962 issue, would I do anything to change the formula for a concrete tank? If so, what?

Luanne Hunsaker,
 Brigham, Utah.

1. It is more economical, but hardly worth the effort.
2. I cannot recommend any one type.
3. No.
4. No.

Q. I am 12 and am planning on using my 10-gallon aquarium for marine fish. I have heard and read much on a few subjects, but everyone differs. Therefore I would like you to please answer a few questions:

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2. What temperature should the water be?
3. For the 10-gallon tank, would an outside filter with glass wool be OK?
4. What are some good fish for a beginner to keep in a 10-gallon tank?
5. Is regular aquarium gravel all right?
6. How much light is needed?
7. Is there anything marine fish need besides salt water in addition to what other fishes do?
8. What food is needed for these fish? Is frozen brine shrimp OK?

David E. Horuchowitz, Westfield, N.J.

A. 1. Three changes of fresh water at 24-hour intervals are needed. Yes, coating the inside corners is proper.

2. 72°.
3. Yes; change the glass wool frequently.
4. Clownfish, *Dascyllus* species, *Beau Gregory*.
5. No. Use silicate sand.
6. Two hours daily, at feeding time.
7. A little more care and attention.
8. Yes, but vary it with pieces of washed raw shrimp and small bits of lettuce.

Q. I am in the sixth grade. My sister gave me some shrimp eggs. Her shrimp are white, and mine are red. Could you

please tell me what happened? I am not complaining, but I am curious about the whole thing.

Carol Phipps, Hopkinton, Mass.

A. Shrimp will vary in color depending upon where they came from.

Q. I am having difficulty breeding Sea Horses. Little green spots are growing on the sand and even on the Sea Horses themselves. I wrote to one of the manufacturers and they referred me to you.

Michael R. Kelly, Rochester, N.Y.

A. The green spots are algae, harmless but unsightly. Cut down on your lighting.

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The Pathological Origin of the Stratum Argentium in the "Brass Tetra."

Continued from Page 18
2. Histological contributions.

(a) The mechanism of this reaction will appear with the histological preparations which show the cysts in stage I, encroached upon in various degrees by guanine (sub-stages 1, 2 and 3). At the very beginning of the infestation (fig. 1, above), the cyst appears in the form of a small, fairly clear bed surrounded by a heavy concentration of melanin. A very light layer is (scarcely) visible under the cyst. Histologically (fig. 1, below, magnified X400), the corresponding approximate cyst at this stage is situated in the superficial muscle beds, just below the skin (this is never visible on the preparations). The parasite (metacercarian larva), situated in the center, is easily recognizable by having nuclei smaller than those of the host. It is bathed in a liquid which is pale pink in color. The wall of the cyst is formed, inside and outside, by several layers of epitheloid cells, originally very certainly mesenchymal, as evidenced by the strong charge of melanin pigment in the upper layer. This epitheloid appearance of a cyst wall, which is reactional around a parasite or some other foreign body, is a usual appearance among fishes, and it is equally found in the numerous cysts of *Ichthyophonus*, which one of us (J.D.) has had occasion to examine, as well as around the larvae of the indigenous trematodes which are particularly frequent in our regions, on the Carp in particular. The presence of melanin around the cyst is equally constant and explained in the following manner: at the time of infestation, the parasite destroys many cells (melanophores), liberating the melanin. The pigment is replaced by the tissue histocytes of granulation formed by the host, in a defensive reaction which is stocked by them. As the first cells (the oldest), which are mostly absorbed, and the epithelial beds are formed on leaving from there, the melanin is found concentrated at the periphery of the cyst where it forms a bed of intense black, not permitting the distinguishing of the histocytes which they have consumed phagocytically and from which they differ very little. The presence of melanin is not therefore characteristic of this or that parasite, as it is a general phenomenon and it is largely guesswork to try to distinguish macroscopically a genus of platyhelminthes from the color of the cyst. The cyst is merely a reaction by the host, more or less independent of the nature of the aggressor and depending solely upon the constitutional vitality (see Schäperclaus, 1954, pp. 292-295).

(b) Figure 2 shows, above and below, approximately in the same stage, the appearance of guanine around the cyst. Macroscopically (top, at a larger size than the corresponding fig. 1), one can see perfectly the deposit which stands out, by its brilliance, from the much duller aspect of the scales, and which is centered around an entirely black cyst, clearly larger than the melanophores

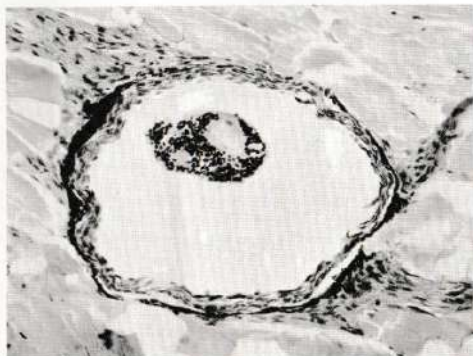


Fig. 2. Above, the cyst, with melanin all around it, begins to be encased in guanine (X25, photo by Gery). Below, microphotograph corresponding to this stage (X260, photo by Ginsburger); explained in the text.

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visible all around the guanine deposit. Histologically (below, at a magnification of X280), we find again a rounder cyst (because the preceding one was slightly flattened). The metacercarian, larger here, situated a bit higher in the photo, is particularly clear, to a point where one can see the breathing opening (at the right) and the intestine (at the left).

The histocytes are scattered on an epithelial layer surrounded by melanin, as previously. The new element is characterized by the appearance of guanine (where some crystals were already perceptible in the preceding preparation, but very poorly visible in the black-and-white photo). This deposit, histologically, consists in one part of a bordered edge around the cyst (melanin on the outside and inside), which cuts off its view with its light yellow color (naturally this is difficult to see in black and white) covering it; in the other part, an important infiltration of the intramuscular fascia; these, normally composed of a single layer of cells which carry small blood vessels and are occupied by histocytes (round nuclei) and the fibroblasts with their more oblong nuclei, impregnated with the seemingly extracellular guanine crystals (principally to the left above and to the right below, giving a striated appearance to the thick fascia). This overload of guanine begins to spread progressively through the muscle fibers themselves and give rise to degenerative lesions.

(c) The third sub-stage (fig. 3, above and below) corresponds to such an invasion in that the cyst itself is almost completely hidden below a heavy bed of guanine: the macroscopic appearance (same magnification as the corresponding fig. 1) shows a very bright spot with a scarcely visible black dot in the middle. Histologically, fig. 3 (below), showing a corresponding degree of invasion, was taken with polarized light to show the particular glow of the guanine (an irradiated appearance), which shows as well in the other microscopic structures: the cyst (center of the picture) is a little older and smaller and presents a heavier appearance where its elements are loaded with melanin: the parasite (which is not shown here) is generally dead at this stage and in the process of disintegration. The guanine has become extremely abundant, covering the subcutaneous muscles around the cyst and allowing only rare muscular fibers to subsist and showing atrophy (above left and right of the picture). The cyst is thus entirely surrounded by guanine and seemingly subsists on its general metabolism.

By and by there is deposited below the skin of the fish, in the subcutaneous muscle bed, a padding of guanine crystals 2 to 3 mm thick which serves to replace this muscle bed, resulting in a veritable process of degenerative interstitial myosin.

The particular brilliance of the Brass Tetras (caused by the phenomenon of interference, or diffraction, associated with a basic color furnished by other pigments, the carotenoids of exogenous origin) is then fundamentally of a pathological origin and results in a sort of false *stratum argenteum* which is

situated more deeply than the true one, which is a syncytium of the skin. We do not know why the abundance of guanine stops at this subcutaneous bed without causing more damages which affect the life of the fish. Other questions (which are probably linked to the preceding one) also remain unanswered: why do certain species react to the presence of subcutaneous parasites with a local effusion of guanine, while others do not? (The presence of cysts is a phenomenon which is frequently observed with wild fishes, not only the Brass Tetras but others, principally *Moenkhausia* and *Hemigrammus*.) How is the guanine deposited and where does it come from in such quantities, considering that the melanin (where the deposit mechanism is known) is never there in a quantity more than that of the grains of chromatophores supposedly destroyed? Finally, a question to which we have referred at the beginning of this article: how would an infestation as important as this limit itself (as in more than a third of the cases) to a uniform bed of guanine over the entire surface of the body, without going any further? One must admit that the guanine deposit travels according to a general mechanism, just as it is centered in the beginning around the tissues of granulation (same as melanin); and an endocrine (enzymatic?) action is brought into play on the catabolism of the nucleoproteins (of which guanine is the product of disintegration). It is possible that melanin (other typically endogenic pigments, considered as waste substances which accumulate under the skin) plays a part in freeing or fixing in the increased production of these pigments.

These questions give rise to some others, more general ones, which treat with the inequality of the "normal" distribution of guanine with different fish species. It is known that certain species of Clupeidae, and the Cyprinids like *Alburnus*, have a *stratum argenteum* from which is extracted an essence used in the Orient in the manufacture of artificial pearls (and more and more, nail polish). On the other hand, certain Cyprinids are perfectly dull, and have no use for guanophores except in the iris, peritoneum, etc.

In spite of the unanswered questions, we hope to have amply pointed out the cause for its appearance in certain Tetraogonopterinae, the so-called "Brass Tetras," and to have served to draw the attention to this new phenomenon which is caused by the formation of a "reactionary" bed of guanine around the parasitic cysts. Once the mechanism is known, it is easy to trace the symptoms with some other species: *Hemigrammus aeneus* Gery is effectively parasitized and shows cysts very analogous to these metacercarians (the specimens have been preserved in alcohol and are much too scarce for a histological examination); similarly, the pair of *Hemigrammus armstrongi* pictured by Axelrod (*Tropical Fish Hobbyist*, June-July 1957, pp. 6 et seq.) shows very clearly the "patches" of guanine and it is sometimes possible, on certain pictures, to distinguish the black spot of the cyst in the center (see fig. 4); also, the picture by Fletcher of *Moenkhausia brosoni* (*The Aquarium*, 1961, page 364) where the fish on the right shows several very small

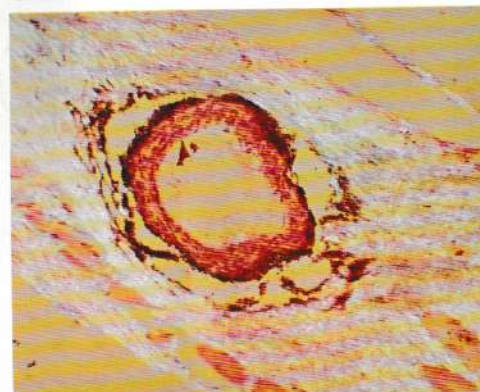
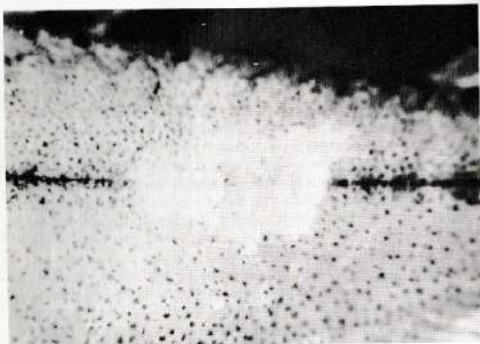


Fig. 3. Above: important deposit of guanine around the cyst has a metacercarian still visible in its center (X10, photo by Gery). Below, microphotograph taken with polarized light, of the same stage (X280, photo by Ginsburger).

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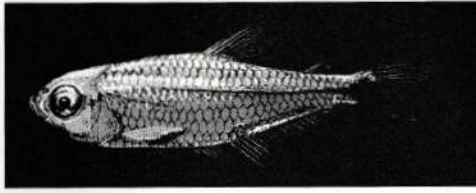


Fig. 4. *Hemigrammus armstrongi* (drawn by Gery, from a holotype specimen taken from the Demerara River in British Guiana).

metacercarian cysts. There has been too much retouching in the photo by lanes of the "Brass Tet" (probably *Hyphessobrycon bifasciatus* Ellis in *The Aquarium*, 1951, p. 150) and of *Hemigrammus cupreus* Eigenmann (Mem. Car. Museum 1918, pl. 20, fig. 3) to suspect that these fishes were parasitized.

A certain analogy cannot help but be drawn between the defense reactions of an oyster and a fish to a parasite. In both cases the parasite is surrounded by substances whose luster is so little different that man has used the second (guanine) to imitate the first (naacre), thereby using a process which has been utilized for a long time by a fish to make a sort of "artificial pearl."

Summary

The peculiar coloration of the so-called "Brass Tetras" which were considered by some as "individual sports," and by others as depending on the nutrition or on the composition of the waters in which the wild varieties of these fishes live, is shown by the authors to be the result of an infestation by a parasite.

The parasite, which in the case studied here (*Hemigrammus armstrongi*) is an unidentified metacercarian of a trematode, induces a two-step reaction on the part of the host: at first, a classical pseudo-cyst with histocytes is formed, with the accumulation of melanin which does not depend on the foreign body but on the host-cells themselves (fig. 1). Then a second action, which heretofore has not been described, takes place. This consists in the inclusion of the whole cyst in a mass of guanine crystals, which invade progressively the entire subcutaneous layer of muscles, giving to the fish its characteristic glitter (figs. 3 & 4).

Some questions follow, concerning the mechanism of guanine's accumulation. It is suggested that, above a certain level, a generalized (hormonal?) factor could replace the local one. Other examples of parasitism among Brass Tetras (subfamily Tetragonopterinae of the Characidae) are shown, and, finally, the curious analogy with the formation of pearls is mentioned.

Indostomus, A Piscine Paradox

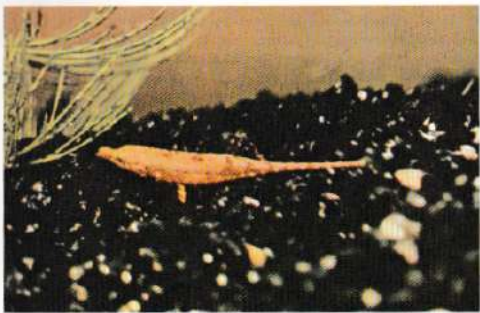
BY FRANK THOMPSON, CURATOR
Fort Worth Zoological Park

The fact that there are well over 40,000 known species of fish leaves room for many gaps in our knowledge of them. One of these gaps has long been in the relationships between the Pipefishes and Seahorses (family Syngnathidae), Sticklebacks (family Gasterosteidae), Trumpetfishes (family Aulostomidae), Ghost Pipefishes (family Solenostomidae), and the Tubenose (family Aulorhynchidae). In 1929 a small freshwater fish which might shed some light on this problem was discovered in Lake Indawgyi in Northern Burma, but for some reason never became well known and, in fact, was represented in this country by a single preserved specimen. This species was *Indostomus paradoxus*, which has not, until now, had a popular name. Looking much like a species of Stickleback, it also shows characteristics which resemble those of the marine Pipefishes in many respects.

In the fall of 1962 Ross Socolof of Gulf Fish Hatchery received a small shipment of "Freshwater Pipefish" from the Far East with the information that they came "from mountain streams having a pH of 6.8". He sold a few of these to customers as "Pipefish" but kept one group for experimental purposes. In February of the next year he mentioned these unusual specimens to me and expressed doubt that they were, in fact, a species of Pipefish. The ten remaining individuals were shipped to Fort Worth, arriving just before the start of the Mid Year Conference of Zoological Parks and Aquariums held in Fort Worth the first week of March. In the rush of preparations for this conference, the ten 1-inch specimens were placed in a reserve 5-gallon aquarium off exhibit until they could be carefully examined and identified.

The curiosities were mentioned at a bull session among some of the aquarium curators who were attending the meetings, and the curators dropped their investigations into the effects of various liquid refreshments long enough to make guesses as to the probable species. It remained for Dr. Earl Herald of Steinhart Aquarium, however, to leave the meetings and take a taxi to the Zoological Park, where he examined the specimens both in their tank and under a low-power microscope. There is an unfounded rumor that a number of extremely unscientific whoops and yells issued forth from the laboratory in which the examination was made, but it is a fact that Dr. Herald returned to the conference rooms in a jubilant state and announced that the nearly forgotten *Indostomus* was represented by ten living specimens in the James Record Aquarium at the Fort Worth Zoological Park.

True to its newly coined popular name, the Paradox Fish is a living contradiction of itself. The armored plates and caudal fin, and especially the general appearance of the head, all suggest that it, along with the Pipefishes and Seahorses, is a member of the family Syngnathidae. Its movements while feeding are quite similar to those of the smaller members of this family. On the other hand, the Paradox Fish has two dorsal fins, as opposed to the single dorsal of the members of the family Syngnathidae, and possesses pelvic fins, which Syngnathids do not have. These matters were discussed by Bolin (*Journal of The Washington Academy of Science*, Vol. 26, No. 10, Oct. 15, 1936), who proposed that the original placement



Indostomus paradoxus shown against a background of black gravel; shown against gravel of normal color, the fish becomes almost invisible. Photo by John Mehrrens.

of the species as a close relative of the Pipefishes might be in error. He expressed the opinion that *Indostomus* could claim "... no very close relationship to any known family," although it seemed to be allied to the Sticklebacks. These questions relating to its exact ichthyological position will doubtless be settled as the species is more closely studied. Of the ten received in Fort Worth, one later died and was preserved, four were shipped to Dr. Herald, and five were kept for study purposes.

The Paradox Fish feeds well on live brine shrimp nauplii. Sedentary, it will lie in one spot for hours at a time or drift slowly about much like a Seahorse. If disturbed it can move with lightning speed, however, and

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it jumps clear of the water with ease. The fish's very small size and slender build make it difficult to note minor differences between individuals, a fact which may promise to cause problems in sexing, although several of the Fort Worth specimens now appear to be heavier and may be ripening females. The size also precludes the keeping of the Paradox Fish with all but the smallest and most peaceful of other species. Although experiments in determining the temperature tolerance of *Indostomus* have been necessarily restricted, the few experiments made have shown that the species withstands temperatures of from 68° to 90° with no ill effects. If kept on natural colored gravel they are quite difficult to see, even when lying in plain view, and they seem to prefer the cover offered by stones and low plants, making a small group of them all but invisible in a tank of more than 5 gallons in capacity.

Of course, one of the nicest things about the aquarium hobby is that there is still much to be discovered, investigated, and described. This is especially true in the case of the Paradox Fish, and as this fish becomes more widely available it will be possible to make a real contribution to science by working with this midget mystery in your living room.

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