

The AQUARIUM



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Color Plate by Wm. T. Innes

HAPLOCHROMIS MULTICOLOR (Schoeller)
The Small Mouthbreeder

January, 1940

Vol. VIII No. 9

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Printed in the U. S. A.

1/3
Price, 20c

THE AQUARIUM

. . . Editors . . .

WILLIAM T. INNES F. H. STOYE

GEORGE S. MYERS

Published Monthly by INNES PUBLISHING CO., Philadelphia, Pa.

\$2.00 per year, in United States and Canada, 20c per copy. Foreign, \$2.50

All remittances to be payable in U. S. funds

Entered as second-class matter, May 27, 1932, at the post office at Philadelphia, Pa., under Act of March 3, 1879.

Vol. VIII

JANUARY, 1940

No 9

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THE AQUARIST'S CALENDAR



MANY of our readers use electric light bulbs to help plants grow and to take the chill off aquariums in Winter. An excellent idea and an effective one when the lights are so placed as to produce the best results. These lights in many cases are partially submerged in the aquarium water. The point to which we draw attention at this time is that these bulbs, due to the light they generate, gather a considerable amount of algae on the surface. This greatly interferes with the radiation that should go to the plants in the aquarium. Like any other accumulating film on glass, it comes so slowly that one is hardly aware of it, but it is there, doing its damage. To those who do not regularly clean these bulbs, this is a reminder. Give them a rub with a moist rag and salt. The increase in the volume of light will be surprising.

In this same connection the writer cannot refrain from again marvelling at how the bulbs last when immersed in water, especially in these days when it seems that they so often require renewing in household use. Over a period of several years with half a dozen 75 watt bulbs burning in aquariums an average of 8 hours per day, covering a period of 7 months each year, only one bulb has ever burned out. That one had been in use nearly 4 years. Several of them are dull and should be renewed, but they are still working.

Clear bulbs, by the way, although

rather difficult to secure nowadays, give the best results. The blue tinge which some of them have is without effect, good or bad, as far as plants are concerned.

* * *

Many of our best aquarists do not believe in giving their fishes maximum temperatures during these cold months. By maximum we mean from 78 to 80 degrees. This stimulates them too much when they should have a period of comparative rest, especially before the Spring and Summer breeding season starts. It is best to concentrate on breeding while all conditions are the best, and this certainly is not in the month of February. Carry them along easily just now. An average temperature for most species of 70-74 is quite enough. This should not be taken as any cause for a let-down in vigilance against chill. Temperatures below 68 degrees are just as dangerous now as at any other time of year.

* * *

If, through any failure of heat, an aquarium has been subjected to severe low temperature, do not hurry the heating by the rapid addition of warm water. No matter what method is used for raising the temperature, take several hours to do it, but bring it up eventually to about 80, and keep it there for several days. Those fishes which have not already been killed may be saved by this method.



THE SMALL EGYPTIAN MOUTH BREEDER, *Haplochromis multicolor* (Schoeller)

BY Frederick H. Stoye

• *A story of maternal protection unsurpassed in Nature.*

CICHLIDS, as a group, undoubtedly are the most intelligent and interesting of our aquarium fishes. Among the various forms of parental care exercised by them, that of the mouthbreeders or oral breeders (as the scientist dubs them) is probably the most unusual. All species of mouthbreeders known so

Our small Egyptian Mouthbreeder, however, is an ideal aquarium fish, attaining a length of from 2 to 2½ inches. The first specimens reached Harster Brothers in Speyer, Germany, in 1902. They had been collected by

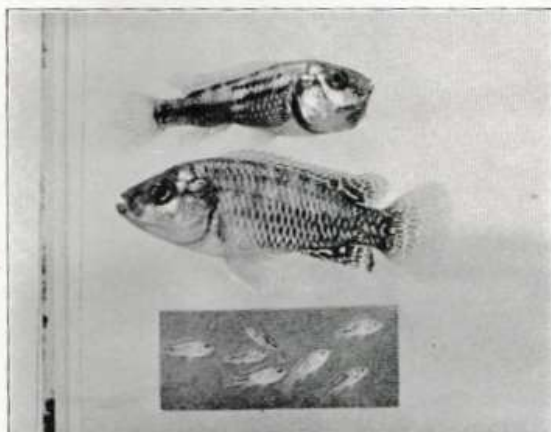


Photo by W. T. I.
Upper fish, emaciated female with mouthful of young; centre fish, male. Below are young about a week after emergence.

far hail from Africa or from the Asiatic territory (Palestine, etc.), immediately adjacent to lower Egypt. Many of them are fairly large fishes, growing to a length of a foot or more. All species of genus *Tilapia* are quite large. The so-called large African Mouthbreeder, *Tilapia macrocephala*, and *Haplochromis multicolor*, the small Egyptian one, are the only mouthbreeders generally available; as the former grows to a length of 8 inches in the aquarium it is not suitable for the average hobbyist.

Dr. H. C. Schoeller, a German physician of Alexandria, Egypt, in small brooks emptying into Lake Marjut, a large brackish body of water in the vicinity of that city.

The basic color of this little Cichlid is olive brown to green with many irregular, dark stripes and bars. These may disappear entirely or become very prominent when the fish is frightened. The back has a violet sheen. The scales along the sides show vivid metallic golds, coppers, greens, blues and violets.

In some lights a decided bronze tone predominates. The dorsal fin of the male has a row of iridescent dots over its base. Above this is an orange-brown margin interspersed with blue-green and bordered by a line of like color. His anal fin is marked by three curved rows of brown-red dots with gray- to blue-green in the intervening spaces. During the breeding season this fin (in the male) has a bright red tip. All colors of the female are less vivid, her fins are practically colorless, her ventral region is distinctly yellow and her head is larger. The body is fairly slim, tapering evenly from the large head toward the caudal base.

Aquariums with a surface of 8 x 10 inches are ample for breeding. They should be fairly thickly planted and have bunches of submerged floating plants like *Riccia* over part of the surface to provide shelter for the female. The bottom should be covered with a 2-inch layer of fairly fine, but not too loose, sand. Screened and washed building sand is just right.

In preparation for the mating the male fans a circular depression in the sand about 3 inches in diameter. If the female is ripe for spawning, indicated by her increased girth, they soon come to an understanding. She answers his coaxing and enters the pit, closely followed by the male. They slowly circle in the pit, patting each other on the sides with their mouths. During each trip around a couple of eggs are expelled by the female, fertilized by the following male and picked up in the mouth by the female during the next "turn." The throat pouch of the female gradually expands as her precious load increases. When the spawning is completed her throat is so distended that she is unable to close her mouth.

She now seeks the shelter of the surface plants and the male should be

removed as he is liable to annoy her. After 12 to 20 days, depending on the temperature, the fry is released from its cradle. During this period one may see, at first the spawn, and during the last few days, the helpless fry in the throat of the female through her partly open mouth. The eggs or youngsters are as closely packed as sardines in a can and are frequently shifted about by a chewing motion of the mother.

During the first day of their liberty the babies are quite awkward in their swimming motions, and keep close to the head of their mother. At the slightest disturbance they crowd around her mouth and are permitted to enter this haven of safety. Each night they are put to bed in this cradle. Gradually they venture farther away from their parent and do not all return into the pouch of the mother at night. When danger threatens they do not willingly crowd around the female, but have to be chased and picked up by her. After 5 to 7 days not all can be harbored any longer. Now the time has come to remove the female, as she may make a meal of her brood.

Haplochromis multicolor is fairly peaceful, becoming quite aggressive during the breeding season. It is a very hardy fish, enduring temperatures of below 60 degrees without harm. For breeding temperatures from 70 to 80 are recommended. Live food, such as mosquito larvæ, *Enchytræ* and small pieces of earthworms form its natural diet. Small pieces of clam, fish, fish roe and cereal mashes mixed with dried shrimp form a good substitute. Of the dry foods, shrimp is quite readily taken.

The small Egyptian Mouthbreeder is an ideal fish for the beginner who has become tired of live-bearers and wants to try a spawning fish.

AN AQUARIUM IN THE TROPICS

BY *M. W. F. Tweedie*

Curator, Raffles Museum, Singapore

IN the minds of most aquarists the keeping of "tropicals" is associated inseparably with the problem of maintaining artificial heat. Here, in Singapore, where the water from the tap and the sea we bathe in is perennially at 80° F. or warmer, the question does not arise. Moreover, the enthusiast need not depend upon the dealer for his fishes, he can go out and catch them himself. A good selection may be taken with a dip-net in ditches and weedy margins of lakes on Singapore Island, and Johore, the adjacent state on the Malayan mainland is a paradise not only for the aquarist but for the systematic ichthyologist as well.

In the spring of 1937 I collected fish in South Johore in the company of Dr. A. W. C. T. Herre of Stanford University, and in three or four days we obtained over forty species of fish, more than half of which were eminently suitable for a small aquarium. Several were new to science and have been described and named by Dr. Herre.

I have, at present, two tanks in my house, each with a mixed population of Malayan fish, twenty species in all; one is of ten-gallon capacity, the other rather smaller. Having experimented with artificial aeration I abandoned it as unnecessary, but keep the tanks well planted with *Caboma* and a kind of water grass sold by the local dealers.

The hobby is sufficiently popular in Singapore to support numerous Chinese and Japanese dealers who supply apparatus, food, plants and fishes; curiously enough, most of their tanks contain *Scalares*, *Gambusias* and other New

World fish and they say that there is not much sale for local species. I am certain that very few of them realize what a wealth of beautiful and interesting fish can be had almost at their doors.

I feed my fish on tubifex worms, bought from the dealers, which costs me two or three cents (U. S.) a week, and mosquito larvae. To maintain a supply of these I place bowls of water around the house and inspect them personally every day, taking out such larvae as I require with a glass syringe. In case this should be read by the Singapore Health Officer, I hasten to point out that no larva ever comes to maturity in these bowls and that I destroy fifty or more potential mosquitoes every day.

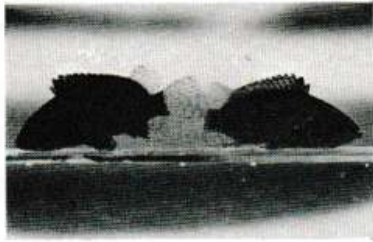
For photography I use a tank modeled on the description in "The Complete Aquarium Book," by W. T. Innes, p. 133. This is placed on a table outside in bright sunlight and horizontal illumination is effected by two small mirrors, one on each side of the camera, the total illumination, with diffused light, being therefore rather more than twice that of the direct rays of the tropical sun. The fish dislike it, but it does not seem to hurt them; the water, however, must be changed every ten minutes or so as it heats up very quickly under the converging rays from the mirrors. With this arrangement and a 28 Sch. film I expose at 1/100 sec. and f. 11 or equivalent exposure and stop. I have used both a quarter plate camera and a Leica with a focal plane focusing device. The latter has the advantage of giving a greater range of speed and

experimenting is more economical, but I have obtained as good results with the one as with the other.

Descriptions and notes on some of the less familiar and more interesting fishes follow.

NANDIDAE

Several species of this family are familiar to aquarists but I have not read of *nebulosus* in any of the standard books. It is a handsomely marbled, dark brown fish with the soft dorsal, soft anal and caudal fins very transparent.



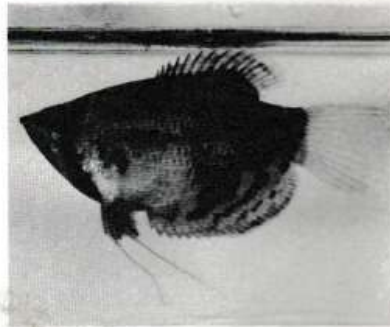
Nandus nebulosus BLEEKER
FIG. 1

Mine have always spent most of their time "sitting" at the bottom of the aquarium and only become animated at meal-times. With its enormous, protrusible mouth the fish takes in solid lumps of tubifex worms and gulps and chokes over them in a rather unseemly manner. I have never known them to attack other fish, but always liberate them before they grow too big.

They are common in South Johore and on Singapore Island.

ANABANTIDAE

Fig. 2 is the best Anabantid I have kept. It is pretty, small, never fights its own kind or chases other fish and appears to be very hardy. I have had four of them for over a year. They have fed on tubifex worms and mosquito larvae, mainly the former. They came unscathed through an epidemic of ichthy-



Sphaerichthys ophromenoides CANESTRINI
FIG. 2

ophthirus (yes, we have it here too!), which killed many small Cyprinids.

Normally the color is olive brown with yellowish vertical cross bars and an indistinct pale lateral stripe between the anterior two of these. The anal is elegantly marked with dark brown and the dorsal similarly but less boldly ornamented; the tail fin is so transparent as to produce, in a poor light, the illusion of a fish without a tail.

As in most Anabantids the colors change with the emotions, and in the distressful glare and confinement of the photographing tank the beautiful cross-bands are hardly visible, though they can be seen to some extent in Fig. 2.

This little fish has quite a romantic history: one specimen was collected in the island of Banka, off the east coast of Sumatra, and described by the Dutch ichthyologist, Bleeker, in 1859. There were no further records until Dr. Herre took two specimens in 1934 near Malacca. In 1938 I found the species occurring in quantity at a locality in Johore. Two preserved specimens were sent to Stanford University and Dr. Herre and Prof. G. S. Myers confirmed their identity. A fish has been introduced by aquarists under this name, but it was really a species of *Macropodus*.

I had, at one time, thirteen in an aquarium. They got on very well together and lived without any casualties for more than six months. They will not touch prepared food and prefer mosquito larvae to anything else I can give them; *Daphnia* would be an ideal food for them.



Parosphromenus deissneri (BLEEKER)
FIG. 3

This is the smallest Anabantid I know and probably does not grow to more than $1\frac{1}{2}$ inches. Bleeker described his specimen as "rose-pink." All mine are yellowish-buff with bold longitudinal black bands which come and go with the varying moods of the fish.

When the males display they are more beautiful than any local fish that I have seen. The dorsal, anal and caudal fins are spread like a peacock's tail. Towards the base they are deep crimson, and between this and the dark brown outer edges is a narrow band of brilliant emerald green. Unhappily after a short period of captivity the joy of life seems to go out of them. Although they remain perfectly healthy the color fades from their fins and the beautiful display is never seen. It remains for a more skillful aquarist than I to reproduce ideal conditions for them. They were found in a shallow, weedy ditch whose temperature under the mid-day sun must reach 90° F. at least.

They are restless and exasperating in the photographing tank and the picture

does no more than give an idea of their appearance.

SYNGNATHIDAE



Doryichthys martensi (PETERS)
Fresh-water Pipe-fish

FIG. 4

Possibly many will be surprised to learn that this family, which includes the well known sea-horses and pipe-fishes, has fresh-water members. This species is common in the swiftly-running streams of South Johore and another, *D. deokhatoides* (Blkr.), is sometimes found with it. I have kept *martensi* from time to time and they seemed to live happily enough in a well-planted aquarium, feeding on mosquito larvae. None, however, survived more than two or three months. Their appealing helplessness makes them amusing and charming little fish to keep. They swim rather less competently than you or I and, in a mixed tank, care must be taken to see that they get their share of food. They soon learn that the nozzle of the glass syringe is a source of mosquito larvae, and swim up, clumsily bumping their noses against it and snapping up the "wrigglers" as they are squirted out.

As in all Syngnathids the relatively large eggs are carried by the male in an abdominal pouch. Ovigerous males are quite common and I have once had young ones hatch out in a mixed tank,

little fellows half an inch long with rather large heads. They worked industriously over the leaves, apparently eating algae, but all disappeared quite suddenly and some little *Brachygnathus xanthomelas*, who should have known better, refused their worms that day.

HOMALOPTERIDAE

Homaloptera sp.*

The Homalopterids are allied to the loaches and are typical of the swift, fresh-water streams of southern Asia. All have the pectoral and anal fins modified to form organs of attachment, and live clinging to vegetation or stones in rapid water. The present species, which is only known from a single locality in Johore, is no exception to the rule, and it is surprising that it does so well in an un-aerated aquarium.

Even in the tranquil waters of the tank they spend all their time clinging to the glass or to leaves or stones, and their occasional excursions into the open water take the form of nervous leaps from one point to another rather than the confident swimming of a normal fish. Their movements are, in fact, very like those of a climbing lizard, particularly like the little house-lizards or geckos that run about our walls and ceilings here with surprising agility.

The two that I have kept have fed on mosquito larvae and have thrived and grown.

*This is a new species of *Homaloptera*, a description and figure of which will appear shortly in a paper by Dr. A. W. C. T. Herre.

SILURIDAE

A "glass cat-fish" of small size and suitable for the aquarium. They spend much of their time poised in the water rapidly oscillating their tails as if trying to swim somewhere but mysteriously re-



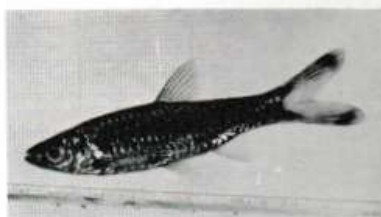
Cryptopterus macrocephalus (BLEEKER)

FIG. 5

strained. Mine have eaten nothing but tubifex worms.

CYPRINIDAE

This is a case where the systematist who named the species surely described preserved and faded specimens. There are three lines on the body if one cares to look for them, but the hall-mark of the fish is the beautiful coloration of the tail, which has each lobe black at the tip and proximally bright orange. This is one of the few Rasboras that cannot be confused with any others of this difficult genus.



Rasbora trilineata STEINDACHNER

FIG. 6

Common in Johore in running streams, where I have taken specimens with a cast net up to eight inches long. Small ones seem to thrive in the aquarium, but do not grow much.

*Rasbora cephalotaenia* (BLEEKER)

FIG. 7

This is a very handsome Rasbora of moderate size. It might be confused with *R. einthoveni*, but the lateral stripe consists of a double row of spots rather than a continuous band. Moreover in *einthoveni* the pectoral fin is longer than the head and is shorter in *cephalotaenia*.

In a good light the dark spots appear iridescent green and above them there is a broad stripe of pale violet.

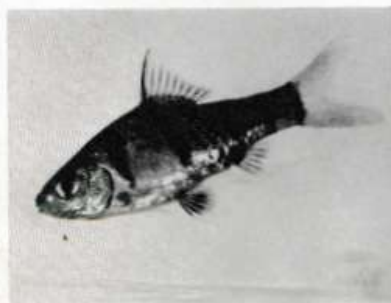
*Barbus hexazona* WEBER AND DE BEAUFORT

FIG. 8

Specimens from the Malay Peninsula agree with Weber and de Beaufort's figure (Fishes of the Indo-Australian Archipelago, III, p. 181) in having the posterior cross-band straight. In the specimens figured by Innes (Exotic Aquarium Fishes, p. 200) it is angular. Perhaps geographical varieties exist.

I have found this species rather deli-

cate and difficult to keep, but it is pretty enough to repay a little trouble. It is shy and retiring in temperament.

Book Review

"The Book of Fishes," edited by John Oliver La Gorce. 367 pages, 6 x 10 inches, 443 color plates from paintings, 62 life photographs. National Geographic Society, Washington, D. C. Cloth binding \$3.50. Not sold in stores.

From time to time that remarkable magazine, "National Geographic" has used big featured articles on natural history subjects, such as birds, butterflies, dogs and fishes, with perhaps special accent on fishes. Richly illustrated contributions by leading authorities on marine and freshwater life have appeared for many years.

One of these authorities is John Oliver La Gorce, Vice President of The National Geographic Society and an editor of the magazine. Mr. La Gorce has woven the best of the articles into very much of a book. It is remarkably comprehensive, and while scientific accuracy from such distinguished writers may be taken for granted, the book as a whole approaches the subject from a popular, human-interest viewpoint.

Anglers will delight in the volume, for it goes into detail regarding names, habits and range of the common and uncommon fishes they are likely to meet from the Atlantic to the Pacific, and points between. The splendid color plates alone furnish a wealth of identification material that will, we believe, establish the book as a popular encyclopaedia of fresh and salt water game and food fishes. Brilliant action photographs fairly bristle throughout the pages.

Beside the editor, Mr. La Gorce, the other writers of the book are Charles Haskins Townsend, John T. Nichols,

Louis L. Mowbray, Leonard P. Schultz, Roy W. Miner, Van Campen Heilmer, Russell Maloney and Imogene Powell.

Many aquarists will remember with pleasure the masterly paintings by Hashime Murayama of varieties of the Goldfish published in *The National Geographic Magazine* some years ago. Mr. Murayama, in this book, has fairly outdone himself in his beautiful, accurate color paintings of game and food fishes. Miss Else Bostlemann, famed for her paintings of deep sea subjects, shows some of her most exquisite work. The action snapshots (some of them remarkable hits) are from the best work of a number of photographers.

*"Big fleas have little fleas
On their backs to bite 'em,
Little fleas have smaller fleas,
And so ad infinitum."*

Mr. Jon Vernon Roithner, of Johnson City, Tenn., puts an end to this vicious cycle by feeding dog fleas, great and small, to his *Scalares*. Catching them from their natural habitat, he drops them on the water in the aquarium, where they are promptly gobbled. He says the fishes prefer them to other foods, but unless the dog is extremely well populated, we would suppose that it would take all of one person's time keeping a few fishes satisfied.

Any metal-frame aquarium of 3-gallon size or over should be placed in its permanent place before filling. Moving it while filled produces strains that are very likely to cause leaks. Also be sure that the aquarium is evenly supported before the water is put in. Otherwise an internal strain is produced which will eventually crack the glass, even after a very long time.

The Use of the Brine Shrimp As a Hydrometer

By S. E. ABERNATHY
Berkeley, Calif.

In a too dilute salt water solution, Brine Shrimp in domestication become semi-transparent and weak. The intestinal canal empties, the gill sacs blacken and the animals die at the bottom of the aquarium as if from lack of vigor.

If we note in time the condition of the shrimp and gradually increase the concentration of the salt water, it becomes full of vigor, the intestinal canal fills, motions become more rapid and the shrimp leaves the bottom of the aquarium, doing well in such a solution.

On the other hand, if the concentration is increased too rapidly and becomes too heavy, the alimentary canal becomes solidly constipated, the shrimp seeks the surface of the water, and dies there, especially during the casting of the molting skin, which is as difficult in too heavy a concentration as in one too light. However if again in time we correct by diluting the solution, the shrimp revives and thrives as the right amount of tap water is added. Let it be understood that the higher the room temperature, the greater the proportion of salt necessary, and vice versa.

Show in Cleveland

During the week of February 5th to 14th, 1940, in conjunction with the American and Canadian Sportsman's Show, held in Public Auditorium, Cleveland, the Cuyahoga Aquatic Association will have on display an exhibit of over two hundred species of tropical and goldfish. Every effort is being made to display rare fish; at least two species never shown to the public, and just as new to science, will be there, along with other very rare fish.

~ The EDITOR'S LETTER ~

Dear Readers:

IN THE November letter I referred to the difficulties connected with the maintenance of an aquarium in the schoolroom, due largely to the severe drops in temperature at night, and especially over week-ends.

One of our readers comes back with the thought that I should have gone farther into the subject by suggesting the use of native fishes for such conditions, since most of them can stand pretty severe cold. The idea has merit. For years I enjoyed collecting and keeping cold-water fishes, but efforts to interest others in them have not been more than slightly successful. Just a sprinkling of our readers, from widely distributed places, keep inquiring why we do not regularly devote space to native fishes for the aquarium. The reason is that not one percent of other readers are or will be interested.

Despite the hardiness and great variety of local fishes, most of them have three big defects as aquarium possibilities. They seldom can be bred. They do not prosper in small tanks nor in much heat. The glamour is missing because they are not "imported."

Some of our southern species may be considered and treated as tropicals or near-tropicals. My remarks apply to the average wild fish of the central and northern climatic zones. Under proper conditions most of them are long-lived, easily fed and cared for. At times they are handsomely colored. A wide range in variety of appearance and of habit may be included in a collection of these fishes. Those points would be of educational interest to pupils in schools, but I fear that in most instances the fishes would have short (but not merry) lives in small or overcrowded tanks. Besides, most of the collecting season is in the summer months when the schools are closed.

It is true that most native species stand the cold well, but I doubt whether many of them in a school aquarium would outlive that really tough fellow, the Goldfish.

As a closing word I again say to aquarists, especially to those who have pretty well run the gamut of exotic fishes, give our natives a trial. Years and years ago I had a 40-gallon aquarium in which there were about fifteen 3-inch male minnows known as "Silverfins" (*Notropis whippii analostanus*). Those vibrant, white-finned beauties with steel-blue sides, delicately overlaced with dark-edged scales, whirling about each other, pinwheel-fashion, alternating with long, graceful sweeps, made a delightful, vivid impression that time has never dulled.

Sincerely yours,

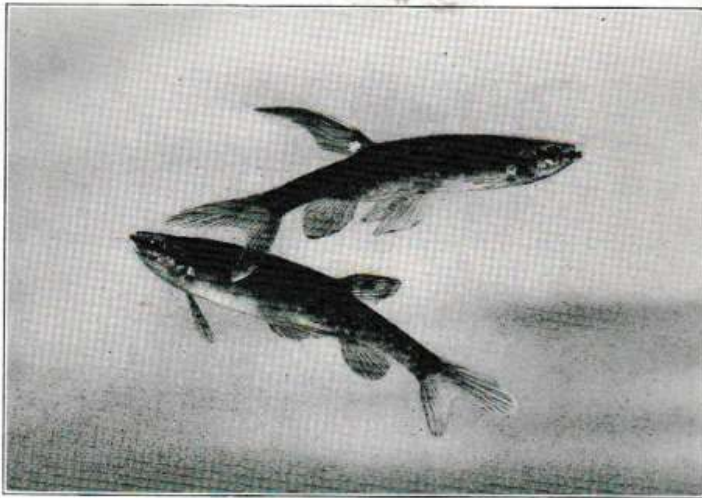
Wm. T. Innes

COPEINA ARNOLDI REGAN

BY William E. Chambers

THE eternal fascination of raising tropical fish, a hobby which has spread in our own day to most parts of the world, is due in no small part to the unending variety they present. Some fanciers are attracted by color or grace, others by unusual body shape and fin development, and still others by the

development of unusual attractiveness. The odd finnage also serves as an aid in differentiating between the sexes, as the male dorsal is long and tapers to a point, while the female dorsal is shorter and rounder. Another sex indication is to be found in the colors of the dorsal. The male has a brilliant



Copeina arnoldi
Upper fish is the male

Photo by W. T. I.

varied breeding habits to be found among aquarium fishes. Unique even among the latter is the fish *Copeina arnoldi*, whose amazing breeding act could scarcely be credited, were it not seen.

The life history of this fish affords much interest throughout its cycle. The long and gracefully slender body of *Copeina arnoldi*, in color is a mottled brown, paling towards the abdomen, distinguished by a pronounced fin de-

white spot at the base, outstanding in contrast with the black area in front of it. The female has a reddish spot. The edges of the pectoral and anal fins and the lower edge of the caudal fin bear a conspicuous red coloring. A distinctive black line skirts the mouth and proceeds up to the eye, which has a black iris, set off strikingly by a white corona. The black line is flanked by two parallel white lines, giving the effect of a bridle.

Not all aquarium fishes protect their young, and some of them are cannibalistic in nature, devouring their own fry if given the opportunity. Hence the ingenuity with which *Copeina arnoldi* protects its young is particularly interesting, especially when combined with their extraordinary breeding habits, which are enough to make them outstanding in any biological assembly.

In breeding *Copeina arnoldi*, we have found a 20-gallon aquarium, about three feet long, most satisfactory. Keep the aquarium covered. Water temperature for best results should be between 75 and 80 degrees, with a pH of about 6.8. Place a sheet of frosted glass inside the tank, so that several inches rise above the water line. The glass naturally rests at an angle, against one end of the aquarium. Observation of the fish during the breeding act showed us that they invariably selected the light end of the aquarium in which to spawn, so the glass should be placed there. The fish were fed generously on nourishing foods such as scraped raw liver, chopped earthworms and live *Daphnia*. Presently, after a few preliminary love plays, they lock their fins, her right being joined to his left, and leap out of the water onto the glass. For ten seconds, approximately, they cling to the glass in this position, depositing the eggs, which are contained in a jelly-like mass. About ten eggs are deposited in each mass. Each batch of the eggs is laid beside the other, so that a solid, flat mass is formed, resembling a large snail clutch, with possibly a few stragglers on the outside. This spawning process of leaping from the water onto the glass and back again into the water is repeated until the female is completely spawned out.

Act II of this incredible performance then goes on. The spawning completed, the fish assume their positions at the opposite end of the aquarium,

swimming around as though nothing had occurred, in an effort to distract attention from the newly-laid eggs. To the casual observer there is no evidence of recent spawning. The female remains quietly hidden in the plants, while the male stations himself at some distance from the eggs, and every 20 minutes or so swims rapidly to a position below the spawn and vigorously splashes it, so quickly as to almost elude detection. Close observation would indicate that in the act of splashing the spawn the male snaps its body sidewise, causing the head and tail to almost come together. He then retreats to his former position among the plants. This performance is repeated again and again until the fry are hatched and fall into the water. The embryos are visible in 24 hours, and they hatch 72 hours after the eggs are laid. The parents do not protect the young.

The exposed position of the eggs affords a rare opportunity to observe embryonic development. The eggs, which are of a pale amber hue when first laid, gradually darken with further growth. Under a glass one can readily discern the black eye-spots with the optic nerve endings leading to the brain. With further development the outline of the spine can be observed,



Showing the urostyle, a thin, rounded, movable appendage just above the tail fin, peculiar to certain fishes during their infancy. As it is difficult to see, we have enlarged the photographs of the baby *Copeina arnoldi* about two diameters. The purpose of this appendage is unknown.

and ultimately the squirming fry can be seen. One peculiarity which the young of *Copeina arnoldi* share with several other species is the development of an appendage known in science as the urostyle, which resembles a narrow fin, longer than the tail, rounded, and continuously curling and uncurling. When the young fish has reached a body length of about five-eighths of an inch, this pseudo-tail gradually vanishes.

This extraordinary and desirable fish, with its unbelievable breeding habits, is an ideal community tank inhabitant, and will accept a wide variety of foods.

Aspirin

Mr. C. B. Jordan, of Dallas, Texas, writes that a dealer in live bait-fish places an aspirin tablet in with every shipped can of 50 minnows. The dealer reports wonderful results in improving the percentage of fish received alive.

We do not know of any such experiment on tropicals, but mention it for what it may be worth. The editor would be pleased to learn results, should anyone try it.



"I like the kind of fish you can neglect."

Chlorine

The winter season is when chlorine is most noticeable in city water systems. Although there is sometimes enough of it present to make a distinct odor as the water leaves the tap, the human system seems to suffer no ill effects from this extremely small amount. It is wonderful in its effects against bacteria and has tremendously reduced deaths, especially from typhoid.

On the other hand it is poison to fishes. It kills thousands of them through the use in aquaria of freshly drawn tap water.

One of the principal dangers about chlorine, as far as the aquarist is concerned, is the irregular amount of it in tap water. Health authorities use an extra dose when epidemics threaten.

Chlorine slowly leaves water which is exposed to the air. That is one reason why aquarium water is improved by standing at least a day before use.

The warmer the water, the faster the chlorine takes leave. Boiling removes it immediately. For practical purposes a very good plan is to draw the needed supply of very hot water from the spigot. By the time it has cooled next day there is no appreciable chlorine left and it is ready for the aquarium. Many aquarists constantly have on hand a supply of "ripening" water. Even though it is not intended for use for a week or a month, it is better to start with hot water. It not only expels chlorine quickly, but kills animal parasites which may be present.

One of the methods used by some of our municipal water works in partially removing chlorine from water before it is pumped into service pipes is to shoot it high into the air in an immense spray. With the wind blowing in the right direction the chlorine can be smelled at a fair distance.

part of your letter we wondered whether your fish was a large one, and it turns out that it is. The failure to completely close the mouth is a characteristic of many fishes after they get to be a good size. You can see it especially in Cichlids. We do not think you have anything to worry about.

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Ans. There are no fresh water Sea Horses. If you are going to keep them you had best use genuine ocean water. We do not know the composition of the water from Salt Lake, but since you live in Salt Lake City you might try it on Sea Horses, but of course it would have to be diluted to the proper strength, by hydrometer reading. It should be brought, by the addition of fresh water, to read 1.021.

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I have an aquarium containing a mixed collection of fishes, among which is a handsome large green Swordtail.

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Ans. We do not think your fish will get tired of this sport. While Swordtail males seldom actually strike other fishes, or tear their fins, they keep them worried and thin. This does not always happen with this species, but when you have an individual that does this sort of thing, you had better either place him by himself, or put him in an aquarium with some larger fishes that he cannot bully.

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From A. J. Haas, Mission, Texas.

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Ans. Congratulations on curing this very difficult disease. It is usually fatal. Perhaps the iodine did the business.

Gleanings

from the reports of the German Aquarium Societies in the "Wochenschrift," with comments by the translator,

F. H. STOYE

Hamburg—Zierfischboerse St. Pauli.

During the last meeting and auction friend Nilsson showed a Guppy male which had the shape and size of a Guppy female. This transformation does not seem to occur very frequently in Guppies. The particular fish had produced several broods of young while a female; today it has a fully developed gonopodium (anal fin converted into a male intromittent organ) and pursues the females in its tank very actively.

Comment—We have discussed sex changes on prior occasions and pointed out that they are no uncommon occurrence in live-bearers (THE AQUARIUM, Jan., 1935). They have been quite rare in *Lebistes reticulatus*, friend Guppy, although quite common in some strains of the Swordtail, *Xiphophorus hellerii*. I have seen a few Guppy males which apparently had been females and then changed their sex. These converted males can be recognized by their large size, deep body and almost complete lack of colors. The case of a female Mosquito Fish was brought to our attention some time ago which, although having developed an apparently perfect gonopodium, was heavy with young.

Frankfurt on Main—"Iris" Aquarium and Terrarium Society.

We would like to remind our members of a few basic rules: 1. Never place newly acquired fishes in a community aquarium or with other fishes until they have been in quarantine for a few days and kept under close observation during this period. 2. Always have a few simple remedies on hand (sea salt, potassium permanganate, etc.). 3. Keep one aquarium in readiness to receive sick fishes.

4. Watch your charges carefully; segregate any suspicious looking specimens at once. It is easier to prevent diseases than to cure them.

Comment—Excellent rules, all of them; known to every one but strictly observed by few. If rigidly adhered to, little, if any, trouble will be experienced in aquarium management.

The question whether crushed Enchytrae are a proper first food for the fry of the Black-banded Sunfish was again discussed. The member of the society "Vivarium," Breslau, had taken exception to and questioned the report of Mr. Boecher, who some time ago gave us a talk on his success in raising the Black-banded Sunfish, first on finely crushed and, later, chopped white worms. The members of "Vivarium" question the advisability of using this diet and claim that it presages failure, especially for a beginner. They point out that any uneaten particles will pollute the water and result in disaster to the entire brood. We wish to repeat again that our Mr. Boecher, who made the original report, *did* raise his Sunfishes on this diet most successfully. He used a 30-gallon tank, as he in his experience found that this Sunfish can not be raised successfully in a smaller aquarium. There is practically no danger from pollution, especially when one is patient at the beginning and feeds sparingly and slowly. Then most of the food will be taken before reaching the bottom.

Comment—I do not see any reason for questioning Mr. Boecher's report. Small quantities of this food fed at frequent intervals should be excellent. If finely crushed the small particles will

take from 10 to 20 minutes to reach the bottom of the aquarium and will, undoubtedly, be eaten by the fry during their descent. Crushed white worms are first-class food for the small fry of all carnivorous fishes and are always used by me with good success. Small crustaceans, fed in addition, will make a very wholesome diet for carnivores.

* * *

Stettin—"Wasserstern" Aquarium and Terrarium Society.

Several members complained about the poor results they had in breeding *Notobranchius rachovii* and *Aphyosemion arnoldi*. After spawning, the eggs were removed from the bottom (out of the sand) and transferred to small glasses which were suspended in the water of the breeding tank. The temperature ranged between 73 and 77 degrees; the water depth was 4 inches. The fry of *N. rachovii* emerged in about 8 weeks, that of *A. arnoldi* in about 6. The water used at first was tap water with a slight addition of sea water; later, river water was used. Of several broods, all except 2 young fishes were "belly-skippers," which died after a short time.

Comment—I have often been wondering just to what cause or causes the lack of success in breeding or raising certain species of African Killifishes should be ascribed. In many cases the embryos may be killed by tiny worms or other destructive forms of lower life; in others they may be killed or injured by the bad water conditions gradually resulting during their long period of development. In the instance cited it appears that the embryos were either weak from the start, due to lack of vigor in the parents, or they were weakened during the long larval period by lack of oxygen and other detrimental factors. "Belly-skippers," *i.e.*, young fishes with faulty or improperly developed swim-

ming bladders, also occur in live-bearers. They glide or skip over the bottom and can only rise with the greatest effort. A larger, shallow vessel in which the water is gently circulated and which contains pond or river water with an addition of 10 to 15% sea water might give better results.

* * *

Teschel-Bodenbach — Aquarium and Terrarium Society.

Friend Derbek reported that he acquired (by exchange) a collection of aquatic plants during our last meeting. Two days after planting them in one of his tanks, he found some of the fishes dead and others in a stupor. There were 16 Black and Red Swordtails. During the discussion the members expressed the opinion that the plants were not responsible for the death of the fishes. The majority seemed to believe that the sand, etc., contained harmful elements which were liberated while inserting the plants.

Comment—I do not agree with the majority opinion. To be sure, the plants themselves were not primarily responsible for the death of the fishes. But the conditions to which they were subjected apparently caused the trouble. We must first of all consider that this happened some time in November, when the days are very short and dark (more so in Germany). The aquarium in question probably contained barely sufficient oxygen to sustain the fishes. The introduction of additional plants, probably a fair number of them, resulted in such depletion of this vital gas that the fishes gradually suffocated. As I already indicated, the light must have been insufficient for the *growing* of the plants. They began to decompose with the results reported. Decomposing plants, under certain conditions, may kill the entire fish population of an aquarium within a few hours.

CORRESPONDENCE

Letters appearing here have already been answered personally. The ones selected for publication are those containing points of interest to readers.

We answer all letters on day of receipt, provided a stamped, self-addressed envelope is furnished.

From Rev. J. B. Godbout, Jeanerette, La.

About February last winter I wrote to you about a case of rare occurrence. A pool containing about 12,000 gallons of water was to be kept full with water coming from a large roof, recently covered with pure rolled copper. You obligingly answered my letter, and asked me to let you know about my experiment. The question was: What would it do to my fishes? The pool is well stocked with water plants: Anacharis, Cabomba, etc., and Water Lilies. The fishes are: Goldfishes, Golden Orfe, Chinese Carps, Mollies and *Gambusia affinis*. I let the water in very little at a time and watched carefully. After three months, I calculated that about two-thirds of the water in the pool was from my copper roof. And I kept on with that water all through the summer. I can tell you now, if not accurately, what it did to my fishes, at least what it did *not* do to them. It did not kill them. My fishes were more lively and with much better color than usual. In fact, it is the first summer I did not suffer some big loss. I did not find any dead in the whole season. My pool is seven years old, and I never disturbed the bottom, where a good layer of healthy mud has accumulated. The water has been perfectly clear all summer; better than before. This experiment might be useful, and I am glad to report it to you.

Ans. It is possible to place just the right amount of copper in water so that it discourages the growth of algae and certain objectionable organisms and at the same time it is not strong enough to injure the fishes. You have evidently

been fortunate enough to accidentally strike this happy medium. We always refrain from advising the use of copper as a germicide, because a slight overdose has fatal effects.

* * *

From Herman O. Hess, Uniontown, Pa.

It is difficult for me to arrange to heat my aquarium by electricity, and my only alternative is gas. If I have the room properly ventilated would this be injurious to the fish?

Ans. It is always better to have the resulting gases from burning natural gas carried out of the room if possible, but a great many people live in the same room with gas logs, etc., where very little of the fumes are carried away. The principal product of combustion is carbon dioxide, which is also the principal product of breathing. By having the gas flame burning in a room, is about the same thing as having a lot of people in the room. It doesn't necessarily kill anybody very soon, but it is not the best thing in the world.

* * *

From Mrs. G. Barber, Vancouver, Canada.

Could you tell me what is the matter with one of my Scalares? He always has his mouth open, and apparently cannot close it. This does not seem to inconvenience him in any way; he acts as though nothing wrong has happened, and I am wondering if he is really sick. By the way, he is my biggest one, being 6 or 7 inches across. I would appreciate information concerning this trouble, if any.

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