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THE AQUARIUM BULLETIN

SEPTEMBER 1917

FIVE CENTS



CENTRAL MUSEUM (See page 21)

ANNUAL NUMBER

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Hints on the Study of Fishes

By DR. R. W. SHUFELDT, C.M.Z.S.

Washington, D. C.

Apart from studying fishes in their natural habitats, and learning all we can about them in nature—the importance of which no one will for a moment doubt—there still remain not a few other lines along which fish should be subjects for research work. For example, we may study food fishes from their economic standpoint; we many consider them as objects frequently employed for portrayal in

If my memory serves me aright, he once published an article on the study of the fishes of one of our eastern markets. Such a theme has a great deal to recommend it; not only may the strictly scientific and technical side of descriptive ichthyology be thus entered upon, but likewise the popular and economic ones; habitats of food fishes may also be more or less thoroughly studied in this way.

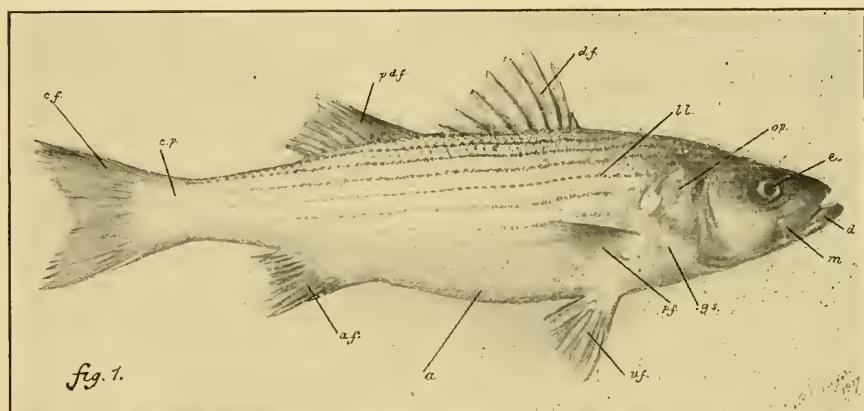


Fig. 1. Right lateral view of a market specimen of the Striped Bass (*Roccus lineatus*), with fins elevated. Photographed by the author, and much reduced. *d.*, dentary of lower jaw (inferior maxilla); *c.*, eye; *op.*, operculum; *m.*, maxillary; *g. s.*, gill-slit; *l. l.*, lateral line; *p. f.*, pectoral fin; *v. f.*, ventral fin; *d. f.*, dorsal fin; *a. f.*, anal fin; *c. p.*, caudal peduncle; *c. f.*, caudal fin.

the fine arts, including photography; they may be investigated with respect to their comparative morphology and ecology, and so on. What I have to say here about the study of fishes, however, combines a little here and a little there, and touches all of these methods.

Many years ago, when I was attached to the Smithsonian Institution as Associate in Zoology, and when Prof. Spencer F. Baird was the then Secretary, I remember very well the importance he attached to what might be termed every-day science.

In pursuing such a line of work, one may commence with any common fish one finds displayed for sale on the stands, as for example the Striped Bass here shown in Figure 1. This is the *Roccus lineatus* of science, a very abundant and well-known form. A specimen fifteen inches long is large enough for the purpose in view, and in selecting it one must be sure to choose as perfect a one as possible, with respect to all of its external characters and parts. We next make a photograph of this fish, being careful to obtain a direct lateral view, and

having first extended all the fin rays as shown in Figure 1. One of these photographs should be paged in our "Fish note-book," in the place where the history of the striped bass is to be entered. This account should first set forth where the specimen was purchased and where it was taken. Inquiry should be made as to its abundance and range, as well as to its *relative* value as a food fish. Mention may be made of the other kinds of fish to be found in the market when this bass was purchased, espec-

may note its form, weight, and proportions, and to what extent any of these may vary one way or another. Sexual variation must likewise be commented upon, and record must be made of what is known of its breeding habits and young. Following this should appear the *coloration* of the specimen, given in systematic detail, with markings and any peculiar appendages.

We now commence at the cephalic or head end of the fish, and mention any peculiarities of the "mouth-



Fig. 2. Left lateral view of the complete skull of a Red Hind (*Epinephelus ascensionis*) : reduced. Photograph by the author of a specimen in his private collection, N. Y. Aquarium specimen.

ially whether they were taken at the same time and on the same fishing grounds, or otherwise. Brief notes upon its natural history may next be entered; these may either form personal observation; taken from authoritative text-books, or gathered from the fishermen—from such of them as are good observers, and *truthful* as to statement of fact. A few lines may be devoted to the place of this bass in the system, or its classification, naming at the same time some of its allies or near congeners. Next, we

parts," such as may be exhibited on the part of the *dentary* (*d*) or *maxillary* (*m*), following the account with similar ones on the eye (*e*), the *operculum* (*op*), and the *gill-slit* (*g. s.*). The form of the *abdomen* (*a*) should also be noted, as it varies in many species of fishes.

All the *fins* of the various kinds of fishes all over the world vary in many particulars, in the most remarkable manner, with respect to their number, their form, their modification, their color, the number of rays and spines

composing them, and so on. In the fish shown in Figure 1, their number and arrangement may be said to be typical of the average teleostian or bony fish.

With respect to describing them for our note-book, the details under all of the above named heads should be entered. First note that the fins may be of two kinds, namely the vertical or unpaired ones, as the dorsal fin (*d. f.*), the post dorsal fin (*pd. f.*), the caudal fin (*c. f.*), sup-

ray, as in *a. f.*, and branched ray, as in *v. f.*; the last two are "soft rays." Sometimes the ventral fins are united, as we find them in fishes of the genus *Gobius*. In the Catfishes, the spine of either pectoral fin may be locked at will, standing straight out from the side; there is a poison gland connected with it in some species of this family, so that a painful and troublesome wound may be inflicted by the form so armed.

There is an enormous variation in

fig. 3.

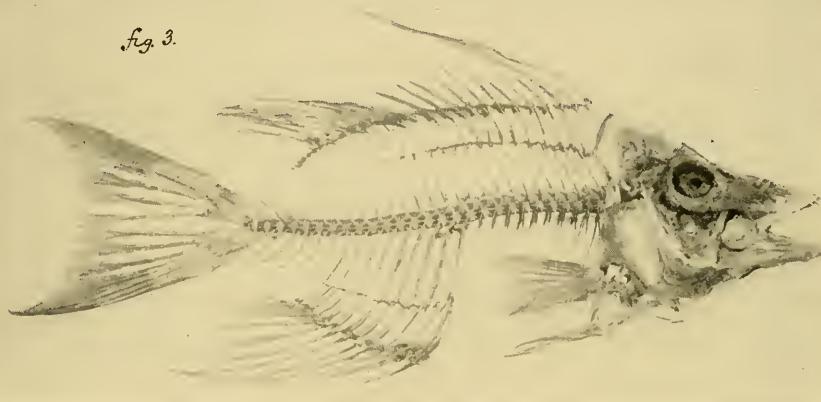


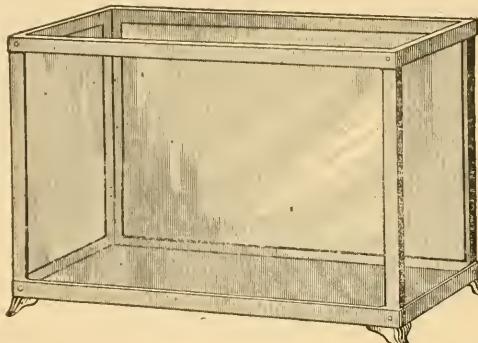
Fig. 3. Right lateral view of the complete skeleton of the Hogfish or Capitaine (*Lachnolairus maximus*); reduced. Photographed by the author; the specimen prepared by him at the New York Aquarium and now in his private collection. Bermuda. Weight 12 lbs.

ported by the caudal peduncle (*c. p.*), and the anal fin (*a. f.*). On the other hand the paired fins are the pectoral fins (*p. f.*), and the ventral one (*v. f.*)

Observe that the vertical fins are arranged somewhere in the median longitudinal plane of the body, while the lateral fins are commonly placed as shown in Figure 1. Particular attention must be paid to the nature of the rays composing the fins; these are generally considered to be of four kinds, as the simple ray, the spine (Fig. 1., *d. f.*); the simple articulated

the scales of fishes, or of those in such species as have scales; they not only vary in the different kinds of fish, but they vary all over the body of the same individual. As a rule, they are divided into two kinds, namely the *cycloid scales* and the *ctenoid scales*. Recently, Prof. T. D. C. Cockerell, of the University of Colorado, has written several extensive papers on this subject, and has pointed out the value of a detailed knowledge of fish-scales, with respect to their use in classification.

(To be continued.)



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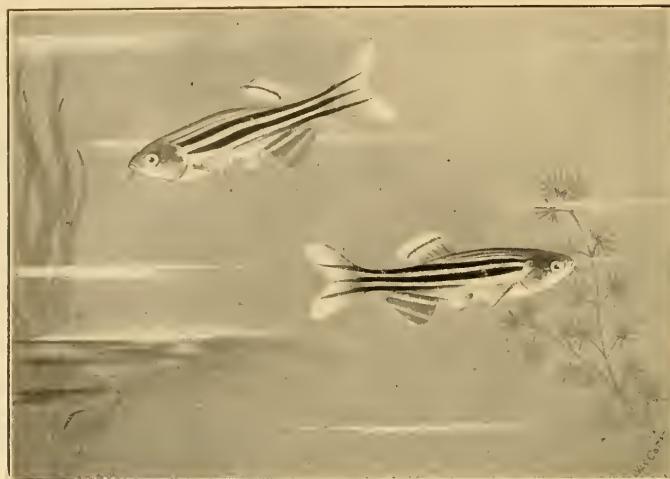
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VAN COTT



Danio Rerio

By H. A. VAN COTT.

(Illustration from wash drawing from life by author.)

From far away southeastern Asia the very attractive little *Danio Rerio* has been carried to us. This small exotic fish is one of the most beautiful we have in our aquariums to day. Graceful and tireless swimmers, never do we find them at rest, except for a few short moments at a time, and then they are flitting away, back and forth, up and down the tank, the light flashing their colors and strong markings.

In size, they rarely exceed one and one-half inches; this diminutiveness is however more than compensated by their strongly marked, brilliant colors, and ceaseless activity. A word description, like the accompanying illustration, falls far short of conveying to the mind the beauty and attractiveness of this little fish.

The ground color is a pearly-white, blending into a light yellowish-green on the back. Brilliant metallic peacock-blue horizontal bars run from the gill-covers and extend on through the anal and caudal fins. Between the deep blue bars a tint of soft crimson

is noted. The pectoral fins are transparent and quite broad in proportion to the fish and are one of the principle means of its rapid motion through the water. The dorsal fin is also transparent with a faint bluish bar following the outline, especially in old specimens. The anal and caudal are both transparent, but distinctly barred with the horizontal bars of blue. The ventral fins are clear and show no markings.

On the mandible, two short hair-like barbules may be seen when closely examined. The eye-pupil is jet black, surrounded by a circle of faint, but brilliant gold.

This fish is found to be remarkably hardy, withstanding a temperature of 45 degrees Fahrenheit and apparently contented in an unclean tank, but they show much better color and are far more active when in a thickly planted balanced tank with old clear water and maintained at a temperature of not less than 70 degrees Fahrenheit.

One of the most beautiful

aquariums as well as the most interesting I have ever seen, was a five-gallon tank nicely planted, and with crystal clear water containing twenty-five *Danio Rerio*. The little fish darting back and forth, displaying their colors and graceful swimming, was indeed a wonderful sight.

The sex of the *Danio* is somewhat difficult to distinguish out of the breeding season. In the Spring, when the roe is forming in the female it is comparatively easy to determine. The female at this period is always much fuller in appearance than the male and as the spawning period approaches, this difference becomes still more marked, accompanied by ceaseless racing up and down the tank; first the male chasing the female and then the reverse.

The *Danio* is not a difficult fish to breed or raise if the proper precautions are taken to protect the eggs, and sufficient food supplied for the fry. The adult fish have the discouraging habit of devouring their eggs as soon as spawned, and the young as soon as they begin to swim around.

For spawning this fish it is well to select a tank about sixteen inches long, eight inches wide and six inches high. Place three tiers of half-inch pebbles on the bottom anchoring several sprays of *Cabomba* or *Myriophyllum* in the pebbles and adding about four inches of old clear water taken from a tank that has a heavy growth of algea. The tank is placed in a position so that it will receive all the direct sunlight possible for at least two weeks; this will promote the growth of algea and infusoria.

The tank is then removed to a position where it will receive only a rea-

sonable amount of sun. A temperature of 70 degrees is then maintained. Under these conditions I have known them to spawn within two days, while at other times, and under like conditions, I have watched a pair that I expected to spawn at once, for over two months before I could see a sign of an egg.

When the eggs are discharged by the female and fertilized by the male, they do not adhere to the plants or the sides of the tank, but at once sink down between the pebbles and are thus protected from the parent fish. If the eggs cannot be seen, one may know the spawning has occurred by the appearance of the female. She will have lost the fullness of body and will again be difficult to distinguish from the male. As soon as the eggs have been dropped the pair should be removed at once to another tank, otherwise they will devour the young as soon as they begin to hatch.

At the above temperature the eggs will hatch in about seventy-two hours. The young fish first appear like threads on the sides of the tank and on the white pebbles. About twenty-four hours after hatching the young will be swimming freely with the same characteristic movements of the parents. If sufficient infusoria is present they will grow very rapidly and in ten days will begin to take the smallest *Daphnia* and then grow by leaps and bounds.

Under ideal conditions—temperature and an abundance of live food—the *Danio* will reach full size faster than any other aquarium fish.

This fish can be especially recommended to beginners and no collection is complete without a few *Danio Rerio*.

Pterophyllum Scalare

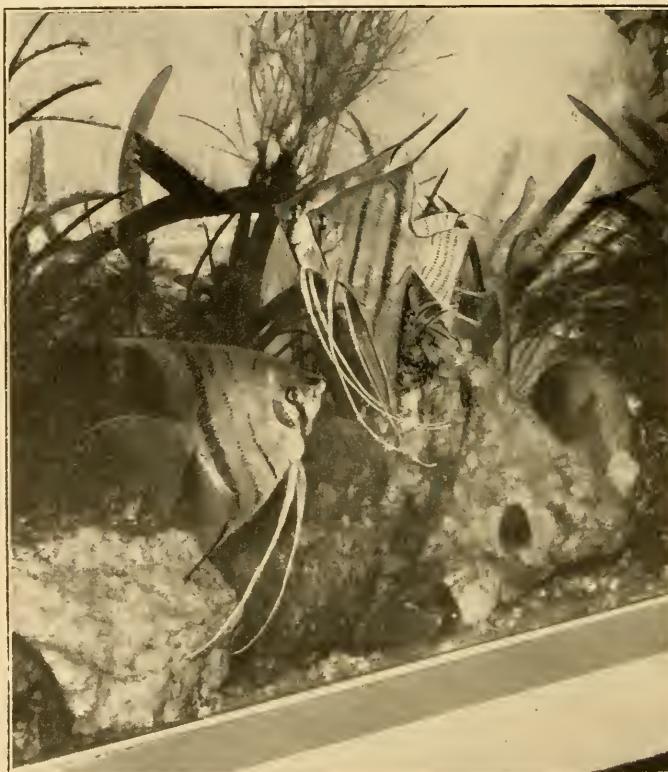
BY JOSEPH FROELICH

(The following article is based on actual observations of the writer as well as the experiences of several European fanciers.)

"Pterophyllum Scalare," what a magic word for the fish fancier. Who has not seen or heard of this most beautiful of all aquarium fishes. Aristocratic, proud and elegant are their movements, not wild like their nearest relations, such as the Chan-

Originally exported to Europe from South America in 1911, they were first exhibited in this country at the second annual exhibition of the Brooklyn Aquarium Society in 1913, being imported by members of this Society. It need not be said that they created quite a sensation at the time.

The Scalare is a native of Brazil



chito, Heros Spurios and other cichlides. Its general behavior is courteous towards its colleagues, no vicious biting, no severing of plants, no nagging. *Pterophyllum Scalare* swim slowly and in a dignified manner about the tank, associate among themselves and ignore all other inmates of the aquarium.

and is found in a tributary of the Amazon river about 900 miles above its mouth. Contrary to the general belief these fishes are easy to keep; they are hardy and require little attention. They are not at all sensitive to gradual variations in temperature, lack of proper feeding, diseases, etc., and are easily shipped or trans-

ported. Without doubt, the most *exacting and particular* fanciers and breeders will consider the Scalare as the peer of all aquarium fishes that have ever been introduced. They are known to attain a size of 10 inches from tip of dorsal to tip of ventral fin and a body and tail length of $5\frac{1}{2}$ and $2\frac{1}{2}$ inches respectively. The Scalare in general is so beautiful and attractive that even the most disinterested layman must stand and gaze at it.

The writer has successfully kept

temperature of at least 85 degrees is required.

The Scalare is a "nighthawk," that is it prefers to swim about during the early part of the evening. During the day they hide in one of the rear corners of the aquarium, the edge of the tail pointed towards the front; it is very difficult to locate them at times for this reason. Very interesting indeed is the resting or sleeping position,—the eyes turned downward, the body resting on the bottom or on plants by the pectoral fins which



specimens in his aquarium for over two years. As the Amazon River lies near the equator the Scalare is naturally a tropical fish requiring warm temperatures, but it has done very well in temperatures as low as 62 degrees Fah. although it is advisable to keep them at about 75 degrees; the coloring will then be at its best. For breeding purposes a

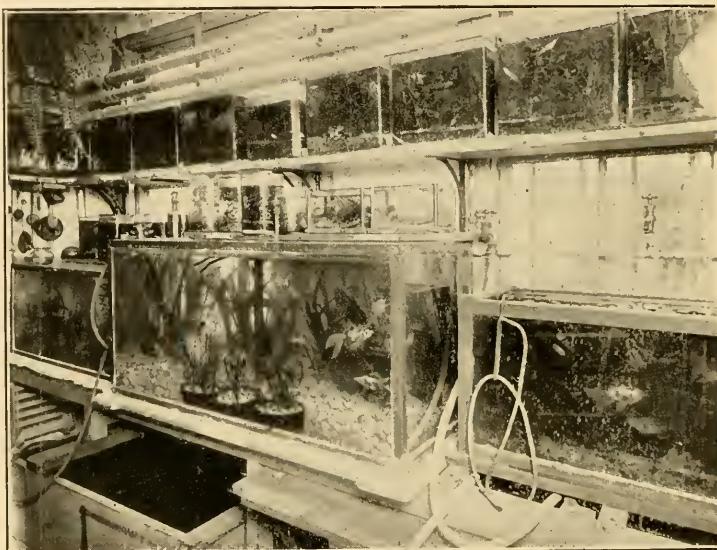
assume a position similar to the rockers of a chair. This occurs in the latter part of the night or early morning hours. By artificial light at night they swim about and chase each other in graceful movements, at first with the head upright, then in a downward directions, then with the body almost horizontal. In fact, it is a continuous procession, up and down, back

and forth at the front of the aquarium.

The best food for these fishes is large daphnia, mosquito larvae, all kinds of bugs and water insects, earthworms and enchytraen. The Scalare does not like to pick food off the bottom of the aquarium unless very hungry; they prefer to get it while it is dropping, floating or swimming around. They are on very rare occasions inclined to fight and sometimes fly around the tank at a ferocious speed ending up with a fierce impact against the sides or

more darkly colored than in the female. Eyes mostly a deep red color, but on some specimens pale red or yellow. The threadlike extensions to the upper and lower ends of the tail are considerably longer, but very readily damaged as they are delicate and easily buckled. The front edge of the feelers of the young males are bordered in red, have stronger and sharper serrations than those of the female. The forehead, especially in the old fishes is arched considerably.

The female fish has transverse bands

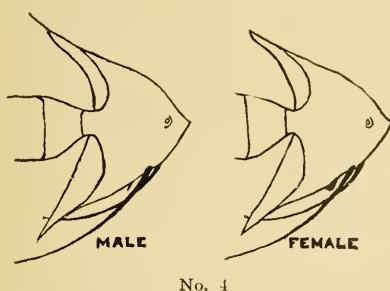


covering of the aquarium. But this happens very seldom and they do not injure themselves as a rule.

The male fish is more pale in color with less distinct transverse black stripes, but the stripe passing through the head is a deep black. Dorsal fins are narrow, run out to a more acute point than those of the female. These fins, especially in the young fishes, are bordered in a gleaming red color, so are also the long drawnout ventral fins. The extensions, often very long, (mostly in older fishes) branch out at ends of dorsal and ventral fins and are

of a deep velvety black color, breast an iridescent green, abdomen a lighter color. Dorsal fin extends broadly, in older fishes up to one inch wide and also of the same deep black marking. Feelers much shorter than those of the male. Abdomen broad and full, with a greater distance between the ventral and pectoral fins. Generally speaking the female is much more beautifully colored than the male, a rare occurrence in fish.

These distinguishing features cannot always be depended upon. The very changeable coloring, the more or



less massive fin formations, the length and breadth of the fins and threadlike extensions of the pectoral and caudal fins, as well as the branching out of the fin ends are frequently very unreliable methods of distinguishing the difference of sex.

A far safer way to tell the sexes is by the following method illustrated in Cut No. 4. During breeding time the female fish shows a more or less visible short, thick, funnel shaped egg-laying tube whereas the male fish shows a somewhat longer but very thin, sharp sexual organ. These are shown very much exaggerated in the drawing (they are very little more than $1/32''$ long) and are located just to the rear of the feelers.

The expert aquarist with a skillful eye and good lighting facilities can usually detect these sex differences while the fish are in their tank, but it may be necessary to place them in a suitable observation tank. This may be a small clear glass tank. Should the fishes when placed in this observation tank appear frightened and excited, it may not be possible to make correct observations at once; they should be allowed a little time so they can settle themselves in these temporary quarters.

As we have now become pretty well acquainted with the sexes, habits, etc., of our friends, the Scalares, a little study of their spawning methods is

in order. In order to induce them to spawn, nature will have to be imitated as nearly as possible. A very large tank is necessary, holding at least 30 gallons of water. Never put the Scalare into fresh water as it will harm them considerably, often causing death. Tank should contain old, green water and should be densely planted along the sides and rear with *Vallisneria Spiralis* or *Sagittaria*, the former preferred. The bottom of the tank in front of the plants should be laid with coarse sand or fine gravel on which may be sprinkled a few pebbles and small stones.

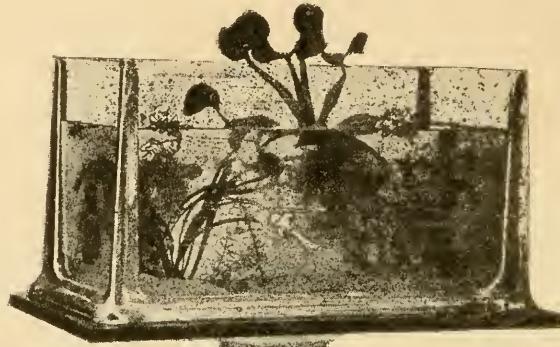
Now that the breeding tank has been properly prepared and planted, the fishes may be placed therein. Of course one must be sure to have selected a pair and also let it be understood that it requires an immense amount of patience and perhaps months of waiting to bring about the desired result.

Both fish commence by first carefully cleaning off the leaves of the *Sagittaria* or other plant upon which are then laid the eggs of the female. During this time the male fish swims around the female with fins erect and fertilizes the eggs. Both fishes then take turns in fanning the water around the eggs with their pectoral fins, this is to keep a constant supply of fresh water circulating about them. This is kept up for about 4 days when the eggs begin to hatch and the young fry make their appearance, clinging to the plants.

The male fish now proceeds to dig a pit about 8 inches in diameter in the sand at the bottom of the tank. The young fry are then removed from the plants by both parent fish and placed into this pit. As they cannot yet
(Continued Col. 2, Page 17.)

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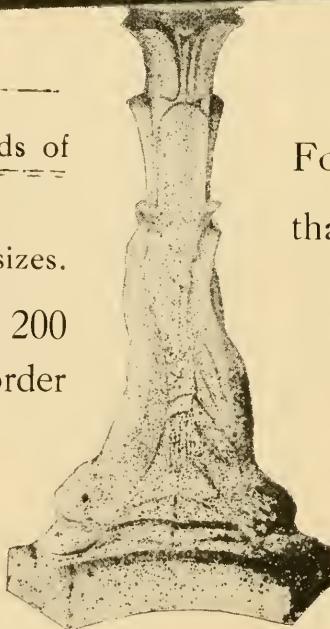


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Collecting Fish Under Difficulties

BY HERMAN RABENAU

(Mr. Rabenau recently made his second excursion in the interest of The Brooklyn Aquarium Society, Inc., for the collection of Southern Wild-fish to be used in the scientific study of the Society.)

Once a man gets the "Aquarium Fever" he generally lets his enthusiasm carry him further than he originally intended and, at times, unpleasant experiences result.

Having made one very successful trip in the interest of The Brooklyn Aquarium Society, Inc., for the collection of specimens of wildfish from Southern waters, for their use in scientific study and exhibitions, I was naturally elated to receive another assignment. I concluded to go in the cool Spring and to take in North Carolina.

Because of the concentration of varied geographical conditions at the upper headwaters of the different streams, and the consequent variety in species, I decided to make a round trip that would embrace as much territory as possible.

Going first to the upper branches of the Santee River in North Carolina, I found mostly sandy river beds. These branches are fed by cool springs; after each rain, however, the water is yellow from clay sediment with which the country is overlaid, the rocky formation being from four to ten feet beneath.

Following up a branch of the Santee River, the Catawba, great changes were found, new bridges having replaced those washed away by floods. The smaller tributaries, however, contrary to expectation, were clear and shallow.

Inquiring of a small boy if there were minnows in the brook, I was told that the druggist was selling them at

ten cents each but I was disappointed to find that the fish were common goldfish, *carassius auratus*. However the druggist, a Mr. Davis, proved of great assistance by granting me storage space for my paraphernalia.

During the next few days I became acquainted with the nearby brooks but found specimens scarce, most of the fish having been swept away during the floods.

As warmer weather approached, however, specimens became slightly more plentiful and I filled one can with them and expressed it to Brooklyn, preserving in alcohol one of each class.

Never having seen a person collecting fish in this manner before, the natives viewed me with astonishment and apprehension and finally verified my statements by communicating with the New York authorities. My next blow was advices that my fish had died enroute to New York, the reason for which later proved to be the unsuspected presence of wood alcohol, instead of grain alcohol, in the coating of the can used.

Next going beyond Asheville, N. C., to a point some 6000 feet above sea-level, I learned of an aquarist, a Dr. Von Rok, a philanthropist who maintains a beautiful conservatory with pools, aquatic plants and goldfish. In this territory I found only Blacknosed Dace and a variety of Sculpins, *Cattus ictalops*.

I next left for Shausville where I had collected on my previous trip. I was here received by a Mr. Taylor who lent me every aid. In this vicinity were small ditches inhabited by minnows from shoals of which I

collected fine, hardy specimens of *Crosmus oreas* and *Notropis cerasinus*. The water, which found its source in a small spring, was nearly still. The following day I took a wagon with my cans and a helper and in two hours had the cans, each 20 inches in diameter, filled with some 500 selected specimens.

My elation was short-lived, however, for a game warden, to whom complaint had been made, approached and I was placed under arrest for game fishing without a license. My documents, proving that my efforts were strictly for scientific purposes, were disregarded and a local Justice of the Peace fined me \$70. Not having this sum at the moment, I was placed in confinement, being taken ten miles by automobile to the county seat. Strange to say, these good-hearted people did not add a charge for this unsolicited ride.

The following day I was visited by more county officials who pleasantly informed me that the Justice had erred in his fine and that it had been increased to \$200 instead. It now dawned upon me that my cans, etc., had excited more than ordinary attention and that I was suspected of being an anarchist or worse.

After paying my fine under protest, I wired to Dr. Smith of Washington, D. C., Commissioner of Fishes and President of the Washington Aquarium Society, who courteously intervened in my favor.

The protest against the fine and confiscation will be appealed and decided in a few months and, as the District Attorney doubts the legality of the action taken, there is every probability of a proper refund being made.

Anxious about my specimens, I

hurried to the railway station and found they had received no care, the water being black and only some twelve fishes still living.

My next stop was at Washington where I visited the Aquarium and left bottled specimens for classification, which was made as follows:

Minnows: *Hybopsis kentuckiensis*, *Rhinichthys atronasus*, *Notropis ombriabilis ardens*, *N. cerasinus*, *N. hudsonius*, *N. macdonaldi*, *N. procne*, *N. pyrrhomelas*, *N. chalybaeus*, *Chrosomus areas*, *Leuciscus randoisulus* and an unknown specimen.

Suckers: *Catostomus commersonii*.

Darters: *Etheostoma flabellare*, *E. thalassinum* and three unknown specimens.

Sculpins: *Cottus ictalops*.

Madtoms: *Schilbeodes insignis*.

Note: Owing to these conditions it was impossible to procure any photographs as was planned.—Ed.

PTEROHYLLUM SCALARE

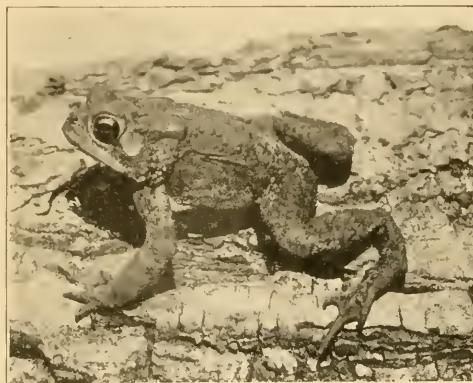
(Continued from Page 13)

swim, they are carefully watched by the parent fish so they cannot go astray or be attacked by some enemy. After seven days they are able to swim about, but return to the pit the first night and huddle together in a lump.

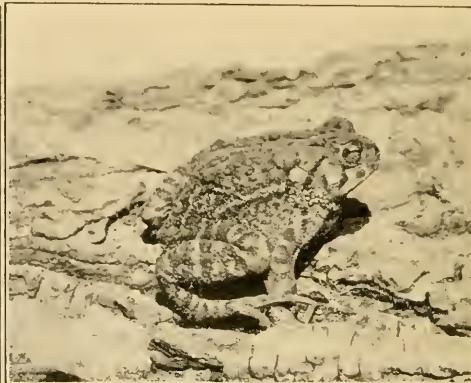
The baby fishes look much like young Helleri; in about two weeks they have the appearance of an Ambassis Lala, in four weeks more it is first noticed that they commence to resemble their parents. In a further five weeks they attain the full shape of the parent fish. Pterophyllum Scalare grow rapidly and are of good size when eight months old.

Frogs and Toads in a Terrarium

By RICHARD DECKERT
of the N. Y. Zoological Society



Common Toad (*Bufo americanus*) *



Fowler's Toad (*Bufo fowleri*) *

Having treated at length of the Newts and Salamanders, we now come to the other order of the Amphibians, the Salientia or "Jumpers," from the universal habits of most of its members. This of course means the Frogs, Toads and Tree-toads.

Of the toads, the Fowler's toad, *Bufo fowleri*, is the only representative on Long Island, but on the mainland, in Westchester County and New Jersey, another species is found beside this. This is *Bufo americanus* the "Common Toad." Both species are numerous wherever they occur. The American toad is the first to appear in Spring, and his long trilled whistle can be heard in late March and throughout April well into May. The Fowler's Toad arrives at the ponds somewhat later—usually the first week in May, and both species can be heard together for a short time.

The song of the Fowler's Toad is much shorter, and more harsh in quality—a high note combined with a low drone, lasting about 3 to 5

seconds. In appearance the males of both species look very much alike, and it is hard for the novice to tell them apart. The females of the Fowler's Toad are smoother and never attain the size of those of *B. americanus*. The largest Fowler's Toads I have seen came from Massachusetts, and measured $3\frac{3}{4}$ inches from snout to vent, while some giant female American toads from Sullivan Co., N. Y. measured 5 inches the same way—which is quite a respectable size for a toad. These large mountain toads were covered with prominent spiny tubercles all over, and their color was a rich sepia brown, with sooty black spots. The crests on the head, the parotoid glands and some large warts on the back, sides and calf of the leg were brilliant brick red. This rich coloring as well as the rough skin gave these toads the appearance as if they had been carved and burnt out of wood. Of both species, the American toad is the better suited for captivity, as it is not so wild as the Fowler's—it

will soon calm down and become accustomed to its terrarium, and some specimens I have had became so tame that they took worms, beetles and grasshoppers from my hand. Their gentleness, bright, alert manner and readiness to take food whenever offered, makes them most interesting pets. The Fowler's Toad will usually try very hard to escape, upon first being caught—and will work unceasingly, seeking an exit to its prison.

The males are more persistent in their efforts than the females, and will often injure themselves during their frantic struggles. Of all lowly creatures, the toads are the most useful, and it has been ascertained that they destroy countless numbers of injurious insects. I have fed 120 potato bugs to one large American toad—the toad voiding the contents of its stomach several times only partly digested as a result of this continuous meal, but without abatement of its appetite. I have seen several Fowler's Toads near a garbage pile, sitting in a half circle around a bone, licking up the flies as fast as they alighted. In our garden I have watched one of an evening, stalking a slow moving slug—finally gobbling him down before he reached the lettuce bed. At night they come toward the screen doors through which the light shines—and where the harvest of mosquitoes, beetles and moths is particularly rich.

Many people do not like toads on account of their supposed ugliness. I cannot for the world of me, see anything ugly in a toad—in fact they remind me very much of little bulldogs with their beautiful bright golden eyes, short pug-face, stout body and strong muscular limbs.

Their usual pose when active is a bold upright position, which enhances

the similarity with a dog squatting on its haunches. The tongue is fastened in front of the mouth and is snapped out with lightning rapidity at anything which looks like food for the toad. Sometimes a beetle with a strong acrid smell, such as a bombardier beetle or other ground beetle is eaten, but immediately disgorged, and it is well that this happens, as all these beetles are useful, either as scavengers or as hunters of caterpillars, and other soft bodied insect pests. The toad looks ludicrous, as he tries to wipe the bad taste from his mouth; often shutting his eyes and making other signs of discomfort and disgust.

*Photos by E. R. Sanborn, N. Y. Zoological Park.

Line Breeding

By C. E. VISEL

Line breeding may be an experiment to the aquarist, but is an established fact well known and regularly practiced in connection with live stock, birds, etc., and just so, it is that fish fanciers will not line breed to merely produce "just fish," but if they are going to stay in the game, they must produce specimens worthy of consideration.

Most fanciers in their early days seem to think that they stand no chance of breeding prize-winners, because they are not able to spend fabulous sums to purchase the style bred stock which may have won ribbons, certificates, etc., but we have knowledge of two breeders today who own prize-winning stock, the parents of which cost less than \$2.00 each.

We prefer to believe that this was not an accident, but the result of careful study in line breeding. The



A Young "Line Bred" Fish—By C. E. Visel

fancier who understands line breeding, knows exactly what blood he is introducing, and of the results he will obtain, and it is not a haphazard proposition.

The first essential is to procure fish, the parentage of which is known, or if this is not possible, one must establish his own particular type of stock. If he starts with a single pair, see that the roe is as nearly perfect in

shape, etc., as may be possible, and rely on the bucks for coloration. The original pair should not be related, and if one is able to use two or more pairs, so much the better.

All sentiment must be cast aside, and every young fish which does not show the desired results should be disposed of immediately, to avoid breeding of imperfections, coloring, etc. For instance, if a certain type of



"Miss America"—A Perfect Production of Line Breeding

young fish are subject to bladder trouble, they should be disposed of, as not a single fish of this particular breeding should be retained—otherwise there will be a strong tendency to create a line of fish subject to this ailment.

No one should buy a fish simply because it has won some particular prize, because by the introduction of this fish to the tanks, he may introduce a strain which will entirely destroy the previous efforts.

Nor should one try to procure all results at a single time—one point at a time will give far better satisfaction, and assure success, than otherwise.

To successfully follow line-breeding, the fish must be separated into different tanks—every tank of which should be numbered. Thus your written record will show you that fish in tank No. 1 were crossed with No. 2—the offspring being No. 3 and No. 4—etc.

Invariably the breeder will select strong, hardy stock, as no weaklings are wanted in this important procedure—and bear in mind that the buck will produce the coloration required, while the roe will throw the type or shapes required.

(To be continued)

NEWARK'S ANNUAL EXHIBITION

The Essex County Aquarium Society of Newark, N. J., will hold its second Annual Exhibition for gold and tropical fish fanciers at the Newark Public Library, from September 13th to 16th, inclusive. The exhibition is to be competitive and besides the usual ribbon prizes, five loving cups will be awarded.

Detailed information and entry blanks will be forwarded to anyone who wishes same by writing to the secretary of the exhibition committee.

The officers of the Committee are: Chairman, Mr. F. Hoernig; Treasurer, Dr. Bachman; Secretary, H. I. Hartshorn, 12 Myrtle Avenue, Newark, N. J.

THE ANNUAL EXHIBITION

All preparations are now practically complete for the Brooklyn Aquarium Society's Sixth Annual Exhibition to be held from Thursday to Sunday, September 20th to 23rd inclusive, in the Central Museum of the Brooklyn Institute of Arts and Sciences, Eastern Parkway at Washington Ave., Brooklyn, N. Y.

This is an event of importance to all fish fanciers and a record breaking attendance is expected. Although goldfish spawn started poorly in the Spring, this year turned out to be a banner one for the breeders and many beautiful specimens have been raised and will be exhibited. Many new names will also be noted in the list of exhibitors. Competition will be unusually keen and fanciers in this section will await with interest the decisions of the judges.

As the tropical fish breeders have been just as successful as their goldfish brothers, visitors will be assured of seeing as complete a collection of those fish as was ever shown. Among them will be the brightly colored rainbow fish, the ruby moon fish and the Mexican sword-tail fish all of which bear their young alive; the interesting nest builders, the curious mouth breeders, the fighting fish and many other curious, interesting and attractive fishes will vie with each other to attract the visitors' attention.

This exhibition is an annual event of the Brooklyn Aquarium Society and all fish fanciers, whether members of the Society or not, are invited to exhibit. Owners of well balanced aquaria are especially invited to show them.

The exhibition will be open to the public from 9 A. M. to 6 P. M. on Thursday, Friday and Saturday, from 2 to 6 P. M. on Sunday and from 7.30 to 9.45 Thursday evening. No admission fee will be charged and the public is cordially invited to attend and become acquainted with the many forms of aquatic life on view.

Through the kindness of the Department of Parks of Brooklyn, the exhibition room will be profusely decorated with palms, ferns and a variety of other decorative plants for which that Department is noted. In addition to this, a gorgeous display of water lilies of many colors in full bloom will delight the eye of the visitor.

A special invitation is extended to the members of the Society to attend the exhibition on Thursday evening and help celebrate Society Night. A number of our members are unable to attend our meetings regularly, through one cause or another, but all seem to make a special effort to attend Society Night and, if past performances count for anything, a rousing good time may be expected. Attendance on Thursday evening is not, however, limited to members of the Society. Anyone who is interested in aquatic life and who would like to become a member of the Society is advised to make his presence known that evening and become acquainted with the leading fanciers and with the Society. MOTION PICTURES OF AQUATIC LIFE WILL BE SHOWN AT EACH SESSION, EXCEPTING SUNDAY.

Any further information concerning the exhibition may be obtained from C. H. Chapin, Secretary, 479a Quincy Street, Brooklyn, N. Y.

The**Brooklyn Aquarium Society, Inc.**

Franklin Avenue at Hancock Street
(Brooklyn Public Library)

Meetings Every Month
(except July and August)

Second Tuesday, Business, etc.

Fourth Tuesday, Exhibitions of Fish,
Lectures, etc.

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Subscription 50c. Single copies 5 cents.

Vol. 4 September 1917 No. I

This is our birthday, thank you; we are four
years old, young, but full of ambition and learning
more and more your desires and dislikes.

We have lighted the candles—one, two, three,
four—and while enjoying our party, we feel
kindly toward our fellow fanciers who have with
their kindly thoughts, words and deeds, made it
possible for us to offer you this number as our
mark of appreciation, which we hope you will
enjoy as much as it has been our pleasure to
prepare.

However it is but a beginning, and another
year hence we hope and fully expect to give you
something that will far surpass this humble
offering.

We pride ourselves on being on time each
month, a resolve we made long ago, but which
we are going to break for one month—our October
1917 number. Why? Because our Annual
Exhibition will be held the latter part of this
month, as announced elsewhere in these columns,
and we want to tell you the story in detail.
Therefore the October issue will not be published
until October 15th.

Little four-year old children must retire early,
friends, and we ask you to excuse us, therefore,
from the party, that we may be bright and fresh
when we appear before you in October, on the
fifteenth.

OFFICIAL SOCIETY NOTICE**Meeting of September 11, 1917**

Tuesday Evening, September 11th, will
see the first gathering for the Fall at the
new room in the Brooklyn Public Library,
Franklin Avenue at Hancock Street.

Come and make this an "Old Timers
Night."

Mr. Theo. P. Fritz and others of the
first members will read an interesting
paper telling of the early days of the
Society.

The coming SIXTH ANNUAL EXHIBITION is looming large and bright
on the horizon as will be evidenced by
the report of the Annual Exhibit Committee.
The Committee will also distribute invitation cards that should be
mailed to your friends.

Members are requested to fill out and
mail as directed at an early moment
ENTRY BLANKS sent out together with
The Bulletin.

The Annual Exhibit Committee is
anxious to hear from members who
desire to make donations to be put up
as special articles. Communicate with
Mr. Scott, Chairman, 10th Street,
Brooklyn, N. Y.

At this business meeting, September
11th, the Monthly Exhibit Committee
will welcome suggestions for the pro-
gram for the remainder of 1917.

Don't forget about the outing to the
larger of the Rockland Lakes, Sunday,
Sept. 9th. Meet at West Shore Ferry,
foot of Cortlandt Street, in time to catch
the 10.30 A. M. Boat. Excursion fare
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**PHILADELPHIA FREE
ANNUAL EXHIBITION**

The Annual Free Exhibition of the Philadelphia
Societies will be held in Horticultural Hall,
Fairmount Park, on October 6th, 7th and 8th.
Every effort will be made to make it more
attractive and instructive than ever before.
No prizes are offered (competitive exhibitions being
prohibited in the building) but the exhibition
is open to entry by non-members of the Philadelphia
societies. Any information concerning
entry blanks, etc., can be secured from Mr. Fred.
Richardson, 3841 N. Marshall St., Philadelphia.

The exhibition will comprise the various types
of goldfish, exotic fish of all sorts, aquatic
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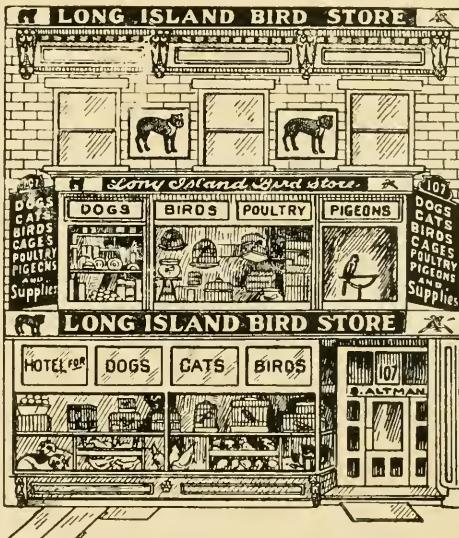
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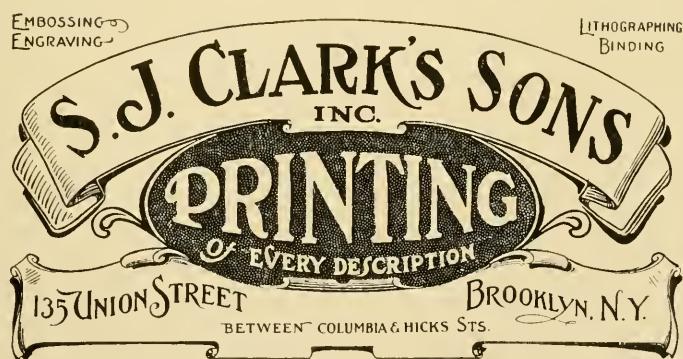
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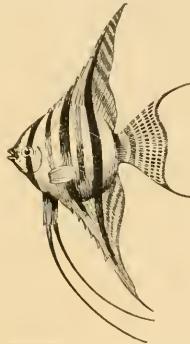
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