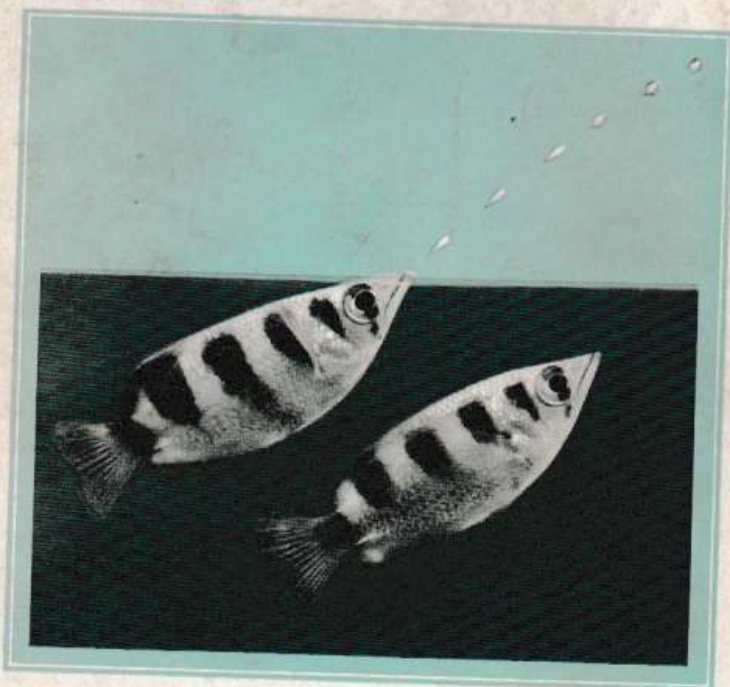


The AQUARIUM



ARCHER FISH (*Toxotes jaculator*)

Photo W. T. L.

Vol. VIII No. 3

July, 1939

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THE AQUARIUM

. . . Editors . . .

WILLIAM T. INNES F. H. STOYE
GEORGE S. MYERS

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JULY, 1939

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Contents

	PAGE
Aquarist's Calendar	36
The Archer Fish, <i>by</i> HUGH M. SMITH	37
Extra Tank Space for Babies, <i>by</i> GEORGE H. PENN, JR.	41
Police Execute Fighting Fish	42
Artificial Illumination without Heat, <i>by</i> GEO. E. REICHENBACH	43
<i>Protopterus anectens</i> , A Lung Fish, <i>by</i> HJ. MITSCH	44
Peacock Platys	46
Black Swordtails	46
Editor's Letter	47
Gleanings	48
Correspondence	50



THE AQUARIST'S CALENDAR



WHILE it is here, summer seems long. So does winter. Yet the two, with a bit of spring and fall thrown in, do not add up to a long year. That is the human viewpoint. Fish are realists. They know when time and conditions are ripe to do certain things, but man is probably the only creature on this gorgeous globe who takes time seriously and sentimentally. Philosophers down the ages have argued that time does not exist, but weave what theories you will, fishes and aquarists know when it is hot, and that summer hereabouts lasts a long time.

The present point, of course, is what to do about it, if anything. In plenty of instances nothing much need be done. They are the cases where the fish have what is considered to be an excess of water-per-fish. This liberality of space makes up for the reduced percentage of dissolved oxygen contained in warm water. Nearly all aquarists know that, but it is one of those things that needs telling and re-telling. Truth bears repetition. Give the fish a summer treat. Spread them out in more containers. Or it might be an idea to give some away to a good prospect for the hobby. It is one of the best ways of making a convert, especially if fish are given that are likely to breed successfully for the beginner.

For physical or for family reasons (both good) it is sometimes impossible to increase fish space. Much the same

result can be had by introducing aeration. This is no doubt the most important single factor in successful aquarium management in summer.

* * *

Aquarists should not imagine that a summer draught of air passing around an aquarium has the same cooling effect that it does on us. If the air tests warmer by a thermometer than does the water, then the draught only *beats* the aquarium. Breezes cool us by evaporating our perspiration, but an aquarium's only moisture is at the surface. As we have several times pointed out, a vigorous air current from a fan beating directly on the surface of the water does a great deal of good, but an ordinary draught has little effect, and that that *may* be to heat the tank. Go by what a thermometer says—not by how pleasant a bit of moving air feels.

* * *

We regularly refer to mosquito larvae as being one of the seasonal fish foods freely available in July and August. They collect in all sorts of still-water spots, especially where there are no fishes, and they are easily netted from the surface. To those who do not find opportunity for such collecting, perhaps a search for fishing worms may seem less of an undertaking—or at least a more familiar one. The larger fishes enjoy small or medium worms whole, but for the average aquarium fish they should be chopped.



THE ARCHER FISH

BY *Hugh M. Smith*

Formerly Fisheries Advisor to the
Kingdom of Siam*

WHEN I went to Siam to study the remarkable fish life of the fresh and salt waters, one of the things I was most anxious to do was to make the intimate acquaintance of the archer fish, a creature which gets its living by a unique practice which had never been satisfactorily explained by scientists.

In the eighteenth century and earlier, vague accounts reached Europe regarding an oriental fish which obtained its food, consisting of insects, by knocking them down with drops of water propelled from its mouth. These accounts, unsupported by reliable evidence, doubtless met with a mixed reception on the part of zoölogists and the general public; and it may be imagined that the scientific world of that day was eager to obtain authentic information concerning a creature whose behavior was so different from that of any other known fish.

The Earliest Record

The first definite printed reference to the fish in a European language seems to have been published in the year 1765, in the *Philosophical Transactions of the Royal Society of London*. At a meeting of the society held on March 15, 1764, a communication was read from John Albert Schlosser, M.D., F.R.S., of Amsterdam, announcing the presentation to the society of a specimen of the fish which, to quote him, "I believe hath never been observed by any writer on natural history." The communication carried a description of the peculiar habits of the fish on the authority of a Mr. Hommel, governor

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• *It secures its food by shooting insects with a pellet of water, and almost never misses its target at four feet.*

of a hospital in Batavia, who was also the collector of the specimen. Designated as "the jaculator or shooting fish, a name alluding to its nature," the creature was described as follows:

It frequents the shores and sides of the sea and rivers, in search of food. When it spies a fly sitting on the plants, that grow in shallow water, it swims on to the distance of four, five or six feet, and then, with surprising dexterity, it ejects out of its tubular mouth a single drop of water, which never fails striking the fly into the sea, where it soon becomes its prey. The relation of this uncommon action of this cunning fish raised the governor's curiosity; though it came well attested, yet he was determined, if possible, to be convinced of the truth, by ocular demonstration. For that purpose, he ordered a large, wide tun to be filled with seawater; then had some of these caught, and put into it, which was changed every other day. In a while, they seemed reconciled to their confinement; then he determined to try the experiment. A slender stick, with a fly pinned on at its end, was placed in such a direction, on the side of the vessel, as the fish could strike it. It was with inexpressible delight, that he daily saw these fish exercising their skill in shooting at the fly with amazing dexterity, and never missed the mark.

A second article on this fish, also contributed by Doctor Schlosser, contained a description of the fish in Mr. Hommel's own words and gave additional information on the fish's peculiar habits.

Shooting Powers Denied

During practically the whole of the nineteenth century there seem to have

been no new observations on the shooting powers attributed to the archer fish and no confirmation of the statements made by Hommel in 1765 and 1767. On the contrary, the leading authorities on oriental fishes denied that the fish did or could perform as claimed.

Dr. Pieter Bleeker, "the most active ichthyologist that ever lived," who spent more than thirty-five years studying the fishes of the orient, was author of more than four hundred articles on those fishes, and was long a resident of the same city (Batavia) as Hommel, was unable to verify the early accounts of the jaculator fish and in 1875 expressed the belief that it did not deserve the celebrity which had been imposed on it and that its reputation was based on an error of observation.

The Fish Comes Into Its Own

Although several minor notices of the habits of *Toxotes* appeared in European periodicals in the last two or three years of the nineteenth century, it was not until the twentieth century had dawned that this fish may be said to have finally come into its own. The observations of a Russian ichthyologist, Zolotnisky, on the fish in captivity definitely corroborated the essential facts of behavior as set forth in the earliest published accounts. A number of living specimens had been obtained in Singapore, and these were subjected to close scrutiny and experimentation, with the result that not only were the long-disputed habits fully established, but new items of behavior were noted and set forth.

Among the facts regarding *Toxotes* which were recorded by Zolotnisky and have been confirmed by the present writer and other persons in Asia and America were the following:

(1) The fish subsists largely on insects which hover over the water or rest on overhanging vegetation. When

a fish approaches within a certain distance of an insect, it becomes stationary, points its head and turns its eyes directly at the prey, brings the front of its mouth to the surface of the water, partly opens the mouth, and forthwith propels a drop, or several drops, of water at the insect, which ordinarily is 12 to 20 inches distant, but may be 40 inches or more. The aim is true and the insect falls into the water and is at once devoured.

(2) The fish frequently swims backward. This habit is often observed when the fish reconnoiters a prospective prey, and backs from it in order to secure a good position for observation and attack.

(3) The eyes sparkle with seeming intelligence and their mobility is noteworthy. They can be directed laterally, upward, and backward, but may not be turned downward.

(4) Aerial vision is acute. Even small insects may be seen at a great distance and fall a prey to the fish's amazingly accurate aim.

(5) Discrimination and selection are apparently exercised in the choice of food; considerable ingenuity is sometimes employed in obtaining food; and in shooting at insects the distance and the force are gauged.

How Toxotes Shoots

One searches the literature in vain for an explanation or suggestion as to how an archer fish is able to propel a drop of water with such force and accuracy that it can dislodge insects on overhanging vegetation or hit them on the wing.

The doubt shown by zoölogists of the last century in regard to the reputed shooting powers of the fish was partly due to their failure to detect in the fish's mouth any special mechanism by which drops of water could be formed and expelled.

It is, of course, obvious that there must be some peculiar adaptation or apparatus in *Toxotes* to account for its extraordinary accomplishment. Let this be the occasion to point out, for the first time, the special anatomical and physiological features on which the shooting performance depends.

By carefully watching the fish at close range on many occasions in Siam, I formed an opinion of the probable propelling mechanism, and I subsequently verified that opinion by holding the fish in a basin or bucket of water in the position regularly assumed when shooting and making them perform almost at will. This was accomplished by the quick, forceful compression of the gill covers with my fingers. I was able to cause a fairly satisfactory imitation of the normal shooting act, and had no difficulty in propelling drops of water for distances up to three feet.

This compression of the gill covers would in itself not be adequate to account for the escape from the mouth of water in the form of individual drops of uniform size; and it is to the peculiar shape and structure of the mouth parts that we must look for the

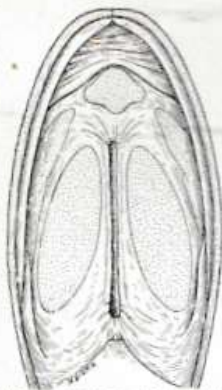
additional factors necessary for the complete and perfect performance.

The mouth cavity of *Toxotes* is long but its diameter is much restricted by



When the odd shaped tongue fits against the roof of the mouth a slender tube is formed, which is less than a sixteenth of an inch in diameter in a fish that is seven inches long.

the projecting sides of the roof and by the large tongue which when raised may completely close the passage from the outer air to the pharynx. The anterior part of the tongue is free from the floor of the mouth, and its rounded tip is of paper-like thinness and fits snugly against the palate; posteriorly the tongue is thick, bears minute teeth, and has a conspicuous fleshy prominence. Extending along the median line of the roof of the mouth, from a point just behind a band of vomerine teeth to the pharynx, are two low ridges, close together and parallel for most of their length, but slightly diverging at their posterior ends. Between the ridges is a deep groove which, when the tongue is applied to the roof of the mouth, becomes converted into a tube. This groove-tube, which in a fish seven inches long is less than a sixteenth of an inch in diameter, has not been previously described or referred to in ichthyological writings, but is readily seen when the tongue is depressed. That it should have been so long overlooked is something of a mystery when one recalls the vain efforts made by oriental ichthyologists to discover any special adaptation for drop-shooting.



"BLOW-PIPE" OF ARCHER FISH

The groove-tube which enables the archer fish to project pellets of water from its mouth: a narrow slot in the roof of the mouth which is closed by the tongue.

We are now ready to appreciate how the shooting fish operates. With the tongue closely pressed against the palate, the sudden compression of the gill covers will force water from the pharynx into the palatine canal; and with the tip of the tongue acting as a valve, the flow of water under pressure from the anterior end of the tube is regulated. It is the obvious habit of the fish to coordinate the compression of the gill covers with the momentary lifting of the tongue from the anterior end of the tube, permitting the escape of a single drop of water. With the jaws partly separated and the mouth reaching or projecting slightly above the surface, the drop of water is ejected with a force and for a distance that depend on the pressure. It is easy to understand how, with the pharyngeal cavity serving as both a reservoir for water ammunition and a compression chamber, it is possible for the fish to shoot drops of water in quick succession, as has been frequently observed, or the water may be expelled in the form of a jet when the valve is kept open longer.

Vision

The drop-propelling function would be useless if *Toxotes* did not possess, in addition, the ability to use its eyes in the air and to gauge accurately the distance, size, and suitability for food of small creatures flying or resting near the water's edge. It is an outstanding point that, for a fish, the aerial vision of *Toxotes* is very keen; and it was always a surprise to me to note the readiness with which insects and spiders were sighted as the fish explored the vegetation on the bank of a pond or stream.

Marksmanship

The range, accuracy, and force of the shooting powers of *Toxotes* always excite surprise and admiration. In my

experience in Siam the distance within which the fish could always be depended on to score a direct hit was three and a half to four feet. A much longer effective range has been recorded. Two fishes in the New York Aquarium could without difficulty hit a small cockroach at a measured height of five feet above the water.

Failure to hit a resting insect within proper range may be due to movements of the vegetation or, in the case of a spider dangling on a thread, to swaying caused by wind. When the first shot misses a mark, other shots usually follow in quick succession.

The force with which the watery pellets may strike an object is sometimes most astonishing to a human observer. An insect may be knocked high in the air or may fall on the bank beyond a fish's reach. At short range the drops may strike a person's face with a distinctly stinging sensation. On many occasions, during exhibitions in Siam, a spider at the end of a thread hanging from the end of a pole was knocked far up on the thread or even over the pole. Spent shots could be heard to splash against the roof of a veranda over the water.

For the Amusement of Guests

A friend of mine, a distinguished scion of the royal family of Siam, and an ardent student of fishes, had a residence on the broad Menam Chao Phya above Bangkok and used to entertain American and European guests with shooting-fish performances. A veranda on which he took many of his meals was directly over the water, and under it *Toxotes* could be found almost daily, attracted by scraps of fish, meat, chicken, and prawn which were regularly thrown from the table. By means of a spider or cricket dangled on a black thread from the end of a short bamboo pole, the shooting fish could

readily be induced to display their marksmanship, and scores of foreign visitors, during the years I passed in Siam, were thus edified and amused. It was there that I sometimes saw spent watery pellets splash on the ceiling of the veranda ten to twelve feet above the river, and witnessed many other exhibitions which confirmed my respect for the intelligence and skill of *Toxotes*.

Carrying It Too Far

On two occasions to my personal knowledge, when my friend sat on the veranda eating his breakfast, reading a newspaper, smoking a cigaret, and apparently neglectful of his fish wards, his attention was attracted by well-directed shots which extinguished his cigaret.

Extra Tank Space for Babies

By GEORGE H. PENN, Jr.
New Orleans

Every year millions of baby fish, recently hatched, die off without a real fighting chance at life. One of the main reasons these young fish die is *overcrowding*. So much has been printed about feeding baby fishes that I am sure even the greenest tyro will not have much trouble on that point. *Crowding*, therefore, which results in the suffocation of so many thousands of young fish each year, is the current *real* problem in raising young egg-layers, and also to a lesser extent young live-bearers.

Since even a large fish is happy in water which will just cover its back, a little fellow just the size of an exclamation mark is quite at home in less than 2 inches of water. In fact, the chief point is to have a good ratio between the air surface of the water in proportion to the volume. It follows that where the water is shallow there is an excellent ratio between the surface and volume.

Most fanciers have space enough to allow little more than one 15-gallon aquarium to the raising of several hundred young egg-layers. At this rate one or two spawnings of between 100 and 200 each a year is the maximum number of babies that can be accommodated. As a result of this, overly ambitious fanciers *crowd* their young fish and seldom raise the percentage they should, and those surviving under such conditions are seldom prize-winners.

For better results, therefore, it is suggested that the following plan be tried. Recently a leading biologist in New Orleans developed, for reasons of his own, a water-proofed paper, which gave me what I consider a real "wow" of an idea. This paper can be copied by anyone; all you need do is place a good coat of *black asphaltum* between two pieces of extra-heavy kraft paper, and there you have the water-proofed paper. Next thing is to get a box of approximately 2 square feet surface. Fold a piece of the paper of approximate size so that it lines the inside of the box and you have an excellent container in which to raise to maturity a hundred or so newly-hatched babies. The paper will last for several months. By making a stand arrangement to suit yourself, 3 such boxes can be placed, one above the other, in the space which would ordinarily be occupied by only one large aquarium.

At the close of the breeding season when a fair percentage of the babies have nearly reached adulthood, the paper can be removed from the boxes and discarded; new paper being cheap enough to re-line the trays the following spring!

Editor's note: We tested a modification of Mr. Penn's idea before publishing it. One of the chief difficulties is in neatly folding the heavy paper so

that it fits snugly into the tray, especially into the corners, where it needs support. Instead of using double paper, which would have increased this difficulty, we folded single heavy paper to the exact shape, made a second lining to fit inside of this, then coated the first on the inside and the second one on the outside, and fitted them together in the wooden tray. For good measure the inside paper was coated on the inside after being put in place.

Two trays were made in this way, one coated with asphaltum varnish, and the other with clear Duco. Both were filled with water and covered with glass to reduce evaporation. At the end of 6 months mildew softened the paper where it was in contact with the cover glass. Believing the experiment had been carried far enough, the trays were emptied and the paper examined. Most of it was soft and would not have kept much longer. It had lasted long enough to justify Mr. Penn's claim. No fishes were placed in the water, so we are not sure whether the varnish would have affected them. Our idea would be to defer putting water into the trays until most of the varnish smell disappears. The Duco lasted slightly better than the asphaltum. Hot paraffine, ideal in some respects, was not tried because it seems not to resist water for any considerable length of time.

The battery syringe is a mighty handy tool for any aquarist, and can be used for a dozen or so operations around an aquarium. It is an ideal instrument for introducing any live food into an aquarium. It may be used to withdraw water from a tank in making pH tests, for drawing sediment from the bottom and many other uses. These syringes can be secured at any auto supply house at a very reasonable cost.

C. F. ROESLING, Oakland, Calif.

Police "Execute" Penang's Best Fighting Fish

Fifty-five of the best fighting-fish bred in Penang, and collected from paddy fields and streams of Siam and North Malaya, met with a sad end.

Ordered to be confiscated by the Additional Police Magistrate, the fighting-fish were taken to the Detective Station where, before the vigilant eyes of an European Inspector, they were summarily executed one by one with a pen-knife, the police photographer acting as "executioner extraordinary."

The fighting-fish were part of a haul made by the Detective Branch. The other "fish" they netted were 27 persons, composed of Chinese, Siamese and Malays in all walks of life. And the sum netted for Government in the form of fines was \$233.

Before the "execution," the fish were carefully counted and then put into a bucket. The fighting-fish fanciers took the loss of their favourites more to heart than the convictions and fines imposed on them.

Horse-racing may be a sport of kings, but fish-fighting is the sport of rich and poor, throughout Malaya, Siam and Burma.

It is probably a little known fact that fish-fighting is illegal as is cock-fighting. In former years, before the slump, fish-fighting was carried on an extensive scale and with big money at stake.

There are two principal types of fighting fish, called warriors and princes. The latter are only to be found in Siam, having beautiful fins and tails, which almost resemble those of the gold fish.

The colours of the princes are either brownish white or brilliant azure blue.

The foregoing is copied from a newspaper clipping sent us by a correspondent in Shanghai.

Artificial Illumination Without Heat

Dear Mr. Editor:

I have been reading your magazine, the *AQUARIUM*, for about five years and it has been a great help to me. I am not a "fish nut" but on account of limited space I have only a 40-gallon community aquarium which I try to keep aquascaped and filled with interesting fishes. I think it's about time that I passed on something that may be of interest to your readers.

In the June issue, one of your subscribers was speaking of a problem he has as regards the lighting of his aquarium by artificial light during the summer and asking about a glass which is supposedly a non-conductor of heat.

My solution to a problem like this was to equip my reflector with two kinds of lighting as follows: A 20-watt twenty-four inch fluorescent lamp and three 25-watt Mazda four-inch show case lamps. This seems to work very nicely. The advantages are as follows:

1. A 20-watt fluorescent lamp for an aquarium equals approximately a 100-watt Mazda lamp.
2. The fluorescent lamp gives off very little heat. As a matter of fact, it can be grasped with the hand without any heat effect.
3. There is considerable economy in current used.
4. The three show-case lamps are on a separate switch and can be turned on in order to give a maximum amount of light when anyone is closely inspecting the aquarium.

In winter I find the three 25-watt Mazda lamps give enough heat so that I do not require an ordinary heater.

At present, I have a fluorescent daylight lamp which certainly shows up the colors of the fish and is particularly

good when wanting to inspect the fish closely to see if there are any signs of "ich" fungus or other infection. The Mazda lamps are coated with a special cream-colored paint which does not come off and in fact gives a rather sunlit appearance to the tank.

I might mention that the fluorescent lamps require a transformer six inches long, two inches wide and an inch deep, which can be fitted into the reflector, or else could be arranged to be outside of the reflector entirely.

* * *

In my aquarium, I have a freshwater blow fish that the dealer said would not bother any of the other fishes and would eat dried food. On his introduction to the aquarium he seemed to be well-behaved and while he took live *Daphnia* he did not partake of any dried food. Everything was fine for about a week and then each morning a Neon or a Glow Light fish was missing and then finally the small Platies started disappearing.

On questioning Mr. Blowfish, I found that he was very fond of fresh clams. Now it's a bit of a nuisance to run out and get a fresh clam every day, so we took a tip from the Frozen Food Industry and we buy one clam a week, wrapping it up in waxed paper and keeping it in one of the ice cube compartments in the refrigerator. Every day we cut off a small piece of clam and mince it while it is still frozen, which makes it very easy to do. Then by putting the minced clam in a small net and letting the cold water run through it, it thaws it out and brings it down to the temperature that makes it real appetizing for Mr. Blowfish.

Very truly yours,

Geo. E. Reichenbach.

P. S. I would also like to mention that a smaller fluorescent lamp and of lower wattage can be obtained.

PROTOPTERUS ANNECTENS (OWEN)

BY Hansjoachim Mitsch

of the Zoologisches Museum, Berlin

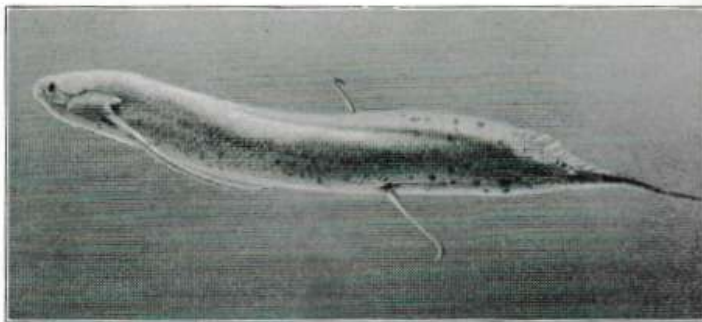
• Translated By
F. H. STOYE

DURING the past few months the highly interesting African Lungfish, *Protopterus annectens*, has for the first time in a number of years again been imported. It was fortunate that small specimens reached Europe. These entertaining and in many respects unusual fishes deserve the attention of a wider circle of fanciers, especially as they easily survive long transports.

Their home is the tropical Africa from Senegal to Zambesi. Mature specimens reach a length of 26". The coloration

is olive-brown with dots and other markings; the ventral sections are light grayish-brown. The dorsal fin begins about in the middle of the back and, with the anal (and caudal; these 3 fins form a so-called "fringe-fin." Ed.) forms one continuous margin. The limbs (the paired fins in the Lungfishes these are paddle-shaped, rope-like appendages consisting of a jointed axis with or without rays. Ed.) have a narrow margin with secondary rays. There are three small gill-appendages above (externally) the small, single

gill slit and five gill arches (internally these are fringe-like and attached at one end as in ordinary fishes). Before I discuss the maintenance of these fishes in the aquarium I would like to say a word about their habits in the natural state. They prefer swamps and areas which are inundated during the rainy season. In the daytime they dig into the soft mud or earth and come to the surface only now and then for air. They do not get really lively until dusk, when they start in search of



A "Lung Fish" that lives seven months out of water

tion is olive-brown with dots and other markings; the ventral sections are light grayish-brown. The dorsal fin begins about in the middle of the back and, with the anal (and caudal; these 3 fins form a so-called "fringe-fin." Ed.) forms one continuous margin. The limbs (the paired fins in the Lungfishes these are paddle-shaped, rope-like appendages consisting of a jointed axis with or without rays. Ed.) have a narrow margin with secondary rays. There are three small gill-appendages above (externally) the small, single

food. They only take animal food and I have not been able to observe that they eat plants, as generally claimed. Some specimens do not touch snails while in captivity; others do take them and probably do so in the wild state.

When, during the spring months in tropical Africa, the home of our Lungfishes, the rainy season ends, the inundated areas become dry. Our Lungfishes, however, do not follow the retreating waters, but dig into the soft mud to a depth of 24" to 32". It is of interest to note that these fishes curl

up like snakes with the difference that they form only one loop. The tail covers the head in such a manner that the mouth remains free. Many glands exude a mucous substance which forms a protective envelope around the entire fish, leaving the mouth opening uncovered. This mucous gradually hardens. Now the Lung-fishes, if one may say so, place the gills out of commission and the lungs begin to function instead. The air reaches the mouth through the canal which the fish forms while digging in. During this period the metabolism of the fish is reduced to a minimum. With the beginning of the rainy season, about 7 months later, the water reaches the fishes in their burrows, awakens them, the protective covering becomes soft and, after a little while, our Lung-fish again reaches its proper element.

Now about my *Protopterus annectens*. I had 4 specimens which I placed together in a 15-gallon tank. The largest fish measured 4", the smallest 3½"; they therefore had ample room. During the daytime they kept mostly in hiding or burrowed in the bottom; it is impossible to maintain a normal plant growth in their tank for any length of time. Besides the usual sand I placed a 4-inch layer of mud over the bottom. Several stones formed a background. They protruded only slightly through the mud. It is quite impossible to keep these fishes in a conventional aquarium whose bottom is covered with sand only. Under such conditions their life-span is shortened. I observed that they are very nervous in such a tank and do not seem to settle down and rest.

It is generally claimed that Lung-fishes are fighters and, in a playful way, often bite large pieces out of each other's bodies. Such behavior undoubtedly obtains among mature specimens; young fishes, on the other hand, seem

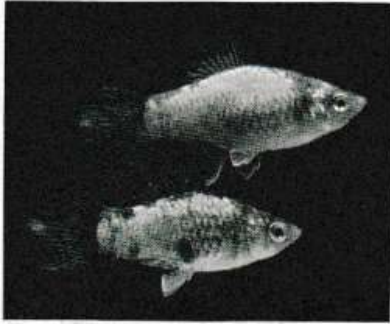
to be quite peaceful toward one another. Mine indulged in some harmless "scraps." They cannot be kept with other fishes, however. During the daytime their tank looks deserted. With the approach of dusk my fishes begin to appear on the scene. If one has patience, one may get a glimpse of them in the daytime, for they dash to the surface for air at intervals.

Small fishes, earthworms, tadpoles, etc., are eagerly taken; all other food is refused. They show great skill in seizing their prey, but do not pursue if a strike misses its aim. They become very quiet when the temperature falls below 75° or when they are starved for a prolonged period. A fast of one month's duration does not seem to harm them and does not show in their condition. A temperature of 82° seems to suit them best. I found that the higher the temperature the better they seem to feel. In captivity they grow very slowly.

Lung-fishes do not like deep water. A depth of 8" seemed to be preferred by mine. Cloudy water does not bother them at all. This does not mean that they like a smelly tank.

Although their mode of propagation is known, no recent observations on this point are available. This offers a field of experimentation to the hobbyist through which he might be able to aid science. Large tanks and lots of luck are needed for success.

Scribes write about the necessity of scalding earthworms on account of their being infested with parasites that are dangerous to fishes. Fishes the world over have been eating worms for ages and ages. If there are parasites they manage to defy them and their alleged effects. Yes, worms are among the very best of foods for freshwater fishes. Now is the time. You find the place.



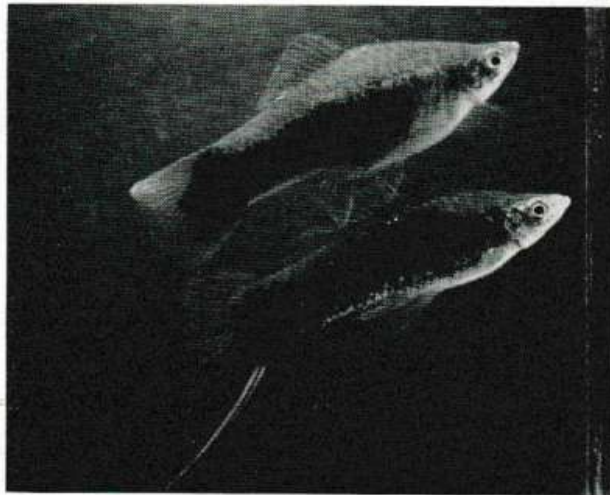
PEACOCK PLATYS

We introduce a striking new color in Platys. It is no pale, watery blue.

Here we have something that is a positive metallic blue all over the body of the fish, slightly deeper in the male. The darker spots on his sides (lower

fish) as shown in the photograph are little dabs of deeper indigo. The head is yellow and the male has a dash of red in his dorsal. Under the almost solid blue spangles on the sides is an undertone of black, producing an effect resembling a black opal.

We suspect a drop or two of *Xiphorus* has been introduced, as the bright metallic color is quite different from any pure Platy we have seen. However, they breed freely and throw true, which after all is what the aquarist-breeder wants. Fanciers who have been yearning for the thrill of "something new" will find it in this fish. At the request of the producer we have the honor of naming the strain. Not always an easy thing to do, but we found this a "natural."



BLACK SWORDTAILS

Here is the latest development in Swordtails; no doubt in Swordtail hybrids, for it seems that so much black could only come through some Platy blood, even though there is ever so little of it present. The black sides of the male are sprinkled with pretty blue

spangles which add to the attractiveness of the fish. The back of both sexes is olive green and the belly is whitish.

The fish are of good growth, the illustration being made at life size. Ours have had one brood of young, and they very soon resemble the parents.

~ The EDITOR'S LETTER ~

Dear Readers:

Some years ago, never mind how many, one of our prominent Philadelphia aquarists used to annually perform a very simple experiment in order to convince himself that previous results under the same conditions had not been freakish.

He was a Goldfish breeder, and of all fishes of variable growth, the Goldfish probably heads the list. At the end of six months it is not uncommon for the few giants of a brood to be fifty times heavier than an equal number of the dwarfs. Fortunately for the experiment the very fast and the very slow growers show these tendencies quite early. When the fry are about four weeks old the giants and dwarfs can each be segregated. Among the dwarfs are many fishes with points valued by fanciers, but they are given scant attention. Instead, the giants are scrutinized carefully. The few fine ones among them are grown into super-giants by giving them the best of food and plenty of room.

What I have described was and is common practice. It is described in some fullness in order to show that the experiment was carried out with considerable care. From what has been said, the reader will correctly infer that the majority of the fry experience an average and fairly uniform growth, and that at the age of one month it is easy to classify them as "normal." The experiment consisted in selecting just one of the average growers and rearing it by itself in a two-gallon globe. Under precisely the same feeding (a small but constant supply of live *Daphnia*) this single fish at the end of five months always far outstripped its brothers and sisters.

Not so strange as it might seem. The approximately five hundred other average fry were placed in a one hundred-gallon tank, which certainly did not crowd them up to the age of one month. However, they grew well and the breeder presently found it advisable to reduce by sorting. This process of elimination was kept up all summer until in October there were only about two hundred fish in a very big tank, but they averaged half-a-gallon-per-fish as against two gallons for the single one in the globe. It is no doubt true that one hundred fish in one hundred gallons of water are better off than one fish in one gallon, but our single fish, even at the end of the experiment, enjoyed a ratio that was four times better as far as water-volume and air-surface are concerned. In the beginning, before the breeder started elimination by sorting, the ratio in favor of the single fish was much greater.

Goldfish are gross feeders and it is important to them to have liberal quantities of oxygen to carry on their life processes. I do not believe that the average exotic fish is quite so much influenced by the capacity of its tank, but I *do* think that few of us give them as much water-per-fish as they ought to have for best results.

Sincerely yours,

Wm. T. Innes

Gleanings

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

F. H. STOYE

Berlin—"Bacopa"—Wochenschrift

During the fancier's discussion several members reported about their partial success in breeding *Dermogenys pusillus*. Only one succeeded in rearing two young in fairly deep water without the addition of salt water. Another member had tried shallow water with the addition of salt water, however, without success. Of the 8 young fishes five died within a few hours, while the others swam about normally, for 2 days, when they disappeared mysteriously. We are continuing the experiments and would like to hear from others.

Comment—A cursory search through the aquarium literature of the past 5 years indicates that premature births (young having large, unabsorbed egg-sacs at birth) and considerable difficulty in rearing the young are the general experience. We agree that *Dermogenys* species present quite a problem as far as proper conditioning of the breeders and rearing of the young are concerned. The main problem seems to be one of proper food for old and young and, to a lesser degree, suitable water and tank conditions. In the wild state Halfbeaks feed on insects that fall upon the water, the small fry of fishes and on water insects and their larvae. They are largely surface-feeders and are unable to pick up food from the bottom. Small fishes or mosquito larvae, etc., swimming below the surface are taken with a swift sideways thrust and are grasped with the edge of the "beak." Only properly fed and kept breeders will produce mature, healthy offspring. These fishes are largely carnivorous and predacious. If you want to get your adults in

the best condition for producing husky offspring, you should feed them on mosquito larvae, livebearer (poeciliid) babies (or any other young fishes), *Daphnia*, and, for a change, white worms. The latter should be suspended from the surface with the aid of tweezers, etc. While over their range, in Siam, the Malay peninsula and the Dutch East Indies, these fishes occur not only in the brackish water of the coast, but also far inland in fresh water, it is advisable to add from 5 to 10% sea water to their aquarium; this seems to have a decidedly beneficial effect.

To save the young from their cannibalistic parents it is advisable to remove the mother just before birth impends (the eyes of the embryos can be seen through the abdominal wall during the last few days of pregnancy) to a shallow enameled pan which should be filled with water from the breeding tank. It should contain a few bunches of *Riccia*, *Anacharis*, *Myriophyllum*, etc., and its surface should be almost covered with floating plants to provide shelter for the babies. Right after having produced her young the mother should be returned to the breeding tank.

The babies thrive best on small live food, like *Bosminae*, *Cyclops*, small *Daphnia*, etc., although they will take dry food. Soon they will also eat small white worms. When properly fed the young grow fast and attain maturity at the age of about three months.

Wild, imported fishes or those raised in cement pools are usually shy when transferred to a conventional aquarium and are apt to stub and injure their beaks against the glass sides. This may be prevented by tying or pasting paper

around their aquarium. The paper may be removed after the fishes have become accustomed to their quarters.

* * *

Leipzig—"Free Aquarium etc. Ass'n"—
Wochenschrift

Friend Schwenker talked about his success with *Ambassis lala*. He has been able to obtain wonderful results during the past few years, although suitable small live food is supposed to be difficult to find in our neighborhood. Proper food is absolutely necessary. Many fanciers have fine breeding pairs in their tanks, but are unable to raise a brood. The trouble is lack of suitable live food for the tiny young. *Ambassis* babies require Cyclops nauplii (young Cyclops) and they do not seem to eat anything else, no matter what is offered. I imagine that there are several kinds of Cyclops nauplii which hobbyists are unable to distinguish. The best scheme is to get nauplii from several ponds and success is assured. Spring and fall are the best times. Then some pools or ponds are full of suitable live food. A net made of bolting cloth is undoubtedly best; some kinds of artificial silk are, however, very good and much cheaper. The spawning act has been frequently described. The eggs hatch in 18 to 24 hours at temperatures from 75° to 79°. The babies do not begin to feed until they leave the surface and are free-swimming. Do not be afraid to give them plenty of nauplii. Those little chaps have large mouths, and eat until their bellies are distended. When properly fed the young are ready to breed at the age of 8 to 9 weeks.

Comment—A very interesting report on the rearing of the Glassfish. We wish to add that old water with a 10° to 15° addition of sea water seems to be

preferable for breeding. The water depth should not be over 4 inches. Their aquarium should contain fine-leaved plants, such as *Myriophyllum*, *nitella*, etc.

* * *

Frankfurt-Main — "Iris" — Wochen-
schrift

We absolutely agree with Grosser's observations (in a recent issue of "Wochenschrift") on the breeding of *Pterophyllum eimeckeii*. The main thing of the so-called "natural rearing" is absolute quiet conditions (no disturbances) for the breeders.

Comment—Most failures with Cichlids are due to this factor. A quiet, undisturbed location of their breeding tank is absolutely necessary for success.

* * *

Berlin—"Nymphaea alba"—Wochen-
schrift

We frequently hear that it is difficult to distinguish the sexes in *Trichogaster leerii* and that the fin development is mediocre. The reason seems to be that the fishes were kept too cold; this is also true of *Macropodus* and *Betta*. When kept sufficiently warm these fishes have better developed fins and the sexes are easier to distinguish.

Comment—It is very difficult to distinguish sex in not fully-matured Mosaic Gouramis. Proper temperature has undoubtedly an influence on fin development. However, *T. leerii*, even if kept at proper temperatures of say 75° will not have their large, beautiful anal and dorsal fins until they are at least one year old. At that age it is easy to distinguish the males by their much larger fins. Two-year-old males have very large and beautiful dorsal and anal fins.

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 Major H. J. Rice, Poona, India.

Did you ever hear of Angel Fish spawning on the glass sides of an Aquarium? I have a couple which have recently done so. They reared 65 fish out of a batch of 107 eggs. On this occasion I removed the female after 24 hours (she was eating her eggs). My observations lead me to think that if cannibalism occurs the female is the offender. This is only to be expected as she is much more exhausted by the act of spawning and has an instinctive desire for live food. The male proves as ideal a father as the Fighting Fish, plus the fact that he does not turn cannibal at a later stage. I find it much more satisfactory to have only one fish instead of two. There is no quarreling. The last spawning of Angel Fish took place during my holidays and I was able to observe them day and night over the whole period of development.

As the eggs were laid on the glass I could observe them from the *outer* side through a magnifying glass. But I won't bore you with particulars. You probably are inundated with stories accurate and inaccurate of their breeding! You probably, for instance, have been told or have observed yourself how the parent collects his young by causing a "draught" in the water with his pectoral fins—rather like a vacuum cleaner. I have had a very interesting two weeks observing and jotting down details of the habits of these truly interesting fish. During the past week the day temperature *in the shade* has been 103, and the night temperature around about 77. Fish have bred in profusion—Guppies,

Danios, Platys, Mollies, and the *Barbus sumatranus*, also the Fighting Fish. I put a number out in the outdoor ponds and I see all kinds of small fishes clustered along the edges. I wonder how many will survive!

One day I came back for lunch and was met with a tale of woe by my wife—a keen aquarist—a tankful of my prize Scarlet Platys had started gasping. She decided to renew the water, as our aerator had broken down. The tap water temperature was taken. It was well over 100° F., so she put half a stone of ice into my bath, added water and brought it down to 85° F., and then fed it to the fishes. I was afraid they might have got chilled, but they were all right, and rather benefitted by getting a reminder that there are cold days to come.

Our whole job in life now is to battle against the heat. The thermometer in the aquaria never falls below 85° and some of the smaller aquaria rise to 100° F. This doesn't matter if only they can get *air*. One must have either an aerator or a large tank which won't rise with the shade temperature. My big tanks are stabilized at 85° F. and the fish look marvelous, displaying all their colors and eating all day long. This seems the ideal temperature. Raise it 2 degrees and one is left with a crowd of gaspers! Fish die for two reasons—they are either frozen or fried!

Ans. We have heard of *Scalares* spawning on the glass sides of the aquarium, but have never seen it. Your account is interesting. While fish trained to such terrific heat as you have

might find 85 degrees quite comfortable, we would not want our readers to take up with the idea that this is a good average heat for any exotic aquarium, not even for the desert minnows which we have in this country that are reported to live in temperatures up to 125 degrees. Our own observation of these fish is that they like a temperature of 75 to 80 degrees, and that they are uncomfortable when it gets to 90. The tendency among our more experienced aquarists here is to avoid excessively high temperatures.

* * *

From Lee Thuan Khok, Chinese Secretariat, Singapore, Malaya.

I have been fired with an ambition to raise *Scalares* again after reading your article on the subject, and also that of Mrs. Lewke, which appeared in the same issue, and hope this time to meet with success. I must say that I once had about 40 of these aristocrats of the aquarium world, was thrilled when they started to spawn, but gave them away in disgust when the babies died.

I began as an aquarist with Goldfishes of all varieties and with the help of instructions from one of your books, was successful in getting several broods of Chinese Moors and Calicoes, but never had a single spawning from the Lionheads. Building operations at the back of my house robbed me of my source and supply of *Daphnia*, with the result that I turned my attention to tropicals.

I began in a small way with Platies and Swordtails and later graduated to *Veliferas* and Black Mollies and at the present the former are the envy of all my friends. Here again I must stress the valuable information given in "Exotic Aquarium Fishes," which is regarded as *the* reference book among us here.

Amongst other fishes I have in my collection are several varieties found

in this part of Malaya are *Rasboras*, *Betta brederi* and several *Panchax*. Unfortunately, due to the fact that they can be obtained very cheaply, especially the *Rasboras*, they have not found much favor with aquarists here.

A recent addition to my collection are Bettas from Siam. I have about 60 of these beauties and they are the pride of my collection. They were once very popular here when large amounts were wagered on their fighting abilities, but the ban on fish fighting has caused the importation of the fighting types to cease, and only the Veiltail varieties are now obtainable in the stores.

I have been lucky in obtaining some beautiful specimens with long, flowing fins and it is my idea to seek some information from you regarding their breeding habits.

How many times a year do the females spawn? Can the egg infusion be used when infusoria run short for the babies? If it is not possible for you to give details by return of post, I shall be thankful if you could give me some hints in your correspondence column.

I am hoping to start an "Aquarist Association" here, but the time is not yet ripe for one. It is hoped that the Van Chef Aquarium, a donation from the gentleman of the same name, will soon be started and by that time I am sure your monthly will have more readers.

Ans.: A good adult female Betta will spawn every three or four weeks during the summer. A very finely divided egg infusion can be used to feed the young, but much better results are found with natural infusoria. One of the main points is to have a large aquarium so that the cultivation of a liberal amount of infusoria is possible. Most of the young of the bubblenest builders die from lack of sufficient microscopic live food.

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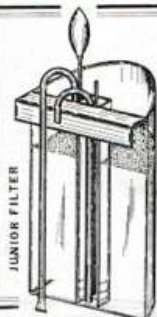
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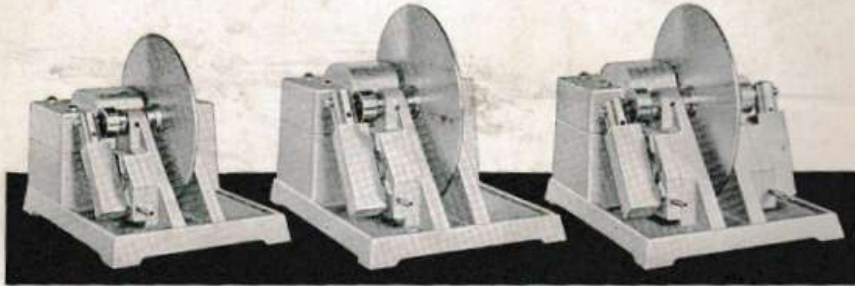
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