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"EVERYTHING FOR PONDS AND AQUARIAS"

2 MINUTES FROM LEICESTER SQUARE, CAMBRIDGE CIRCUS AND CHARING CROSS
Editorial

If it be the prerogative of the angler to describe his largest fishes as the ones that got away then it is also true that the most exciting happenings in fish-keeping always occur in the aquarist’s absence, so that he fails to witness them. Eggs (which may or may not be spotted in time) appear on water plants without the would-be observer having the slightest idea of when or how the spawning took place; a fish once the dominant personality in a tank suddenly appears subdued and chastened with little indication of the reason for this change—with however much dark suspicion the new dominant fish may be viewed. There is no doubt that much is missed by not having fishes constantly under surveillance, but short of carrying an aquarium around like a respirator forever in the alert position this restriction of our observing is usually accepted as inevitable.

There is scope for increasing the extent of fish-watching, however. When President of the Salmon and Trout Association the late Duke of Devonshire used to give forecasts for the season’s salmon catches, based on his observations of fishes to be seen jumping at Careysville. Much of this observing, it has been told, was carried out from the Duke’s bathroom window, while he was shaving. That the forecasts showed accuracy to high degree says much for this method, and it may be that aquarists could, with profit, either move tanks in which big events are expected to their bathrooms, or alternatively repair with their shaving tackle to the fish-house. It follows directly from this suggestion that garden ponds should always be in view of bathroom windows.

There was once a restaurant where glass-topped tables enabled patrons to take a heron’s-eye view of fishes in underslung shallow aquaria, and here again by so converting our dining-room tables it would be possible to combine keeping tabs on the fishes with other essential activities. Ceiling aquaria have been tried in the past, so that should there be an aquarist who prefers to think and watch in the supine posture a Tubifex-eye view of aquarium happenings can be gained. On reflection, we can cut down a lot on time spent away from the fish, when things always happen.
British
Aquarists' Festival News

This is the last month in which schedules and entry forms for the British Aquarists' Festival can be obtained and returned—closing date is 2nd April. Mr. R. O. B. List, Show Secretary, reports that response to requests for early notification of entries has been very good, and he anticipates even heavier post-bags in the next week or two.

Booking enquiries for aquarists' societies party visits to the Festival continue to arrive and are now being dealt with. Society secretaries are reminded that for parties of twenty-five or over tickets at reduced admission rates are obtainable in advance (adults 1.3., children 6d.). These rates include, as do the normal tickets, full admission to the Belle Vue grounds and Zoo.

British Railways have received notification of the event and are communicating directly with societies sending details of rail travel at reduced cost for parties and supplying information on routes and trains.

An interesting addition to the Festival is to be provided by exhibits from the Cactus Society, and lecture on cacti culture will form part of the free programme of lectures and films arranged for the four days. Another innovation will be a large illuminated world map on which the origin of fish shown can be traced by coloured lights.

Among many attractive trophies and awards offered in the competitive classes of the Festival are the handsome silver aquarium replica donated by Messrs. Cussons and Sons & Co. Ltd., for the best furnished aquarium, a trophy donated by the Kemsley Newspaper Group and new trophies put up by the P.B.A.S. and specialist breeders' societies. The Festival's unique award cards, with embossed coloured designs, will become highly valued possessions of their fortunate winners.

Display posters for use in windows of shops and houses, car window “stickers” and pamphlets advertising the B.A.F. will gladly be sent to anyone interested to receive them, on application to the Exhibition Office, 24, Wood Lane, Isleworth, Middlesex (Phone: HOUmslow 9301).

Hospital Aquarium Fund

Descriptive illustrated leaflets and donation forms for The Aquarist's Hospital Aquarium Fund are available for distribution by societies at their own shows, and applications for participation in the scheme are still being received.
The Riddle of *Mimagoniates barberi*

*Transl. by HERMANN MEINKEN*

**Translated from the German by HILDA GILL.**

MOST aquarists with several years' experience will know *Mimagoniates barberi*, since it has been imported in hundreds before the last war. Despite its one time abundance and in spite of numerous attempts, it has not been possible to maintain it in this country. The fish has many attractive characteristics: elegant shape, beautiful coloration, vivacity equal to that of the *Danio*, distinctive sex differences and low temperature requirements—it will live at a temperature of 65°-71° F. so that tank heating is unnecessary.

The fact that *M. microlepis* (Steindachner 1876) has recently reached the Continent suggests that its close associate *M. barberi* may soon appear again. I hope therefore that this article will help aquarists to avoid some of the mistakes that were made in keeping it before. First, let us give a description of the fish.

Its body is elongated and compressed laterally; head and body are almost on the same horizontal line dorsally but ventrally there is a marked slope—the mouth is therefore on the top of the fish. Basic colour is a shiny mud-brown and some especially beautiful and healthy specimens are chocolate-brown.

A dark band runs from the lower jaw, over the operculum, along the whole body to the tail, becoming progressively wider in that direction. The band varies considerably, however, especially in males, according to the general condition of the animal and external factors such as temperature and water pH. Sometimes the band appears to be cut diagonally in front of the tail; at other times it seems to be completely interrupted there and replaced by a green shiny marking. Again, it may be surrounded by a green marking below the dorsal fin or it may be missing altogether. But in most specimens it is found to run continuously, as in the females, to the end of the caudal fin.

Accompanying the dark band is a mud-brown band that is broad at the head and becomes narrower and darker posteriorly. The darker regions appear a beautiful light green in sunshine. A narrow golden band separates this band from the darker colour of the back and a similar golden line runs below the black band, starting at the level of the dorsal fin and ending at the tail. So outstanding is this band, seen through these golden lines, that one has the impression that the fish is too heavy posteriorly.

Dorsal and anal fins of *M. barberi* are brownish with black tips and a grayish or milky edging. The male bears numerous fine bluish-green or violet spots dorsally, and these show up beautifully in bright light. Females are generally not so brightly colored. But the distinction between the sexes is seen in the shapes of the dorsal and caudal fins. The female's dorsal fin is rounded posteriorly, and the caudal fin is completely symmetrical, whilst the male's dorsal fin is pointed and its caudal fin has a large ventral lobe which appears almost square.

The greatest difficulty about keeping this species is met in the first few weeks of possession, whereas they are becoming adapted to their new surroundings. Most delicate fishes die within a few hours or in the next day after reaching a new aquarium; newly purchased *M. barberi* appear quite well and healthy for a time, feeding actively and chasing each other round the tank. But after one or two weeks, some

*Times* as long as three or four weeks, it is clear that many of the fishes are becoming thin, in spite of active feeding.

It seems to me that the females show this sign first; they can be seen to pick up food greedily but only to spit it out again as though unable to swallow it. Once the loss of weight has become obvious nothing can alter the course of the disease. I have tried in many ways: changing diet and water, raising or lowering temperature, altering light intensity, giving salt baths, but nothing prevented starvation of the fishes.

Since the fishes are very numerous in their natural environment it seems that the disease is not one that is imported with them. Possibly it is a parasite resembling *Phlostophora hypheosobryconis*, which caused so much trouble at first when neon tetras were imported. Or perhaps the parasite is similar to *Ickthyophonus*. The original view that the fishes are greatly weakened by their journey to this country cannot be the correct explanation of the trouble, for the animals arrive in excellent condition.

It is possible that some weakening does occur on the journey and that lowering of resistance to parasites follows on this when they arrive. But even this explanation has its weak points: diseases due to internal parasites should vary in symptoms according to the organ affected. Yet *M. barberi* always shows inability to swallow food, followed by starvation.

Affected fishes become sluggish and photophobic towards the end, when a great deal of muscular atrophy has taken place and the skin on their backs begins to get loose. Their last few days are spent on the surface, breathing heavily, until they die of exhaustion. Their bodies are emaciated and hard, the abdomens are thin as paper and intestines are absolutely empty. It is strange that some animals are not affected although living under the same conditions. Investigations are badly needed when this species is again available and fishes that have died from the disease should
be examined by experts: several investigation centres that charge no fees are in existence in Germany.

Losses can be minimised by putting the fishes, as soon as they arrive, in large richly planted aquaria, in sunlight, and a water temperature of 65°-71° F. Food—small Daphnia, Cyclops and mosquito larvae—must always be present. (Owing to the regurgitation of this fishes mouth food cannot be taken from the sand.) A little salt—I prefer the "nutritive salts" for plants to ordinary cooking salt—has also proved useful. My own observations go against the theories that these fishes are hypersensitive to light or that pH is the cause of the troubles.

Fishes that survive the first four weeks have passed the critical period and are very hardy and long-lived. They may be transferred into different aquaria regardless of the condition of the water—hard or soft, old or fresh. They will also tolerate temporary falls in temperature to 60° F.

Once adapted to European aquarium life, breeding of M. barberi is the next problem. It has been known for some time that the number of eggs is small: production of twenty to thirty youngsters can be considered to be good. Eggs are stuck to the undersides of plant leaves of the larger kinds only. These fishes never spawn in algae or Nitella, and Vallisneria is not used, but they do use Ludwigia.

Stalks, roots and upper surfaces of leaves are not used, the fairly large, transparent light brown coloured eggs being placed exclusively on the undersides. The fry hatch after only twenty-four hours and then hang for about two days on the plants and on the aquarium glass, looking rather like very small transparent rods.

After the first two days they suddenly seem to vanish—and this has caused many breeders to abandon their efforts as unsuccessful, since the disappearances are thought to be due to deaths. In fact, the youngsters can be seen, if a lens is employed, pressed closely against the plants, searching for food. Not until the age of two or three weeks do they move about in the water, and then only for short periods. They swim freely and the dark band begins to be visible at four weeks. Tiny live foods are needed from the time of the apparent disappearance of the fry to the free-swimming stage, when very small Daphnia and Cyclops should be given.

The youngsters grow rapidly and no difficulties are met when transferring them to another aquarium.

I consider it likely that the female M. barberi is internally fertilised, as is Glandulocauda (see The Aquarist, this volume, page 129) but I have had no opportunity to confirm my opinion. Only eggs deposited on the day following the males' sexual activity would then be fertilised. If a fertilised egg is kept in a separate glass jar the young can be seen after twenty-four hours, but in the main aquarium they are not seen for forty-eight hours after fertilisation.

The males and females can be observed to rush through the water with bodies closely pressed together (similarly to Glandulocauda) until they abruptly separate. I suggest that sperms are transferred to the female at that moment, although I have not removed the males after this to see if fertilised eggs are in fact deposited by the females.

If this species is available again shortly I suggest that the breeder removes the male the evening after the act of fertilisation is seen, when it would be seen whether the female lays fertilised eggs and whether the number of fertilised eggs is not much greater than after normal reproductive activity of the pair.

To summarise these facts about M. barberi:
1. It must still be expected that at least 50 per cent. of imported specimens will die within one to three weeks.
2. Dead fishes of this species should be sent for microscopical examination to establish the cause of death and whether internal parasites are present.
3. Keep new imports in large, sunny, thickly planted aquaria in old water at 65°-71° F. Give a varied diet, and include especially, mosquito larvae. The critical period has passed after four weeks.
4. M. barberi probably belongs to that group of Glandulocaudinae which has internally fertilised eggs.
5. The young are difficult to see so that hopes of successful breeding should not be given up until at least three or four weeks.

ZOO AQUARIUM NOTES:

More Publicity Wanted for Edible Molluscs!

The arrival of these clams, however, widely used as they are for food on many parts of our coasts, arouses an interesting subject. In these days when food is so much in the spotlight, great interest would, we suggest, be added to aquarium exhibits if all the edible kinds could be clearly marked as such. Some thirty kinds of molluscs, possibly more, are commonly eaten in these islands, yet few but natives know of them. Less than a dozen species regularly reach town markets. At the Zoo many food fishes arrive as thumbnails and attain market size, yet apart from a rare press notice the public is told little about it. It may be added that after five years of official semi-peace the Zoo aquarium is still without pictorial labels. The single word "Edible" attached to a label would at once arouse general interest, and possibly encourage an intelligent desire for further information regarding a subject surely worth more attention at a time of ever increasing shortages.

L. R. Brightwell
THE AQUARIST
A visit to the home of Mr. H. Loder of Burnley, Lancs, will invariably result in seeing something either unusual or extremely interesting in the aquatic line, and a recent visit proved no exception to this rule.

First, however, a little of something about this well-known northern aquarist, for he is a man who works hard for the benefit of the hobby.

To readers of The Aquarist he will be well known as a contributor of articles on the breeding of tropical fishes, as also the secretary of the East Lancs Aquarist Society, and a member of the San Francisco Aquarium Society. On my recent visit he told me he had now become interested also in the keeping and breeding of cage birds—but that is another story!

Mr. Loder keeps the greater part of his collection in a 2-foot glass roofed fish house at the rear of his home, but also has about ten tanks in the dining-room. These are fitted into wood casing built in the recess on each side of the fireplace. Doors are fitted to the front of this casing which, when closed, gives the installation the appearance of large cupboards. No form of individual tank heating or immersion heaters are used; instead, the entire internal area of the cupboards is heated by a hot air system. Lighting is provided by one 60-watt bulb over each tank.

Siamese fighters are something of an exhibiting speciality with Mr. Loder and they are kept and bred in the cupboard aquariums. He informed me that excellent results are obtained when he keeps the fishes in the particular conditions provided by this method. All draughts are excluded from the sides and tops of the tanks and, of course, when the doors are closed, only top lighting is received by the tanks and fishes. He had also noticed that the growth and development of the fry were much quicker than with rearing in the usual exposed tank.

Certainly the adult fighters were in fine condition and the youngsters were healthy and very active. The plant life was also strong, with no sign of being drawn or forced. In one of the larger type of tanks, on the other side of the fireplace, could be seen the latest variety of the Amazon sword plant. This is a cultivated dwarf, the work of an American water plant expert, which was produced. Mr. Loder informed me, with the idea of being more suitable for the smaller type of aquarium. This dwarf grows to a height of approximately three inches and propagation appears to be rapid. Twelve new plants were pointed out to me which had been produced, from an original plant, in six weeks. This tank also contained one specimen of that charming aquatic, the Madagascar lace plant, whilst spatterdocks and Cryptocorynes were to be seen in lovely profusion.

Out in the fish house there was even more of interest. First, the story of the American giant veiltail guppy and, as we know the guppy, this was certainly a giant. It was colourful, with a flowing tail and I should think it would be about two inches long. This fish had been loaned to Mr. Loder by an American aquarist for showing, non-competitively, in England. With the loan, however, went a special request that should the fish die in the meantime, the body must be immediately returned to the owner preserved in alcohol. If still in the care of Mr. Loder I suggest to him that this fish would make an interesting non-competitive exhibit at the B.A.F. in May.

In a tank measuring 32 ins. by 18 ins. by 15 ins. were two pairs of really attractive angel fishes in splendid condition. They had been in this tank for two years and had been breeding at intervals for the last eighteen months. From what Mr. Loder told me it appears that each pair keeps to, and will only breed within, its own territory, which consists...
Pre-fabricated Homes for Hermit Crabs

by L. R. BRIGHTWELL

ABOUT a year ago The Aquarist gave some publicity to the late Richard Elminister, of Millport Marine Station, and the glass snail shells he used to elucidate the private life of the common hermit crab. He left a few brief notes on his experiments, but the glass shells appear to have been irretrievably lost. Now, thanks to Mr. E. T. Brett of Rugby, a keen aquarist and a glass manipulator of quite extraordinary skill, the writer has been enabled to make a brief series of tests at Plymouth laboratory, and bring to light some interesting if sketchy data, lifting the inner curtain from that defenseless abdomen which the hermit always tucks out of sight in the discarded home of a whelk or other sea snail.

Professor Gunnar Thorson of Copenhagen used a glass shell of the simple pattern here shown, and Professor Bullock of Los Angeles even induced the hermit to adopt simple glass tubes, two hermits sometimes annexing opposite ends of the same tube, resulting in a tug of war. But Mr. Brett's models so perfectly hold the mirror up to nature that they leave nothing to be desired. The writer was given, during his fortnight at Plymouth, the use of two tanks each three feet long and two high by as many wide, and an almost unlimited supply of hermits. Once a hermit could be coaxed out of its shell, no easy task, it quickly scrambled into the glass house. Then it was seen that its two dwarfed pairs of walking legs served as struts to keep it steady in the shell, whilst its curly tail took a firm hold upon the columnella. All text figures, even in standard works, show the naked abdomen as a flabby bag. This is correct only in dead specimens. All photographs without exception broadcast the same inaccuracy.

The hermit's rear is analogous to the lobster's well armoured telson, for the hermit is a close relative of the prawn and lobster, rather than akin to the true crabs. When the hermit is alarmed it snaps its tail much as does a lobster, and this forces it up into the shell, like a person being pushed backwards up a spiral staircase. The hermit's breathing apparatus sets up a current keeping the apical whorls well flushed and when it defecates it brings its anus forwards and the outflow current carries its faeces into the water beyond. A few fishermen in this country, but all abroad, know that the hermit usually but not always harbours a messmate in the form of a worm that lives in the upper coils of the shell. When the hermit is at meat the worm comes down to dinner and helps itself, undisputed, to what it wants from between the crab's very foot-jaws. The strange feature of this is that though the worm is taken for granted once it is safely lodged within the shell, this does not prevent the truculent hermit seizing and dismembering it if caught in the open. But the worm always approaches from behind and may make a dozen attempts to gain its objective before succeeding. Once installed all goes well. The worm's own breathing rhythm aids in the general sanitation and also carries food scraps within its grasp. It causes the hermit no discomfort, neither does it molest ova with which female hermits may be encumbered.

The smallest worm the writer found was two inches long and tucked in a whelk shell; those found in whelk shells may be nearly six inches in length. But when does the worm begin cadging on hermits? This point has not yet been cleared up.

When the hermit changes house the worm may stay behind for some days, a week or more if well fed, but sooner or later it sallies forth and once more hazards a rough reception in quartering itself upon a new landlord. The hermit changes its old clothes without leaving its borrowed home, and this also fails to mar the worm's equanimity.
Above, wriggling sea anemone. Below, the cautious mode of entry by the wriggler—always from behind—is illustrated.

There is a catch in most things, and the writer found that in time both the inside and outside of the glass shell became stained and obscured by algae and other matter. Also, if the hermit elects to install some of its anemone "hangers-on" (Calliactis parasitica) the object of the glass observation shell is defeated.

The hermit is a most funny and fastidious house hunter. Taken forcibly from its home it will sit moping, naked and disconsolate beneath a rock for days rather than accept a shell not entirely to its liking. The anemone, with its sting-laden tentacles and threads, no doubt offers very real protection against fish foes, but there is, of course, no sort of sentimental attachment as pictured in old natural history books, any more than there is between the prairie marmot, burrowing owl and rattlesnake combine, a partnership far from advantageous to the marmot whose burrow is invaded.

The anemone, by being carried about, often in the most violent manner, no doubt enjoys a better chance of getting food than it would if static but it does not, as stated by some writers, rely greatly upon scraps of food from the crab's table. It is essentially a hunter of crustaceans, and those at Plymouth would seize and hold big prawns that could generally break away from the largest examples of the common anemone.

Though the hermit will deliberately transfer anemones from the old to the new house, a most tedious business (the writer once gave up trying to imitate it, after half an hour, using two pairs of wooden aquarium tongs) and three anemones on a glass shell, of course, result in a blackout. This transplanting is generally done at night.

In one tank were some thirty anemones adhering to rocks, walls and glass. The hermit when hungry would make the round of the anemones, and plunge either claw to the bottom of the gastric cavity, hurling out long strings of scallop mantle, or any other food contained therein. Once more no sentimental feelings here! It is fatal to indulge in anthropomorphism when studying invertebrates.

The hermit obtains much semi-fluid food by setting up currents from its pulmonary system, and seems less able to chop up and assimilate tough, fibrous food, than either true crabs or members of the shrimp and lobster tribe. It is much more akin to the porcelain crabs and squat lobsters, which feed in a somewhat similar manner.

As to how far crustaceans hunt by sight, the writer confronted a glass-shelled hermit with a large and very ravenous velvet fiddler crab, the most notoriously rapacious and savage of its clan. After making several furious onslaughts upon the hermit's apparently defenseless tail portion it retired discomfited. Hermit abdomens, by the way, are boiled and sold in the fish markets of France; they taste very like prawns.

The glass shells were very strong. Every night saw terrific fights. The hermit literally boxes, striking straight forward, and the impact of claws on glass shells sounded at times like some goblin forge in full swing. There is obviously a future for the glass shell. It should be possible to watch the hatching of the hermit eggs and many other matters as yet uncertain in the economy both of the crustacean and its messmate Nereis lucasii.

Owing to the great difficulty of making these shells they cannot be regarded as every aquarist's playthings. The few produced are now in the hands of such bona fide investigators as Dr. D. P. Wilson of Plymouth, our leading photographer of marine life, and one or two others well known as research workers. Altogether marine biology is much indebted to the late Richard Elmhirst and Mr. E. T. Brett in proving once more that many of the most useful and ingenious inventions are also the simplest, once they are brought from the realms of theory to practical utility.

How and Why?

What are brine shrimp eggs?

In rearing young fishes there is a stage when they are too big to take Infusoria but too small for Daphnia feeding. An ideal live food to fill this gap is the newly-hatched brine shrimp, and packets of eggs of this salt water crustacean are sold for this purpose. Young livebearers are ready to take brine shrimps from birth.

How can the shrimps be hatched?

Use shallow receptacles—such as old pie dishes—as hatcheries. Make the brine by dissolving a tablespoonful of rock salt or Tidman's Sea Salt in a quart of hot water; allow the brine to stand and then decant the clear cool solution into the dishes. The eggs are sprinkled evenly over the surface of the brine after the container has been placed in a warm situation (70°-80° F.) such as above the tropical aquarium, where it will not be moved. All the eggs should have hatched after forty-eight hours at this temperature and the minute shrimps can be seen as red grains moving towards a brightly lighted end of the dish.

How are brine shrimps fed to fishes?

The salt water must not be added to the aquarium and shrimps must be washed free of salt before feeding with them. Strain them off in a fine white silk net and hold it under a gently flowing cold tap for a short time. The shrimps are then dispersed in the aquarium by rinsing the inside of the net beneath the water surface.

Must the newly-hatched shrimps be used at once?

Shrimps will live in the dishes for three or four days at the most after hatching, and may increase in size slightly in this period, but they do not reach maturity for a perpetuating culture to be maintained unless natural foods of the shrimps are supplied.

J. Francis

THE AQUARIST
AQUARIST’S Notebook

There are several types of tanks in use today, but the years of experience by scores of aquarists have shown that the angle-iron framed aquarium is the best for general use. Although all-glass tanks can be bought quite cheaply, they are made of inferior quality glass, are too tall in comparison with their water surface area and they break easily and are irreparable. On the other hand, if a pane of glass is broken in an iron framed aquarium it is easily replaced.

The most usual size of aquarium is 24 ins. by 12 ins. by 12 ins. A tank of this size may cost anything from £2 to £10 in the shops. By glazing a frame you can make a similar tank for 30/-; the writer has recently made one, purchasing everything except paint, for 25/-.

Purchasing the Materials

The first essential is, of course, the frame. A 24 ins. by 12 ins. by 12 ins. frame can usually be bought for 20/- or less. Collect it if you can, as carriage charges are liable to be very high. Get a frame made of 1 in. thick L-section mild steel welded at the corners. Do not be tempted by the cheaper, thin pressed steel jobs that will not last as well as the better ones. Check that the frame’s corners are square with a carpenter’s try square.

The bottom is best made of 1/2 in. thick slate, but 1 in. rough-cast glass can be used. Most builders’ merchants will be pleased to cut the slate for you. Glass, with wire embedded in it, is becoming very popular for the purpose, but it is expensive. For the back, front and ends, 24 oz. glass is the thinnest that can be used on the size mentioned. A better and cheaper aquarium can be made by using this glass for the front and selvage 1 in. rough-cast glass for the back and ends. Selvage is a term for the odd pieces left after windows are cut from standard size sheets of glass. It is usually sold very cheaply by glaziers. Alternatively, glass can be bought from dealers who specialise in recovered builders’ materials. It is important that the piece of glass forming the front of the tank is not scratched. The table below gives suggested materials for three standard sized tanks.

<table>
<thead>
<tr>
<th>Size</th>
<th>Bottom</th>
<th>Front</th>
<th>Back and Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 x 12 x 12</td>
<td>1 in. slate or glass</td>
<td>24 oz. clear glass</td>
<td>24 oz. horticultural glass</td>
</tr>
<tr>
<td>24 x 12 x 12</td>
<td>1 in. slate or glass</td>
<td>24 oz. clear glass</td>
<td>1 in. rough-cast glass</td>
</tr>
<tr>
<td>30 x 12 x 12</td>
<td>1 in. slate</td>
<td>32 oz. clear glass</td>
<td>1 in. rough-cast glass</td>
</tr>
</tbody>
</table>

Constructing the Aquarium

The glazing compound can be made at home, but it is not worth the time and trouble involved for small quantities. Do not use glazier’s putty as it sets too hard. There are some good aquarium glazing compounds on the market and some are that are not so good. Beware of coloured putty. Two pounds of compound will be sufficient for a 24 ins. by 12 ins. by 12 ins. aquarium. A little enamel, or good quality outdoor paint, will be needed. Mid-green is the most popular colour, but cream is often used. Do not use the colour of the frame detract attention from its contents.

The frame must be cleaned. Brush it vigorously with a wire brush to remove rust and scale. Then rub it with emery cloth. Give the whole frame a coat of paint.

Four oval nails driven into the bench will be found useful for the tank to stand on whilst it is drying.

The bottom, back, front and ends should fit together as shown in the diagram. In other words, the bottom should be inserted first, followed by the back and front and finally the ends should be put in. The bottom should have 1/2 in. clearance all round; therefore it will be 1 in. shorter and narrower than the inside measurements of the bottom of the frame. Put a generous seam of compound round the bottom of the frame and place the slate or glass on it. Press it down, working your way round and round its edges, so that it is level. The layer of compound beneath it should be a little less than 1/2 in. thick.

Next the back and front should be fitted. It is best to cut these yourself; you can then be sure that they are of the correct size. A wheel glass-cutter and a wooden straight-edge are perfectly satisfactory. When you have scratched the glass where you wish to cut it, tap it with a pair of pliers under each end of the scratch until a tiny crack is visible. Then, placing the scratch along the edge of your bench, try to bend the glass away from the scratch and the crack will run perfectly along it. Press a fillet of glazing compound round the frame and insert the back and front. Press them down carefully and evenly. Throughout the process of glazing trim off any surplus compound with a putty knife and work it back into the lump.

Now the ends must be cut. It is simple to measure their height but the width may be a little more difficult. Slide two short pieces of beading along each other until they fit tightly between the back and front; holding them together, remove them from the tank and measure them on a rule. Cut your ends about 1/2 in. narrower than this. Put your compound along the frame and press the ends home. Do not forget the top rails of the frame. Trim the glazing compound outside and inside the tank with a putty knife and give it a smooth finish.

It now remains to give the aquarium another coat of paint over the compound. This can be done very neatly by using a sheet of thin cardboard as a mask. The aquarium will look more attractive if the back and ends are tinted pale blue. To do this, either model aeroplane dope can be painted on the outside of the glass or pale blue model aeroplane tissue can be lightly pasted in the same position.

March, 1951
Sightless Cave Fishes from the

Assistant Curator, New York A

(Photographs by I)

There are nearly thirty different species of blind cave fishes, inhabiting subterranean waters in North and South America, the West Indies, Africa, Madagascar and Australia. Aquarists did not become keenly aware of this group of peculiar fishes until 1936, when the first blind cave characin, *Anoptichthys jordani*, were shipped out of their native Mexico alive. No other narrow water cave fish had ever been made available to fanciers before, and when *Anoptichthys* proved hardy in captivity and quite easy to breed, its future as an aquarium novelty was assured.

The attention of American aquarists was focused on another species of blind cave fish when the blind barb, *Cacocobarus geertsi*, was exhibited alive for the first time in the western hemisphere last May at the New York Aquarium. These specimens came to us via Antwerp, through the efforts of Dr. Walter Van den Bergh, Director of the Société Royale de Zoologie D’Anvers, who arranged for their shipment by aeroplane.

Like most barbs they are small, between two and three inches long. Their configuration is barb-like, and they prominently display the two pairs of barbels from which the genus *Barbus* gets its name. One pair originates from the corners of the mouth while the other is located above and in front of these, just over the upper lip. The most striking physical characteristic of the fish is the colour, which is white suffused with delicate pink. Actually they are completely or almost completely devoid of any pigmentation, their pink colour resulting from red blood being seen through the somewhat transparent tissues. Their gills are very noticeable as two deep red blotches on either side of the head. Eyes are entirely lacking. A slight depression is supposed to exist at the site of the eye—were an eye present—but even this cannot be seen in the living, free-swimming fish.

Blind barbs are constantly on the move. At no time have any of our fish been observed to remain still for more than a second or two. Round and round, back and forth, up and down they swim, sometimes fast but mostly slow, seeming to perform endless permutations and combinations of patterns of motion as they pursue their irregular courses about the tank. Whether they use their barbels, or the numerous tiny pores that have been noted about the head, to avoid collisions with one another, only experiment can tell. In any event, they rarely collide with either stationary objects or moving ones.

The blind barb is supposed to have been discovered in 1915 by M. Delporte. It was not formally described, however, until 1921 by the famous herpetologist and ichthyologist, George Albert Boulenger. He named it after one M. G. Geert who apparently gave him the four specimens upon which he based his scientific description.

For a number of years the fish was known from but a single locality, a limestone cave a few kilometres outside of the town of Thyville in the Bas Congo section of the Belgian Congo. This is not a particularly large cave, ranging only about 1,800 feet long. During the dry season the fish are confined to pools well inside. There is evidence that during the rainy season water from the outside pours into the cave through its mouth, which is located in a valley at the foot of a hill. With such a limited habitat, the total population of *Cacocobarus* could not be very large. The Government undoubtedly recognized this, for it placed the fish in Catégorie I of the protected animals of the Congo, which means that no one is allowed to collect specimens without a scientific permit. The fish is now known to exist in several caves, all in the region south of Thyville.

The parallelisms between *Cacocobarus* and *Anoptichthys* are too numerous and striking to be overlooked. Although the two fishes belong to different families, they are remarkably similar in many ways. Both are blind and more or less pigmentless, yet both can detect the presence of light and both develop a slight pigmentation after prolonged exposure to light. Casual observation reveals that *Cacocobarus* is light-sensitive; a bright light shone on their tank almost immediately starts them swimming faster than usual, and when the light is turned off the fish soon slow down again.

Vestigial Eyes

Microscopic examination of the eye region of *Cacocobarus* has revealed that the eyes have become reduced to minute, barely visible, brownish granules, buried in fat, but that all the elements of a normal eye are present, though degenerate, with the exception of a lens. The remnants of an optic nerve are also present. It would be most surprising if this were not the means by which *Cacocobarus* detects light, since the very similar degenerate eyes of *Anoptichthys jordani* have been demonstrated to serve that function.

Like *Anoptichthys*, the Congo blind barb lives well in aquaria. Both species will eat almost anything and both are reported to live in nature largely or wholly on the droppings of cave bats. This adaptability to captivity has proved most fortunate for scientists wishing to experiment with these fishes.

Evolutionists have always been especially interested in the various blind animals that live in caves, and some of the classical studies on the mechanism of evolution have concerned blind fishes. The most detailed analysis of the anatomy, physiology, and ecology of any blind fish has been made on the blind cave characin and its close relatives. Indeed, it is safe to say that no other cave animal has been so successfully investigated.

In 1939 Dr. Charles M. Breder, Jr., then Director of the New York Aquarium, initiated a programme of scientific study of blind cave characins which is still being actively pursued, at the present time.
Bas Congo

By James W. Atz

New York Zoological Society

and Zoological Society)

now in the laboratories of the American Museum of Natural History in New York.

In 1940 an expedition, sent by the Aquarium to the Mexican state of San Luis Potosi, made the unique and

exquisite discovery that Anoptichthys jordani was inter-

esting with the eyed, normally-colored characins,

Anoptichthys mexicanus, which had invaded its cave from the

outside. Specimens showing all degrees of develop-

ment of eyes and pigment were found in this small cave—

the sole natural habitat of the blind cave characin. These

two species of characins were later also hybridized in

aquaria. This is one of the reasons why the river fish are

believed to be the form ancestral to the blind fish, that is,

the species that gave rise to them sometime in the past.

To date around twenty successive generations of Anop-

tichthys jordani have been bred at the Everglades Aquatic

Nurseries in Tampa, Florida, under the supervision of Mr.

Albert Greenberg, its proprietor. The members of the

latest generation raised in the light show no greater develop-

ment of eyes or pigmentation than did those hatched in their

native caves.

Subsequent exploration of the region in and around San

Luis Potosi revealed the presence of four other caves,

containing populations of similar characins. All of these

fishes are blind and more or less colourless, but all differ

somewhat from one another in amount of pigmentation and

in other anatomical details. Two have already been

described as Anoptichthys anoptochrus and Anoptichthys

habini; the other two remain as yet unnamed. A. jordani

has been successfully crossed with A. habini, and it seems

likely—on the basis of this and other evidence—that all five

cave characins are closely related.

Recent experiments on these fishes have thrown new light

on the evolution of cave fauna. Previous work seemed to

indicate that the development of any typical species of cave

animal—with its loss of eyes and pigment—was in general

an example of degenerative evolution, involving the pro-

gressive loss of structure and function. It was found, how-

ever, that river fish, Anoptichthys mexicanus, when main-

tained in the dark, developed serious hormonal upsets

involving the pituitary, thyroid and gonads. Blinded river

fish kept in the light showed no such disturbances—nor do

Anoptichthys jordani and A. habini when exposed to natural

or artificial illumination. Thus, some definite endocri-

nological adjustment had to be made before the ancestral

Anoptichthys could successfully exist in caves. The evolution

of blind cave characins seems not to have been simply a

matter of degenerative evolution, but to have involved

"positive" adaptation to a lightless environment. This

concept brings the mechanism of the evolution of blind cave

fish, at least, more into line with what is believed to have

occurred in the inhabitants of other kinds of ecological

niches.

There seems to be no reason why the blind barb could

not be studied just as profitably as the blind characins; it

is therefore most fortunate that Dr. M. J. Heuts, a Belgian

scientist already well known for his evolutionary analyses

of the three-spined stickleback, has been able to study the

blind barb in the Bas Congo. There is little doubt that the

world’s blind cave fishes have only begun to give up their

fascinating secrets.

Whether the blind barb will ever become as popular with

aquarists as the blind cave characin depends upon its ability

to compete successfully with eyed tank-mates, as does

Anoptichthys, and whether it can be as readily bred in

captivity. So far as known, the blind barb has not yet been

bred, nor have any data on its reproductive habits ever been

reported. This should be a challenge to the aquarist, who

has solved many important scientific problems in his own

way and in his own home aquarium.

References

1 This institution is located, for the present, in the Lion House of the

New York Zoological Park, popularly known as the Bronx Park.


4 Heuts, personal communication, 1950.


9 Greenberg, personal communication, 1950.


March, 1951
Considering the Water-Lily: I

by W. E. SHEWELL-COOPER

There is probably no water plant that is better known than the water-lily, with its attractive wax-like petals and subtle scent. The roots of many of the species are extremely retentive of life and may be out of water for many months without losing fertility. The majority of the water-lilies open their flowers during the day and close them during the late afternoon, but some of the tropical forms wait until the cool of the evening before they bloom and then start to scent the air. Most of the lilies float on the surface of the pool—some hold themselves erect out of the water as if reaching upwards to the sun.

Lilies, on the whole, have been revered for generations. They are found growing naturally in most of the countries of the world with the notable exception of New Zealand. India, as one might imagine, is responsible for a very large number of species. Of course, there is a large number of hybrids to-day, produced as the result of crossing and re-crossing the species and varieties. Most of the best of these we owe to the wonderful work of a French gardener—Monsieur Marliac, who worked unostentatiously in the south of France for many years.

Lilies as Indoor Decorations

It's a pity really that more of the water-lilies are not used as cut flowers for decorations in the house, and I think the reason is because few people know the importance of taking the flowers out of the water when they start to close in the evening and leaving them out during the night. They can easily be put back to float in the bowl in the morning. If this is not done, the blooms fill up with water as they close and then they are spoiled and last but a short time. Grow water-lilies then, in a pool, and use them in the house as well.

Roots of the water-lily interest the gardener almost as much as the blooms, for they vary tremendously. Some plants seem to grow at the base very much like the celery, others have small roots like nuts, some slightly bigger tubers like potatoes, while there is a species with tuberous roots like a bunch of bananas. These, incidentally, should be planted horizontally with the crown of the plant just left exposed. The celery-like plants should always be set upright, with the short roots pointing downwards and the crown once again just above the surface of the soil. It is impossible to over-emphasise the importance of firm planting and this should be done around the roots, care being taken not to damage the crowns. One can usually find the soil marks on newly arrived plants showing how deep they were growing in the nursery and then they can be planted at a similar depth.

Anchoring the Crowns

Whenever there is any flowing water at all, the tendency is for recently planted water-lilies to run, and so I usually put large stones all around the crowns and leave these in position for six weeks. At the end of that period the stones may be removed, because new roots will have grown and so have provided the right anchorage. Some people take the trouble to plant lilies in what are called perforated aquatic pans—these are let down into the soil where they are well anchored. I find an old chip basket is quite good enough and it is quite easy to wedge the crown of the plant into position by using some curves cut to shape. This basket idea is used when planting has to be done after the pool has been filled with water. Of course, when planting a new pool, one can plant actually in the soil at the bottom and one doesn't need pans or baskets.

Care must be taken, on the other hand, with fresh plantings, to see that the water is only added a few inches at a time, the point being that the shallow water gets warm much more quickly than a great mass and that the warmth encourages early growth. As the plants grow, so the pool is filled and as a result there is little root disturbance. It must be remembered that there should always be ten inches of water covering the crowns before winter sets in, and then the normal hardy species will be able to withstand the usual frosts.

Spring Pond Care

Should there be a long frozen period, I think it pays to break the ice at the corners of the pool from time to time as this helps to keep the fish supplied with air; an alternative suggestion is to cover a "corner" of the pool with a board or two, or sacking, with the idea of preventing the water at this spot from freezing underneath. When the plants are bursting into growth in the spring, it pays to remove any dead leaves that have accumulated as well as any other rubbish. A light skimming over the surface of the water will give it a spring cleaning.

Next month I propose to deal with a large number of different varieties of water-lilies under their various headings, but before I do this I must issue a warning against certain pests. First of all, the mosquito larvae which attacks the leaves and the buds. The control is to stock the pond with surface feeding fish such as golden carp. The second, the silvery white butterfly Accentorius niceus, which is responsible for larvae which eat regular circular holes in the leaves. Once again the control is to stock the pond with fish. Thirdly, the black fly which attacks both flowers and leaves during a dry summer. The control is in the first place to spray the plants by means of a hose so as to wash the aphides into the pool where they will be eaten by the fish, or in bad cases to use a properly prepared paraffin emulsion and to spray this on the plants. The fish seldom suffer any harmful effect from such spraying.
Fish Ovaries and their Diseases

by Dr. A. STOLK

Translated from the Dutch by W. J. van der KOLK

It will be necessary to precede the discussion of diseases of the fish ovary with a review of the structure of the normal organ. Although we write about "the" ovary, of course, it is put too simply. Different species show much variety in structure of the ovary that we cannot very well think of one type of ovary alone, but these differences matter very much here. It is desirable, however, to make the distinction between the ovaries of oviparous and viviparous fishes.

The organ is situated in the carp between the two parts of the swimming-bladder and the windings of the digestive tract. At the side it is limited by the body-wall, whilst the duct too, takes part in this. At the end the ovary passes into the egg-duct, which, via the genital opening, behind the anus, is in direct contact with the outer world. We can compare the ovary with a thin walled bag, on the inside with the germ-epithelium. By epithelium we understand a layer of cells, which have mainly a secretory function. In one direction this germ-epithelium is the essential part of the ovary and it is not to be wondered at when dealing with diseases in the organ, we shall only mention this layer.

Rays are formed in this germ-epithelium by a process of cell division. Young egg-cells are formed in the tissue beneath the germ-epithelium. They get loose from the ovary wall and form a mass of cells. The ovary grows in size. After some time separation of the yolks begins in the egg-cells and with this their development is completed. At breeding time the egg-cells are brought down along the egg-duct and to the genital opening where fertilisation can take place by the male's sperm.

It stands to reason that such an important tissue in the germ-epithelium should possess a good blood supply; to meet the needs of food and oxygen. A great number of vessels are for this reason found in the surroundings of the layer, whilst, for the same reason, they are also found in the mass of young egg-cells. When this food-supply and blood-provision decreases, the possibility that no new egg-cells can be formed and in consequence the fish will become sterile. In the following paragraphs appearances of part of carp ovary. Germ-epithelium and developing egg cells are seen.

In this diagram of the anatomy of a female carp the ovary is shown lying between the bi-labed swim bladder and the intestine.

we shall revert to this in more detail. The force for the expulsion of the eggs is probably supplied by the muscles of the body-wall. Some smooth muscles have been found in the wall of the ovary of some fishes, but it can be accepted that the muscles in the trunk of the body play a big role in egg-laying.

Although the ovary of viviparous fish at first consists of two parts, both parts soon unite so that finally only one, single ovary remains. Here, too, young egg-cells proceed from the germ-epithelium and go through the normal growing process. But as the egg-cells are fertilised and develop in the ovary, we find there, as well as growing egg-cells of different sizes, a number of embryos. It is generally known, that, with the viviparous tooth-carp, one single copulation is sufficient for a number of pregnancies. This is made possible by the fact that the male's sperms are kept in small spaces in what can be regarded as part of the ovary-cavity, the so-called sperm-store.

When a large number of spawned egg-cells of the oviparous fishes become lost, a great quantity of egg-cells is necessary to make the species hold its own. With viviparous fishes this is different, and consequently the number of egg-cells can be much smaller. To sum up the above, we can thus say that the ovary of the oviparous fish contains a great number of egg-cells, which are in different stages of development; that the number of egg-cells in viviparous fishes is much smaller, whilst, moreover, a number of embryos in process of development is present. Now that we know something of the normal microscopical structure of the ovary, we can make a beginning with the diseases affecting this organ.

Degeneration of the Ovary

It is a generally known phenomenon, that gravid female fish, after a period of normal fertility, can become sterile at a certain period. They have spawned repeatedly, but without any visible cause a halt has been called to this normal and natural function. When noticing this phenomenon, we have to think of a number of possible causes for it. In the first place certain factors of a more general nature can have played a role: monotonous diet; unsuitable plants; change in the temperature of the water; lack of oxygen; presence of parasites, etc.

However, perhaps the feeding left nothing to be desired,
was in fact not different from other times when the fish showed a normal sexual function, whilst no change has taken place in the other factors. Perhaps moreover—and this is a very important fact—a number of females of the same species in the same tank possessed normal sexual function. On account of these facts we can put aside the factors of general nature for the time being and look for other causes.

Cause for sterility can be found in the egg-duct. It is quite possible that if this tube is affected by an inflammation process or narrowed by inflammation of the digestive tract, then the normal flow of egg-cells is no longer possible. The obstruction can also be higher up in the ovary or near the transition of the ovary into the egg-duct. It has been noticed that at these spots, tumors or ovary-cysts, can block the passage. As, however, these digressions from the normal are only sporadically found, they are of secondary importance.

When we have excluded the above possible causes of sterility, practically only two remain:

(i) Normal cessation of the sexual functions;
(ii) Degeneration of the ovary. In the choice of one of these possibilities, we have in the first place a certain guidance in the age of the fish. The normal cessation of the sexual functions naturally happens more with older fish, whilst degeneration of the ovary can also affect young fish. It is, of course, not in all cases possible to make an exact diagnosis, for the duration of natural fertile periods is not fully known for different species. Moreover, there is another difficulty in that degeneration of the ovary appears in both old and young fishes.

Let us be content with describing an example of ovary degeneration observed in one Loboites female, whose age was not exactly known but which had produced young ones for some months past:

The fish had reached a considerable size and showed no peculiarities. Its behaviour, way of swimming and appetite were normal. Suddenly and unexpectedly the fish was found dead. Upon investigation it appeared that the digestive tract, liver, swimming-bladder and kidneys were normal. The ovary was very big and showed some spotted designs; the organ consisted of a great number of degenerated egg-cells and embryos melted together into one compact mass. In some spots there appear to remain small, intact parts of the germ-epithelium. The microscopic picture of ovary degeneration, leaves no room for wonder at the sterility of the fish.

Experience, however, has taught us that this sterility need not remain. In a number of cases of ovary degeneration, microscopically controlled at a later stage, we noticed a complete recovery of the sexual functions. Viviparous species again produced young ones, oviparous fishes spawned normal eggs. This appeared to be possible by the fact that the remaining germ-epithelium had developed and caused an entirely new ovary to grow in place of the degenerated one.

With regard to the means of recovery, we can be brief. As the degeneration of the ovary is not contagious, it is not necessary to isolate diseased fish in this case. A means of stimulating the germ-epithelium to new activity is wanted but is not yet available. However, it is conceivable that if effectively regulated and varied feeding, and, of course, proper surroundings (right temperature, right pH, and sufficient oxygen) can exercise a favourable influence here.

**Ichthyophonus Disease**

In degeneration of the ovary, apart from sterility, the fish does not show any outward symptoms of disease. The course of ovary degeneration appears in many cases not unfavourable, for the remaining germ-epithelium can produce a number of egg-cells, with, as result, a new period of fertility. From the germ-epithelium a new ovary is reconstructed.

**Ichthyophonus disease**, which affects other organs besides the ovary, is caused by the Ichthyophonus bolesi Pichnulow, and is not at present well known.

Mr. van Laar in his book *Diseased Aquarium Fishes* does not mention it at all. Yet this disease is anything but rare. I was able to study a few cases and have received additional information from other aquarists. Just as with ovary degeneration, Ichthyophonus disease causes sterility. The normal appearance of the fish suffering from this disease, changes considerably. It attains a hollow-bellied contour, is emaciated. In short, it looks bad! These phenomena enable us to distinguish the two diseases.

When, on account of the features mentioned above—after having excluded different other possibilities such as inflammation of the egg-duct and inflammation of the digestive tract—we think we have a case of ovary disease, the following simple rule can be taken as general:

Sterile animal, not emaciated, good appetite, quiet swimming movements—degeneration of the ovary.

Sterile animal, hollow-bellied, strongly emaciated, no appetite, uneasy, shaky movements—Ichthyophonus disease.

As mentioned before, Ichthyophonus disease does not confine itself to the ovary only, but can affect all kinds of organs: liver, digestive tract, kidneys, the gill regions, skin, etc. Seen with the naked eye, the affected organ appears to contain a great number of small yellow to yellow-white
which can attain the size of a big pin-head. These small structures caused many investigators to consider the disease to be tuberculosis. A great deal has been said and written already about tuberculosis amongst fishes, although it can be accepted as a fact that the conception of Ichthyophthirius disease should have a tuberculous nature, must be considered as erroneous. The microscopic structure of the little knobs only tallies very superficially with the structure we meet in tuberculosis.

What is the microscopic structure of the organ affected by Ichthyophthirius? Globules each about the size of a pin-head in the ovary and as they increase in size, the ovary is narrowed and finally compressed. Embryos pass this critical point on their way to the outer and hinder the animal is the result of this. We should consider each globule as ovary tissue, changed by the influence of the parasites; so the knob is a sign to the injurious stimulus of the disease. The ovary of normal ovary tissue is increased by the forming and more knobs. Ichthyophthirius can also appear in fish, the knobs lying in between organs in the body. They can reach such a size as to exceed the cross-size of the digestive tract. The progress of the disease is that small knobs sprout in the big knobs, which in size again, and so continue the process.

Ichthyophthirius disease arises in the guppy, Lebistes reticulatus, and has been discovered in a great number of other aquarium fishes: Macropodus, Sargus annulatus, Calico, Cyprinidae, Aequidens pulcher, Hemigrammus bolivianus, Paropectoichthys, Haplochromus truncatus, Rasbora heteromorpha, Barbus conchonius, Tetraodon, Haplochromis flavomaculatus, Haplochromis bartholomei, Gymnocorymbus ternetzi, Kriptopterus. The parasite, in any case, cannot be choosy.

The treatment of the disease in its early stage is essential. Disease is highly contagious. Diagnosis can be by opening a dead fish, and by looking for the white thread-like threads on the side of the fish. Diagnosis can be confirmed by cutting the fish open along its abdomen. When one side of the body, one gets a good view of the cavity. When the knobs grow in the skin, this search for the growths is, of course, obvious. Diagnosis can then be ascertained beyond doubt.

The treatment of the affected fish is recommended on account of the contagious nature of the disease. However, we do not immediately consider this disease as being deadly; it only needs a slow and gradual progress. Big fish can, however, stay alive for years.

Concerning the treatment of Ichthyophthirius disease, there is full recovery over a number of years is not possible and the intermittent application of heat, adopted good results with Ichthyophthirius disease, also seems to have a favourable influence with the Ichthyophthirius. As recovery from Ichthyophthirius disease takes a long time, results can only be assessed with difficulty. Our informations on this subject are still continuing.

(Translated from the Aquarian)
A Peaceable Dwarf

(*Apistogramma ramirezi*)

by S. Davies

Amazon sword leaf this time. Eggs of *ramirezi* are opaque, and to the inexperienced they may appear to be infertile, but this appearance is a natural one.

The young, which hatched on 5th July, were removed from the leaf to a small pit in the sand by their parents. What looked like short stems were left covering the leaf. After two days the parents were removed but no young were seen until 8th July, when a large shoal of fry was seen swimming almost on the sand. Infusoria feeding was then commenced, and occasional feeds of dust-fine dried food were also used. Temperature of the water was 84° F., and the pH 7.6.

**Progress of the Fry**

Next day the young were swimming in a definite shoal; water temperature was 78° F. Micro worms were added to the diet on 11th July. The loss of some of this batch of youngsters followed their removal to a clean tank. Water in the hatching tank had become foul, and it was siphoned off except for about one inch; fresh water was added gently until the tank was half full. The youngsters remaining were given micro worms and fine dried food (no Infusoria being added) until 15th July, when small *Daphnia* were included in the diet, followed a few days later by chopped white worms and *Tubifex*.

Average size of the youngsters was about half-an-inch on 23rd July and growth continued steadily until I went on holiday in August. On my return the young appeared not to have grown, so fifteen were removed to a new tank; these grew more quickly than the others. Seeing this, it was decided to spread out the young fishes more evenly. Another tank was prepared and the fishes netted and counted. There were 120, and they were divided between three tanks. Growth rates increased after this move, and after disposal of some of the larger members of the batch.

Further spawnsings from the same parents have occurred, *Cryptocoryne cordata* leaves being used on each occasion, but no young have been reared from these. I am at present looking forward to obtaining young from the now grown-up fishes of my first successful spawning and sincerely hope that you, too, will be seen in the same position.

**British Aquarists' Festival**

Have you sent in your entry form? If not, post without delay—lists of entries must be closed after 2nd April, 1951

Show Schedules and forms are still obtainable from Mr. R. O. B. List, B.A.F. Show Secretary, 31 Coronation Court, Willesden Lane, London, N.W.6.
Slippery Sammy

CHRISTMAS shopping two years ago, I was in a South London market idly watching the technique of a vendor of eels. On the spur of the moment I asked for a small eel, “uncut.” My choice from the slithering mass of eels was rolled carefully in a newspaper (no easy task after paying its cost, fourpence, I carried it home).

I remembered, too late, after placing the eel in a bath of 62°F, that at the shop it had been in a tray of ice, and decided to leave the eel in the bath overnight. Next morning, Sammy, as he was soon named, was placed in a two-foot planted aquarium after a two-hour bath in very strong permanganate solution. In the tank Sammy turned his back, dipped his head, threshed the water with his tail in a flash disappeared—burrowing through the sand at quite a speed and with great ease.

Occasionally a snout tip could be seen above the gravel and a dark, strong splashings could be heard—a pool on the floor being additional morning evidence of nocturnal activity. The once well-planted tank was a mass of floating, tangled plants, and these were removed. For two weeks meat and worms were refused as alarmed, but later, garden worms and occasionally, sticklebacks, found their way in the tank disappeared in the night.

The tank was required for another purpose, Sammy transferred to a fifteen-inch diameter zinc wash-tub outside on a balcony. There he remains for a year now. The water has been frozen over several times, has been soupy and green, with a temperature of 55° in the summer, all without apparent objection from Sammy.

He has become quite tame, allowing himself to be stroked, and he has increased in size from 11 ins. over two years ago to 14½ ins. now (I defy a maintenance of a living eel to less than half an inch by any method!).

In colour Sammy changed noticeably. He is now light on top and silvery beneath. He eats two five-inch garden worms once a week, and although his tub is unheated, Sammy has never tried to escape. The breathing is most interesting. When in open water the fins are “waved,” either together or alternately, giving the swimming a paddling motion. If one fin be under a stone the other moves more lazily. Against the side of a glass aquarium the fins can easily be seen under sand, and neither fin is found to move, so that they do not appear to be needed for breathing since he may remain so buried in the sand for four days.

When buried under the gravel with his mouth alone showing I have noticed as many as fifteen small pieces of bread and stone sucked into Sammy’s mouth in an hour. I have nothing to stop this but I have yet to see a single “dog-eared”!

For hardiness an eel is unbeatable. Cost of purchase and feeding, etc., is very low. From the foregoing it has been seen that ice, rain, hot water and zinc all were without effect on Sammy, as were any rough handling he may have had before he reached the fishmonger, and his often story should eel-keeping make no appeal to you on other grounds, if you are an eel-pie lover let it be pointed out that just a few items capable of being kept fresh on the premises for over two years!

H. Roughton-Skelton

Society News

REPORT of the February meeting of the Bristol Aquarists’ Society was a film show. Subjects were not strictly relevant to aquarium-keeping but covered natural history topics giving viewers material for discussion.

ADVICE to the novice was the subject of Mr. P. Campkin’s lecture to the East London Aquarists and Pond-keepers’ Association last month. The lecturer covered all points concerned in setting up a tropical aquarium, recommended three-quarters grown fishes for first stock and cased chapped earthworms, Daphnia and mosquito larvae as top line foods in an essentially varied diet. Mr. Campkin gained first and second awards in the society’s table show and breeder’s class with his stocks following his lecture, demonstrating practically his ability as an aquarist.

MR. A. FRASER-BRUNNER addressed one of the largest aquarist audiences seen in the London area where he described his experiences of fishery research in the Gulf of Aden to the North-West London group of Aquarists’ Clubs at the Kodak Hall last month. The speaker, who illustrated his talk with lantern slides, was introduced by Mr. H. N. Allen, chairman of Harrow Aquarists’ Club.

SUGGESTION box for use of members is the latest addition to meetings of the Hford and District Aquarists’ and Pond-keepers’ Society, and following one suggestion one hour of the last meeting devoted to general discussion on aquatic topics among members: this proved very successful. A table show of dahlias was held at which a pair of pearl danios owned by Mr. T. H. Thomas gained first prize with quite a spread.

RECENT talks enjoyed by the members of the Leicester Aquarist Society included one by Mr. W. J. Page on fish diets and the aquarium hobby, and one by Mr. K. Bolland on garden ponds, illustrated with epidiascope pictures of pond subjects.

FEBRUARY’s meeting of the Midland Aquarium and Pond Society was taken up with a lecture which greatly improved members—on the anatomy and origin of fish, by Mr. T. P. Haasly. This lecturer is to give a talk to the society on Ichthyology in the near future.

FORMERLY known as the Isle of Wight Aquarists Club, aquarists in Ryde have now changed their title to the Ryde Aquarist Society. Meetings now feature a beginner’s half-hour; tropical aquarium setting-up was dealt with last month, together with a talk on fish feeding and breeding. Biology Room of the Ryde Art School of Art, George Street, is the monthly (last Wednesday) meeting place.

MEETING place of the City of Salford Aquarist Society is the Adult Education Centre, Sandy Lane, in Salford, where the weekly Tuesday meetings are held at 7.30 p.m. The year’s plans have been facilitated by dividing meetings into thirteen four-weekly periods. Each period will include one evening’s “lecture-ette” by a society member and a further evening’s lecture by a visiting aquarist.

ANNUAL outing of the West Bromwich Aquarist Society this year will be a trip to the British Aquarium at Manchester on 5th May. Two coaches are to convey members and their families there. Fish-house conversation was the topic of a joint talk given by two members at February’s second meeting.

Photo: E. R. Nichols

For the most meritorious exhibit in Hendon Borough’s 1950 Show, the Mayor’s Trophy was awarded to Hendon Aquarists’ Society. Secretary of the society, Mr. P. R. Chapman, is pictured receiving the trophy at a recent full meeting of Hendon’s Council.
New Societies

SEVEN members are required to complete the group of twenty-five aquarists to be known as the Cardiff Aquarist Circle. Secretary of the Circle is Mr. B. R. Edwards, 18, Lisanelly Road, Cathays, Cardiff.

SECRETARY of the newly formed Macclesfield Aquarium Society is Mr. W. E. Towse, 4, Cheadle Macclesfield, Cheshire. The Society invites all those interested in fish-keeping to join them on the last Thursday of each month at 7.30 p.m. at 22, Sherrard Street, Macclesfield. Secretary is Mr. Towse at the same address.

EMPLOYEES of the Grays Co-Operative Society who have formed the Grays Co-Operative Society Aquarium Club are holding their meetings on the last Thursday of each month at 7.30 p.m. at the Grays Co-Operative Society. Secretary is Mr. E. Clark, 66, Harlow Road, Rainhall, Accrington.

CHANGE of name of the Wandle Valley Aquarium Club to the Mission and District Aquarium Club is announced by the Secretary, Mr. S. M. Southeby, 46, New Barns Avenue, Mitcham, Surrey. Meetings are held on first and third Wednesdays at "The Canons," Mitcham.

FIRST meeting of the Portsmouth Aquarists' and Fish-keeping Association took place on March 20th, when 70 members attended. Secretary is Mr. E. R. Baines, 10, Wixton Road, Southsea, Hants.

AQUARISTS living in the Redhill and Reigate area who are interested in forming an aquarists' club are invited to call on Mr. W. Williams, 70, Dovers Green Road, Reigate, Surrey.

HEADQUARTERS of the Aquarists' Society sub-section of the Works of this organisation, London, N.W. 2. Secretary is Mr. D. V. Marks, 7, Delph Close, London, N.W. 2. Meetings are held on the second Tuesday of each month at Chalkwell School, Chalkwell, Essex.

INCREASED interest in aquarium and pond-keeping in Torquay is responsible for the formation of Torquay and District Aquatic and Pondkeepers' Society, which has adopted for its rules those recommended in The Aquarist's Society Organisers' series (January to May 1930). Secretary is Mr. M. A. Dodgen, Wolverton House, Higher Warberry Road, Torquay, Devon.

FESTIVAL OF BRITAIN AQUARIA

A FEW for fish native to London, Lake District, New Forest, Powys-Cornish and Malvern, Ullswater and Bristol waters to be offered for sale to Fish Tank Ltd., traders supplying some of the aquarium exhibits at the Festival of Britain, is made. This firm is also supplying aquariums for the Children's Zoo, Festival of Britain. A large aquatic display in Battersea Park, and a large aquarium in the International Press Bar. A foot finished tropical aquarium for the Homes and Gardens Pavilion (Hobbs Section) in the South Bank Exhibition has been presented by Aquatic Tanks of Battersea, in association with the Lee Reid Company of Ealing, who are sharing costs of installation and maintenance. Singleton Bros. and Aquadon are loaning equipment.
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The schedule for competitive classes is now available, and can be obtained from the show secretary: R. O. B. List, 31 Coronation Court, Willeton Lane, London, N.W.6. Telephone: MAlda Vale 8742. If you have not received your schedule, please write at once.

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