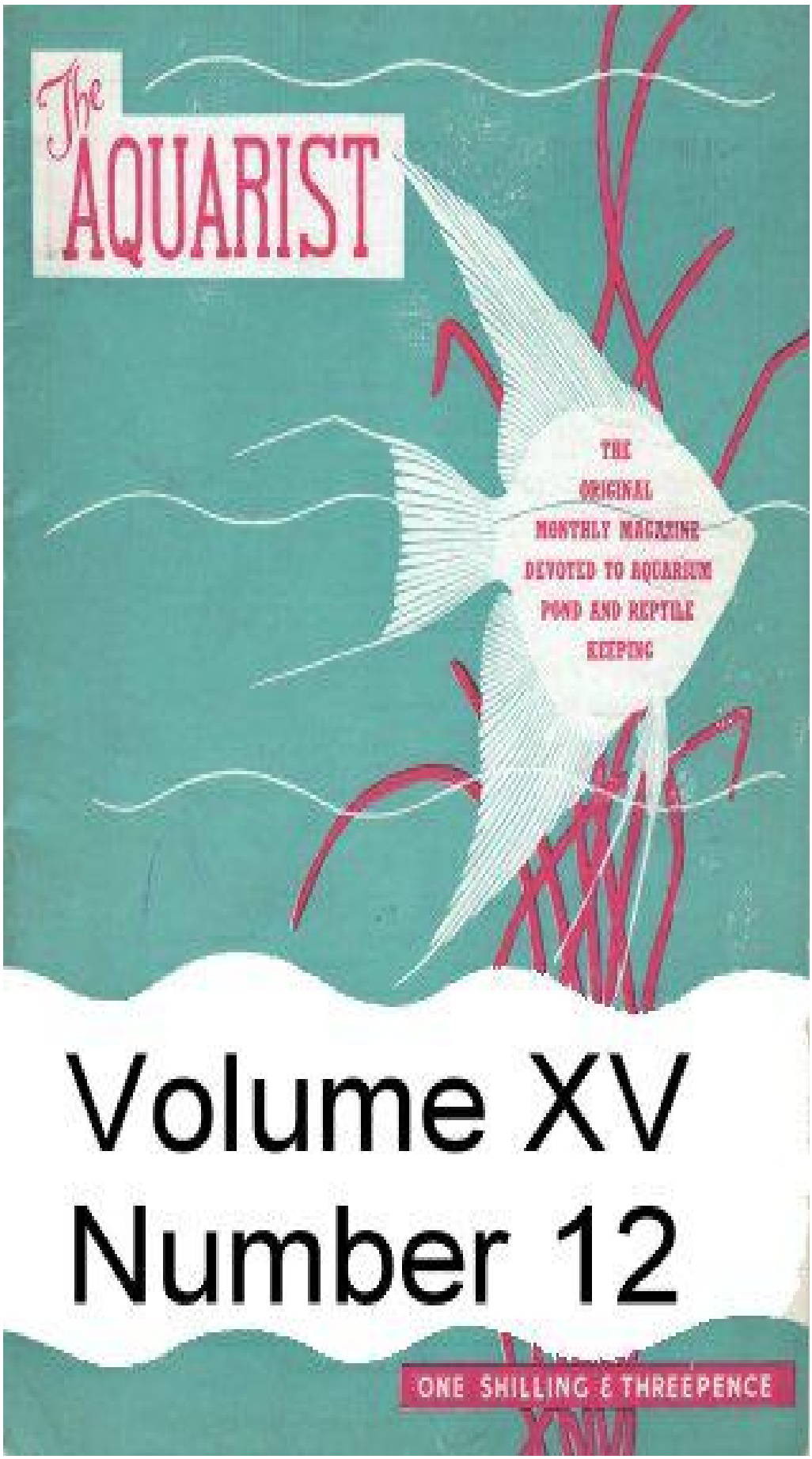

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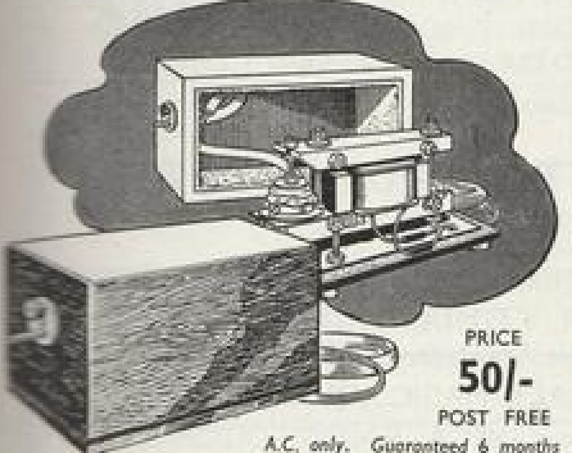

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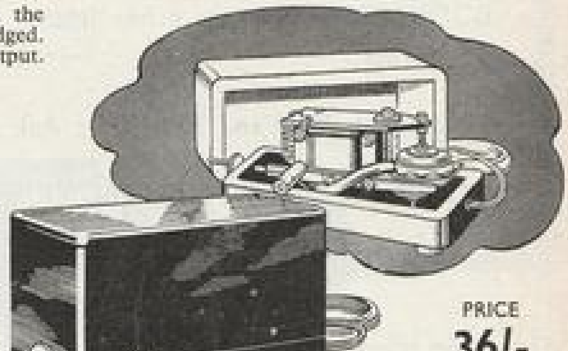

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AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"

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Photo: New York Zoological Society

In the article on our centre pages the habits of these blind barbs (Caecobarbus geertsii) from the Bas Congo are discussed

VOL. XV No. 12 1951

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

The Exhibition Hall at Belle Vue, Manchester, where the Briti Aquarists' Festival is to be staged

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 societie sending details of rail travel at reduced cost for partie and supplying information on routes and trains.

* * *

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

* * *

Among many attractive trophies and award offered in the competitive classes of the Festival ar the handsome silver aquarium replica donated b Messrs. Cussons and Sons & Co. Ltd., for the bes furnished aquarium, a trophy donated by the Kemsle Newspaper Group and new trophies put up by th F.B.A.S. and specialist breeders' societies. Th Festival's unique award cards, with embossed coloured designs, will become highly valued posses sions 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: HOUnslow 9301).

Photo: Lionel E. Day

"I trust I shall be seeing you in May?" The B.A.F. will include a comprehensive display of reptiles and amphibia arranged by the British Herpetological Society (Northern Section)

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*

by HERMANN MEINKEN

Translated from the German by HILDA GILL

MOST aquarists with several years' experience will know *Mimagoniates barberi*, since it was 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 its 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 me 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 this 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 end 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 the black 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 bands and a glassy 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 coloured, 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, whilst 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, sometimes as long as three or four weeks, it is clear that many of the fishes are becoming thin, in spite of active feeding.

Mimagoniates barberi—coming imports with a challenge for aquarists. Male above, female below

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 *Plistophora hyphessobryconis*, which caused so much trouble at first when neon tetras were imported. Or perhaps the parasite is similar to *Ichthyophonus*. 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 dorsal position 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 under surfaces. 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 with when transferring them to another aquarium.

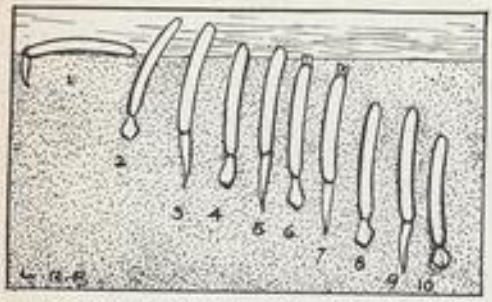
I consider it likely that the female *M. barberi* is internally fertilised, as is *Glandulocauda* (see *The Aquarist*, this volume, page 129) but I have had no opportunity to confirm my opinion. Only eggs deposited on the day following the males' sexual activity would then be fertilised. If a fertilised 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 that 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.



Stages in the descent of a razor clam

ZOO AQUARIUM NOTES:

More Publicity Wanted for Edible Molluscs!

A MINOR headache of all public aquarium curators is the sudden and unannounced arrival of animals that are quite unsuitable for public exhibition. Some time ago the London Zoo received a consignment of razor clams (*Ensis ensis*), amongst the commonest of our native shell-fish, and no doubt therefore expected to be welcomed. But like many common sea beasts, the limpet and plumose anemone for example, these plankton feeders will not thrive in filtered sea water for any length of time. Even under marine laboratory conditions the deep burrowing razor-shell is hard to maintain, though the writer has " staged " it in a specially prepared tank at Plymouth and observed its remarkable digging powers.

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 thumblings 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

AQUARIST AT HOME:

Mr. H. Loder (BURNLEY)

Interviewed and photographed by JAS. STOTT

Mr. Loder with two of his reptile pets—a Spanish eyed lizard and a banded water snake

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 of mine proved no exception to this rule. But 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. He is also the secretary of the East Lancs Aquarist Society, show secretary to the F.N.A.S. 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 lean-to glass roofed fish house at the rear of his home, but he 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 fitment 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.

Illuminated tanks in the aquarium cupboard of Mr. Loder's dining-room

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 *Cryptocoryne* were to be seen in lovely profusion.

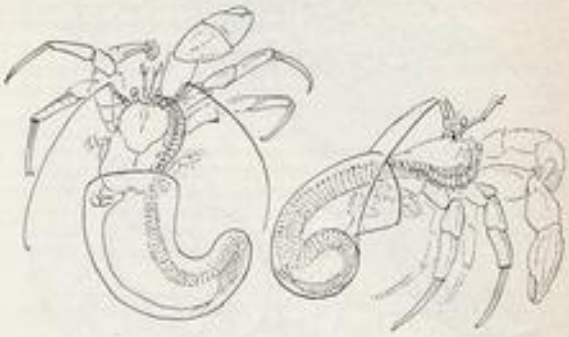
Out in the fish house there was even more of interest. First, the story of the American giant veiltail guppy and, as we know the guppy, this was certainly a giant. It was colourful, with a flowing tail and I should think it would be about two inches long. This fish had been loaned to Mr. Loder by an 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 con-

(Continued at foot of next page)

Pre-fabricated Homes for Hermit Crabs

by L. R. BRIGHTWELL



Hermit crab using the glass shell designed by Professor Gunnar Thorson of Copenhagen

ABOUT a year ago *The Aquarist* gave some publicity to the late Richard Elmhirst, 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 iron curtain from that defenceless 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.

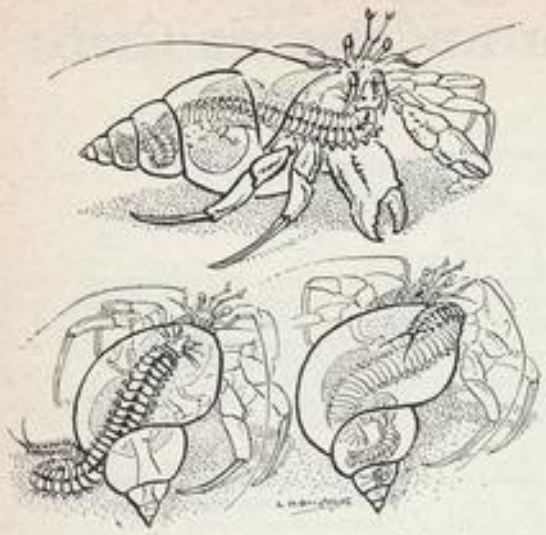
Top figure shows the tightly twisted abdomen of a healthy crab out of its shell home. Below, in a glass shell the crab's worm mess-mate is seen wound round the spiral

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 winkle 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, worm seen feeding with hermit crab. Below, the cautious mode of entry by the worm—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 fussy 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 almost 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 crustacea, 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 hermits when hungry would make the round of the anemones, and plunge either claw to the bottom of the gastric cavity, hauling 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 crustacea 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 defenceless tail portion it retired discomforted. 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 fucata*.

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 shrimp eggs 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

AQUARIST'S Notebook

A page for the beginner conducted by J. P. VOLRATH

THERE are several types of tanks in use to-day, but 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 £2 10s. in the shops. By glazing a frame you can make a similar tank for 30/-; the writer has recently made one, purchasing everything used 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 ¼ in. thick L-section iron welded at the corners. Do not be tempted by the cheap, thin pressed steel jobs that will not last as well as the heavier ones. Check that the frame's corners are square with a carpenter's try square.

The bottom is best made of ¼ in. thick slate, but ¼ 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 thin glass for the front and selvage ¼ 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 :—

Size	*Bottom*	*Front*	*Back and Ends*
Inches			
18 × 12 × 12	¼ in. slate or glass	24 oz. clear glass	24 oz. horticultural glass
24 × 12 × 12	¼ in. slate or glass	24 oz. clear glass	¼ in. rough-cast glass
30 × 12 × 12	¼ in. slate	32 oz. clear glass	¼ in. rough-cast glass

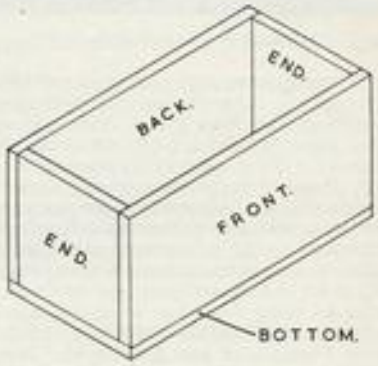
Constructing the Aquarium

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 there are some 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 let the colour of the frame detract attention from its contents.

First 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 ⅛ in. clearance all round; therefore it will be ¼ 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 ¼ in. thick.

DIAGRAM OF POSITIONS OF GLASS



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 ⅛ 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.

Sightless Cave Fishes from th

Blind barbs (Caecobarbus geertsii) of the Bas Congo

by

Assistant Curator, New York

(*Photographs by*

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 characins, *Anoptichthys jordani*, were shipped out of their native Mexico alive. No other *warm 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, *Caecobarbus geertsii*, was exhibited alive for the first time in the western hemisphere last May at the New York Aquarium[1]. 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 a M. Delporte[2]. It was not formally described, however, until 1921 by the famous herpetologist and ichthyologist, George Albert Boulenger. He named it after one M. G. Geerts who apparently gave him the four specimens upon which he based his scientific description[3].

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 Thysville in the Bas Congo section of the Belgian Congo. This is not a particularly large cave, reportedly 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 *Caecobarbus* could not be very large. The Government undoubtedly recognised this, for it placed the fish in *Catégorie* 1 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 Thysville[4].

The parallelisms between *Caecobarbus* 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 *Caecobarbus* 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 *Caecobarbus* 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[5]. The remnants of an optic nerve are also present. It would be most surprising if this were not the means by which *Caecobarbus* detects light, since the very similar degenerate eyes of *Anoptichthys jordani* have been demonstrated to serve that function[6]. 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, behaviour 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

Bas Congo

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Zoological Society)

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

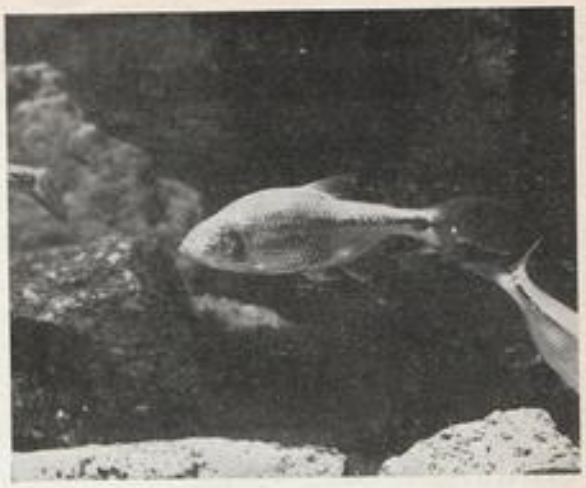
In 1940 an expedition, sent by the Aquarium to the Mexican state of San Luis Potosi, made the unique and exciting discovery that *Anoptichthys jordani* was interbreeding with the eyed, normally-coloured characins, *Astyanax mexicanus*, which had invaded its cave from the river outside. Specimens showing all degrees of development 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 hybridised in captivity[7]. 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 *Anoptichthys 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 development of eyes or pigmentation than did those hatched in their native cave[8].

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[9]. Two have already been described as *Anoptichthys antrobius* and *Anoptichthys hubbsi*; the other two remain as yet unnamed. *A. jordani* has been successfully crossed with *A. hubbsi*, 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

Mexican characin (*Astyanax mexicanus*) believed to be the parental form of the blind Anoptichthys



The blind cave characin, *Anoptichthys jordani*

animal—with its loss of eyes and pigment—was in general an example of degenerative evolution, involving the progressive loss of structure and function. It was found, however, that river fish, *Astyanax mexicanus*, when maintained 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. hubbsi* when exposed to natural or artificial illumination[10]. Thus, some definite endocrinological adjustment had to be made before the ancestral *Astyanax* 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-spine 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.

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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 reverenced 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

Photo: L. E. Perkins

and it is quite easy to wedge the crown of the plant in position by using some turves 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 gallonage 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 raking 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 *Accentropus niveus*, which is responsible for larvae which eat regular circular holes in the leaves. Once again the control is to stock the pool 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

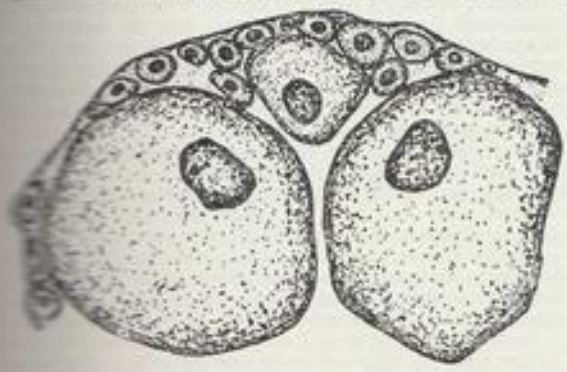
by Dr. A. STOLK

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, this, of course, is put too simply. Different species show such variety in structure of the ovary that we cannot very well think of one type of ovary alone, but these differences do not 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 liver, too, takes some part in this. At the end the ovary continues into the egg-duct, which, via the genital opening, situated behind the anus, is in direct contact with the outer world. We can compare the ovary with a thin walled bag, lined on the inside with the germ-epithelium. By epithelium we understand a layer of cells, which have mainly expanded in one direction. This germ-epithelium is the most essential part of the ovary and it is not to be wondered at, that when dealing with diseases in the organ, we shall repeatedly mention this layer.

Eggs are formed in this germ-epithelium by a process of cell division. Young egg-cells are formed in the tissue connected with the germ-epithelium. They get loose from this tissue, obtain a more central position and continually increase in size. After some time separation of the yolk-substance in the egg-cells occurs 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 as the germ-epithelium should possess a good blood supply, for the delivery of food substances. A great number of blood-vessels are for this reason found in the surroundings of the layer, whilst, for the same reason, they are also found in the region of the young egg-cells. When this food-supply and or blood-provision decreases, the possibility exists that no new egg-cells can be formed and in consequence the fish will become sterile. In the following



Microscope appearance 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-lobed 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 vivaparous 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 vivaparous 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.

As 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 vivaparous 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 vivaparous 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,

Microscope picture of normal guppy ovary showing left, egg cells and right, developing embryos seen in section

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,

Microscope picture of degenerated ovary of guppy: egg cells and embryos are disappearing (compare with picture at top of page)

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 *Lebistes* 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. Vivaparous species again produced young ones, whilst 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 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 *Ichthyophonum hoferi* Plehnmulsow, and is not at present well known.

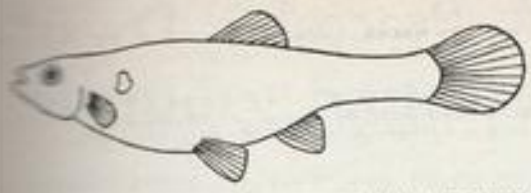
Mr. van Laar in his book *Diseased Aquarium Fishes* does not mention it at all. Yet this disease is anything but rare. I was able to study a few cases and have received additional information from other aquarists. Just as with ovary degeneration, *Ichthyophonus* disease causes sterility. The normal appearance 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



Sketch to illustrate size and appearance of a "knob" penetrating the skin in a case of Ichthyophonus disease

knobs, which can attain the size of a big pin-head. These knob-like structures caused many investigators to consider the disease to be tuberculosis. A great deal has been said and written already about tuberculosis amongst fishes but nowadays it can be accepted as a fact that the conception that *Ichthyophonus* disease should have a tuberculous character, 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 *Ichthyophonus* ? Globules each about the size of a pin-head form in the ovary and as they increase in size, the ovary-cavity is narrowed and finally compressed. Embryos cannot pass this critical point on their way to the outer world and sterility of the animal is the result of this. We have to consider each globule as ovary tissue, changed under the influence of the parasites ; so the knob is a reaction to the injurious stimulus of the disease. The quantity of normal ovary tissue is decreased by the forming of more and more knobs. *Ichthyophonus* can also appear in the male fish, the knobs lying in between organs in the body cavity. They can reach such a size as to exceed the cross-section size of the digestive tract. The progress of the disease is that small knobs sprout in the big knobs, which increase in size again, and so continue the process.

Ichthyophonus disease arises in the guppy, *Lebistes reticulatus*, and has been discovered in a great number of other aquarium fishes : *Macropodus, Sargus annularis*, Labrinideae, Cyprinideae, *Aequidens pulcher, Hemigrammus ocellifer, Pterophyllum, Hyphessobrycon* sp., *Brachygobius nunus, Rasbora heteromorpha, Barbus conchonius, Barbus tetrazona, Hyphessobrycon flammeus, Hyphessobrycon griemi, Hemigrammus ocellifer, Gymnocorymbus ternetzi, Brachydanio rerio*. The parasite, in any case, cannot be called " choosy."

Identification of the disease in its early stage is essential, as the disease is highly contagious. Diagnosis can be proved by opening a dead fish, and by looking for the white knobs. Opening a fish is easiest done by first removing its head and then cutting the fish open along its abdomen. When lifting one side of the body, one gets a good view of the organs of the body-cavity. When the knobs grow through the skin, this search for the growths is, of course, superfluous. Diagnosis can then be ascertained beyond any doubt.

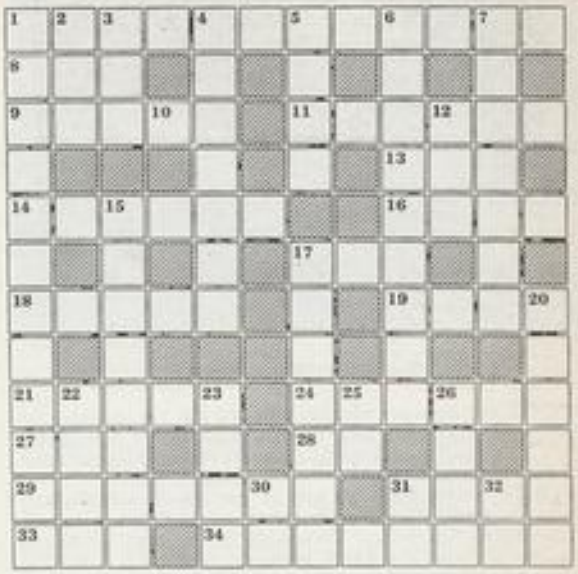
Isolation of the affected fish is recommended on account of the contagious nature of the disease. However, we must not immediately consider this disease as being deadly ; it shows only a slow and gradual progress. Big fish can, therefore, stay alive for years.

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

(*Translated from Het Aquarium*).

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1 *Trachinus* (6, 6)
8 A *Vallisneria* contains this intoxicating drink (3)
9 The doctor Fish (5)
11 Schools of fishes (6)
13 This ends a drip (3)
14 Rebellion or anglers' joy (6)
16 This starts a drip (4)
17 Jack's return for rodent (3)
18 So is a kind of garden pool in the desert (5)
19 Their "eggs" were sold as fish food (4)
21 Confused tutor (5)
24 Opposite of pond ? (6)
27 Call of the cat-fish ? No, a gull (3)
28 Football body in a fantail (1, 1)
29 Crowfoot or *Actinia* (7)
31 —fish, kin to sea horse (4)
33 Ten return for the fisher (3)
34 Water tortoise (8)

CLUES DOWN

1 Back swimming beetle (5, 7)
2 Night of 1 across (3)
3 Bring forth young (3)
4 Sea-urchin (7)
5 Something fishy (4)
6 I lost draw (anagram) (9)
7 In England, burbot; in Scotland, blenny (3, 4)
12 Atmosphere of the fairy-shrimp (3)
15 Variety of 21 across (8)
17 Wheel animalcule (7)
20 Melancholy lair ? (6)
22 A mere net holds girl (4)
23 More than the gait of a sea-horse, but less than 21 across (4)
25 Land of the zulus (1, 1)
26 A dive (1, 3)
30 Compass point (1, 1)
31 Father of terrapins (2)
32 Mixed type—of pike ? (2)

PICK YOUR ANSWER

(1 mark each. No cheating, if you please)

1. Where does the female half-beak (*Dermogenys*) deposit her eggs ? (a) On fine-leaved plants. (b) In the sand. (c) On rocks. (d) Nowhere, it's a viviparous species.
2. What is the scientific name of Buchanan's pygmy perch or blue perch ? (a) *Badis badis*. (b) *Monocirrhus polyacanthus*. (c) *Nandus nandus*. (d) *Polycentrus schomburgkii*.
3. What is (or should be) the colour of the 'sword' in the Wiesbaden green swordtail ? (a) Red edged with black. (b) Yellow edged with black. (c) Green edged with black. (d) Orange edged with black.
4. What is the geographical range of the genus *Aphyosemion* ? (a) From the Gold Coast to Angola. (b) From Morocco to Senegal. (c) From Egypt to Kenya. (d) From Tanganyika to Natal.
5. When treating goldfish for fungus (*Saprolegnia*) in the progressive salt-bath, the dose should not exceed : (a) 2 ounces of salt per gallon of water. (b) 2½ ounces of salt per gallon of water. (c) 3 ounces of salt per gallon of water. (d) 3½ ounces of salt per gallon of water.
6. *Hyphessobrycon serpae* is popularly known as : (a) The Buenos Aires tetra. (b) The spot tetra. (c) The yellow tetra. (d) The flag tetra.

G. F. H.

(*Solutions on page 244*)

A Peaceable Dwarf

(Apistogramma ramirezi)

by S. DAVIES

Photo: W. Senffft (Wochenschrift)

Male Apistogramma ramirezi

FOR any aquarist who has admired the big cichlids and has sighed over their need of large, rather bare tanks, here is a fish having all the beauty and breeding interest of the large cichlids without their disadvantages.

Apistogramma ramirezi, one of the dwarf cichlids, will live in normally planted tanks together with fishes of its own size—about two inches. You must be prepared to supply this species with live foods, however ; without this feeding *ramirezi* will not keep in good health. Breeding is no trouble, and this chronological account of my experiences may encourage readers to witness the procedure for themselves.

At the beginning of June last year I received three *A. ramirezi*, each about one inch long. They were placed in a two foot isolation tank on arrival and started feeding within five minutes. A constant supply of live foods was available and the fish grew well and took on a nice colour. The tank became very green with algae.

The First Spawning

Nine days after receiving the fishes (10th June) I was surprised to find a spawn-covered *Cryptocoryne* leaf close to the front glass of the tank, and to see the two parent *ramirezi* faithfully fanning their eggs. Other fishes were at once removed from the tank. Next day some of the eggs appeared to have been eaten, so the leaf bearing the remainder was removed to another tank in an attempt at artificial rearing.

Hatching occurred on the 12th June, and the young *ramirezi* lay " vibrating " on the bottom of their small glass aquarium ; on the following day they were trying to make little hops. They appeared to be doing very well early on the 14th June but that night I found them all dead, trapped in green algal growth.

The parents, who had been removed to a tank by themselves, were fed with all the live foods (*Tubifex*, white worms, chopped earthworms, *Daphnia*) they would take, and on 21st June a dying floating fern leaf was used for their second spawning. The tank was rather heavily planted and it was not until 26th June that the young fry were seen " hopping " about beneath the female—the male, obviously on guard, three inches away.

Feeding with Infusoria was started, and two days later the fry were gaining strength and swimming very well. On 29th June no young were to be seen ! The parents were removed but subsequent examination of the tank only strengthened the suspicion that they had eaten the fry. However, feeding the adults with plenty of live foods continued and again they spawned, on 3rd July, using an 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 spawnings 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 soon in the same position.

READER'S RECORD:

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 one small eel, "uncut." My choice from the slithering mass of eels was rolled carefully in a newspaper (no easy task) and after paying its cost, fourpence, I carried it home.

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

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

When the tank was required for another purpose, Sammy was transferred to a fifteen-inch diameter zinc wash-tub placed outside on a balcony. There he has remained for over a year now. The water has been frozen over several times, has been soupy and green, with a temperature of 80° F. in the summer, all without apparent objection from Sammy. He has become quite tame, allowing himself placidly to be stroked, and he has increased in size from 10–11½ ins. over two years ago to 14½–15 ins. now (I defy measurement of a living eel to less than half an inch by any ordinary method !).

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

When buried under the gravel with his mouth alone showing I have noticed as many as fifteen small pieces of gravel and stone sucked into Sammy's mouth in an hour. He does nothing to stop this but I have yet to see a single stone disgorged !

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 stony diet.

Should eel-keeping make no appeal to you on other grounds, if you are an eel-pie lover let it be pointed out that there are but few food items capable of being kept fresh on the premises for over two years !

H. Roughton-Skelton

Society News

FEATURE 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 Pondkeepers' Association** last month. The lecturer covered all points concerned in setting up a tropical aquarium, recommended three-quarters grown fishes for first stock and classed chopped 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 when 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. Allies, chairman of Harrow Aquarists' Club.

SUGGESTION box for the use of members is the latest addition to meetings of the **Ilford and District Aquarists' and Pondkeepers' Society**, and following one suggestion one hour of the last meeting was devoted to general discussion on aquatic topics among members; this proved very successful. A table show of danios was held at which a pair of pearl danios owned by Mr. T. H. Thomas gained first prize.

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

FEBRUARY'S "meeting" of the **Midland Aquarium and Pool Society** was taken up with a lecture which greatly interested members—on the anatomy and origin of fish, by Mr. T. P. Haskey. This lecturer is to give a talk to the society on Infusoria in the near future.

FORMERLY known as the Isle of Wight Aquarist 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 barb feeding and breeding. Biology Room of the Ryde 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, Eccles Old Road, Pendleton 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 "lecturette" by a society member and a further evening's lecture by a visiting aquarist.

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

Photo: E. R. Nicholls

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

AN equipment loan service has been inaugurated by the **Wolverhampton and District Aquarists' Society**, so that members can borrow essential items at nominal charge whilst their own apparatus is being repaired or replaced. The February issue of the Society's bulletin includes a report of a lecture on algae given by the chief chemist of Wolverhampton's Water Department and some useful hints on repairing leaky aquaria by a society member.

CHANGES of secretaries have been reported from the following societies: **Banbury and District Aquaria Society** (Mr. A. D. Sawyer, Shutford, Nr. Banbury); **Bridlington and District Aquarist Society** (Mrs. H. Catley, 12, Wright Close, Bridlington); **Colindale Aquatic Society** (Mr. I. A. Williams, 24, Buck Lane, Kingsbury, N.W.9); **Colne and District Aquatic Society** (Mrs. M. Shipley, 31, Slater Avenue, Colne, Lancs); **Peterborough and District Aquarists' Society** (Mr. W. G. Hughes, 39, Chestnut Avenue, Dogsthorpe, Peterborough, Northants); **West Middlesex Aquarists' Society** (Mrs. P. Burton, 14, Creffield Road, Ealing Common, W.5); **Walthamstow and District Aquarists' Society** (Mr. L. A. Ware, 33, Burchell Road, Leyton, E.10); **Winchester City Aquarists** (Mr. G. White, 5, Monks Road, Winchester).

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, Llanbleddian Gardens, Cathays, Cardiff.

SECRETARY of the newly formed **Macclesfield Aquarium Society** Mr. C. Cooper, 4, Cotton Street, Macclesfield, Cheshire, would like to hear from aquarists in the area who wish to become members. Meetings are held in the Club Room, Old Millstone Hotel, Macclesfield.

FORMED in November last, the **Melton Mowbray Aquarist Society** holds its meetings on the last Thursday of each month, 7.30 p.m., at 22, Sherrard Street, Melton Mowbray. Secretary is Mrs. A. Manchester at the same address.

EMPLOYEES of the Grays Co-Operative Society who have formed the **Grays Co-Operative Society Aquarist Club** invite local aquarists to become members. Meetings are held on alternate Thursdays, 7.30 p.m., at the Employees' Sports Club, Marsh House, Bridge Road, Grays, and the secretary's address is Mr. F. Clark, 60, Harlow Road, Rainham, Essex.

CHANGE of name of the Wandle Valley Aquarists' Club to the **Mitcham and District Aquarists' Club** is announced by the secretary, Mr. S. M. Southey, 40, New Barns Avenue, Mitcham, Surrey. Meetings are held on first and third Fridays each month at "The Canons," Mitcham.

FIRST meeting of the **Portsmouth Aquarists' and Fish-keeping Club** was held last month, when over 75 members enrolled. Meetings are to be held monthly (first Wednesday) 7 to 10 p.m. at the Avenue Hotel, Stamshaw, Portsmouth, and the secretary is Mr. J. Errington, 10, Wimbledon Park Road, Southsea, Hants.

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

HEADQUARTERS of the **Aquarists' Society** sub-section of the **Smiths of England Athletic Club** are at the Cricklewood Works of this organisation, London, N.W.2. It is hoped shortly to inaugurate "Guest Night" meetings to which members of other North London societies will be invited.

JUNIOR members of the Southend, Leigh and District Aquarist Society have now formed their own society, known as the **South-East Essex Junior Aquarists' Society**. Meetings are on the second and fourth Tuesdays each month, 7 p.m., at Chalkwell Schools, London Road, Chalkwell, Essex. Secretary is Mr. G. E. Moss, 101, North Crescent, Prittlewell, Essex.

INCREASING interest in aquarium and pondkeeping 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 Organisation series (January to May 1950). Secretary is Mr. M. A. Dodson, Wolverton House, Higher Warberry Road, Torquay, Devon.

FESTIVAL OF BRITAIN AQUARIA

APPEAL for fishes native to London, Lake District, New Forest, Pembrokeshire, Malham, Ulster and Bristol waters to be offered for sale to Fish Tanks Ltd., traders supplying some of the aquarium exhibits at the Festival of Britain, is made. This firm is also supplying aquaria for the Children's Zoo, Festival feature in Battersea Park, and a furnished aquarium in the International Press Bar. A six foot furnished tropical aquarium for the Homes and Gardens Pavilion (Hobbies Section) in the South Bank Exhibition has been presented by Aqua-Tanks of Hammersmith, in association with the Lee Reid Company of Ealing, who are sharing costs of installation and maintenance. Singleton Bros. and Aquafern are loaning equipment.

Photo: B. Griffiths

Officers of the Shirley Aquarists' Club with awards and trophies won by society members in 1950. Left to right: Messrs. W. Chambers, C. Hornby (librarian), D. May, N. W. Gilbert (president), R. Bridgwater (secretary), W. Quicke, E. Lightfoot (vice-president), F. Walker (treasurer), A. T. Burden. Seated: Mr. and Mrs. J. Burden.

Forthcoming Events

ANNUAL General Meeting of the **British Herpetological Society** is to be held on Saturday, 17th March at the London Zoo, Regent's Park. The meeting, commencing at 3.30 p.m., includes a tea and visit to the Reptile House by the invitation of the curator.

EXHIBITION of tropical and coldwater fishes, and some reptiles, is being staged by the **West Greenwich and District Aquarist and Pondkeeper Association** in conjunction with a shell egg show of the Charlton Poultry Club at Kidbrooke House, 79, Shooters Hill Road, on Saturday, 17th March from 2 p.m. to 7 p.m. Admission free.

FILM Show arranged by the **West Bromwich Aquarists' Society** will take place on Monday, 19th March, 7.30 p.m., at the Y.M.C.A. Hall, West Bromwich. Seven sound films on various aquatic subjects are to be shown.

APPLICATIONS for schedules for the **Hendon and District Aquatic Society's** Festival Open Show to be held Bank Holiday Monday, 6th August, should be made now by intending competitors to Mr. D. Cannon, Show Secretary, 7, Courtleigh, Bridge Lane, Golders Green, N.W.11.

CHANGE OF ADDRESS

THE Scottish Fisheries give notice of removal of their premises to 107-109, Broughton Street, Edinburgh, to which address all correspondence should now be sent.

Crossword Solution

W	E	E	V	E	R	F	I	S	H	E	S	
A	V	A	■	C	■	I	■	W	■	E	■	
T	E	N	C	H	■	S	H	O	A	L	S	
E	■	■	■	I	■	H	■	R	I	P	■	
R	I	S	I	N	G	■	■	D	R	O	P	
B	■	I	■	U	■	R	A	T	■	U	■	
O	A	S	I	S	■	O	■	A	N	T	S	
A	■	C	■	■	■	T	■	I	■	■	A	
T	R	O	U	T	■	I	S	L	A	N	D	
M	E	W	■	R	■	F	A	■	D	■	D	
A	N	E	M	O	N	E	■	P	I	P	E	
N	E	T	■	T	E	R	R	A	P	I	N	

PICK YOUR ANSWER (Solution)

1 (d). 2 (a). 3 (b). 4 (a). 5 (c). 6 (b).

6 marks—Wunderbar!; 5 marks—Excellent; 4 marks—Very good; 3 marks—Good; 2 marks—Fair; 1 mark—Poor; 0 marks—Dunnkopf!

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