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Editorial

IN 1953 a report to a scientific journal concerning the breeding of the guppy caused some consternation among aquarium specialists in this species. This report described some observations which suggested that female guppies in a University College, London, laboratory had produced living youngsters from eggs that had never been fertilised by a male fish. Females isolated from all other guppies at a very early age were seen to give birth to small numbers of such fatherless litters.

The possibility of virgin births in the guppy had certainly never been considered or recorded by guppy breeders, so that a great deal of criticism was directed towards this report, and some of their number have refused to accept the details even to this day. Explanations of the events described in the report, that were advanced by some aquarists, were far too facile to constitute serious criticism of the work, overlooking as they did the care with which experienced laboratory workers conduct their experiments. However, no-one could be said to be unsurprised, because despite a poorly substantiated earlier report of virgin birth in the mollie the event was quite unexpected. Amongst scientists, judgment was reserved, but observations have been continued and a further paper from Dr. Helen Spurway, author of the original report, has now appeared in *Nature*.

It seems that the births originally recorded were not truly virgin ones, or parthenogenetic, as was at first supposed. However, they were almost certainly brought about without the participation of a male guppy, and the explanation is that "self-fertilisation" was responsible. Within the female guppies concerned there has since been demonstrated to be male testicular tissue present, and this presumably had provided sperms to fertilise the eggs of the same individual. Thus the observations are to be accounted for by hermaphroditism, a matter of no lesser importance than parthenogenesis for the guppy breeders to take into consideration. As we wrote in 1953, it remains to be seen with what frequency this phenomenon occurs in aquarium guppies and whether other livebearers ever show the same behaviour.

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Microscopy for the Aquarist—37 by C. E. C. COLE

THOSE readers who are closely following the practical notes in this series will by now have already examined the specimens of "beetles-in-caustic" quite a number of times, and (it is hoped) on each occasion have found the creatures softer than on the previous occasion.

The action of the solution should have reduced the internals of the beetles to a thick liquid which can now be removed by pressure on the abdomen or back. It flows out through the anus, and finds other exits through weak spots in the body wall, between segments of the body and often through the neck.

It is as well to pour away the solution of caustic and replace with distilled water. Repeat the gentle pressure, noting how the water becomes cloudy with fresh expelled matter. Repeat washing half a dozen times to ensure the complete removal of the remaining solution. Should any be left there is a danger of it crystallising at a later stage and spoiling an otherwise good slide. To be doubly sure therefore it is a good plan to leave the specimen soaking in a little distilled water for a day or so after no more thick liquid can be expelled from it. At the same time, do not forget and leave the specimen soaking indefinitely, for it has not been in preservative and will easily disintegrate and be largely useless if you make this mistake.

When clean it will be at once apparent that the empty "shell" of the beetle is a great deal more transparent than it was. This is a decided step in the right direction. It is also much softer, and can be flattened easily. The elytra tend to open, revealing the soft, membranous wings. Leave these alone; unravelling the wings is a tricky business, resulting frequently in their complete mutilation.

For the present simply remove the insect bodily into a few millilitres of concentrated acetic acid. This is a preservative, and the beetles can be left in it indefinitely without deterioration. Not only this, but acetic acid will keep the tissues soft and pliable, invaluable when we come to arrange specimens for mounting.

A comparison might well be made here between specimens treated as I have outlined and those from our preserving stock (formalin preserved) which have been untreated. The latter are brittle and thoroughly uncooperative whenever we try to spread them out for better observation. If we can move legs and elytra at all without snapping them off wholly or in pieces, they spring back to their original bunched-up position as soon as we remove our pointers. Not only this, but they are still thick and opaque—very little use at all, in fact. They can, of course, still be treated by caustic solution and subsequently placed in acetic acid, so don't throw them away.

It is as well now, to prepare for the next steps we wish to take. For these we shall need clove oil, rectified spirits of turpentine and Canada balsam or Euparal Essence and Euparal Mountant. Personally I prefer the latter alternative. Quite a useful accessory is a small sable-hair brush, which will help when we are arranging our specimens on glass slides.

It is unlikely that you will be able to get the chemicals specified from your local chemist. You will probably have to go to a regular dealer in such articles. Flatters and Garnett, of Oxford Road, Manchester, are suppliers I can personally recommend. There are others, of course, but I have not had any dealings with them. As prices are frequently changing, a letter specifying your requirements and asking for a quotation for the supply thereof is wisest. At the same time, cover slips, cavity slips, staining pots and anything else you think you'll need can be ordered.

When everything is to hand we can remove our speci-

mens from the acetic acid, and place them one at a time in a shallow dish of distilled water. You will find that they are quite soft and pliable.

After a soaking in water remove them carefully on to glass slides and try to arrange them spread out to show as many as possible different parts. The legs should be widely spaced so as not to obscure one another; the elytra, the pattern of which should by now be plain, can be arranged partially opened. The trickiest part is unravelling the wings, which seem to delight in tying themselves into knots. If you are very careful and persistent you may be successful, and if you are it will undoubtedly be a surprise to you to see how really large the fully outstretched wings are in comparison with the length of the body.

The antennae should be arranged so that they are not obscured by the head. A low-power lens will help to reveal how they are lying, as will placing the glass slide on a sheet of white paper.

At this stage the insect, or the hollow shell, for that is all we have left, is fairly flat, but we need it much thinner yet. A second glass slide is carefully lowered on top of the first, so that the beetle is now the filling in a glass sandwich, and pressure supplied to squeeze the creature as flat as possible. The two slips are tied securely together and popped into a screw-topped jar of methylated spirit or rectified spirits of turpentine.

The spirit will not harden the specimen to any marked degree, but it will remove any vestiges of water remaining in the tissues if given long enough. We will leave it in the solution until next month.

In the meanwhile there is nothing to prevent you trying caustic solution on any other specimens of aquatic creatures you may have—preserved or otherwise.

Shrimp Fish Flown to London

THE Aquarium of the Zoological Society has recently received some specimens of the shrimp fish *Aeoliscus strigatus*. These fish were sent by Mr. George Newmark, with the co-operation of Mr. A. Fraser Brunner, Curator of the Van Kleef Aquarium at Singapore. They were flown from Singapore in a Bristol Britannia, and the whole journey occupied scarcely more than 24 hours from door to door.

Shrimp fish belong to a group which all have a tiny mouth placed at the end of a tube-like snout—the sea-horses also belong here. The body, which is about 4 in. long, is covered with thin bony plates and the lower or ventral edge appears sharp; hence the name "razor fish" by which they are known in Malaya. The tail end of the body terminates in a spine and the true tail appears to be on the ventral of the body. They are nearly always found swimming in the water in a vertical position with the snout pointing directly downwards. They live in small shoals in the upper waters of the Indian and Pacific oceans, and feed on plankton animals of a size capable of passing the small mouth.

In the Zoo Aquarium they are being fed on freshwater *Daphnia*, and they can be seen to suck these into the mouth, the front part of the body quivering at each mouthful. They move from one side of the tank to the other by the vibration of what are really the dorsal fins, but they seem to use their pectoral fins to change position up and down. Certainly the pectorals are used more than in a normal fish, and they move alternately, not in unison.—*The Times*.

Search for the Pygmy Swordtail

by MYRON GORDON
Geneticist, New York Zoological Society

WHILE busy sorting out a preserved collection of Mexican fishes that I had made in 1932 I found a small, strange, short-tailed swordtail which eventually turned out to be a new species. Its discovery, as so often happens, was not realised at the time of the fish's capture amidst the romantic jungle surroundings of its native tropic stream. The new swordtail was first seen in a white enamelled tray in the laboratory amidst odours, not of orange blossoms and gardenias but of gaseous formaldehyde and vapours of fishes steeped in alcohol.

I had been picking out the usual fishes from the collection such as mollies, gambusias, characins and the *variatus* platy and *montezumae* swordtail. All are common species to aquarium fish hobbyists to-day but the last two were rare fishes then. I was sorting them systematically by species and arranging them neatly in rows in my trays when I spotted a tiny, thin wisp of a fish only an inch long that was a bit like a platy and a bit like a swordtail but which did not fit exactly into any specific category.

I was puzzled and I asked Dr. Carl L. Hubbs, when he was the Curator of Fishes at the University of Michigan, to look at it. Hubbs took the tiny sliver of a fish in his hand, reached into the drawer of his work desk for a watchmaker's magnifying glass and slipped the glass into his right eye like a monocle. He brought the tiny specimen into focus close to his lens, rolled the fish over several times with his fingertips and inspected it from every angle. He then pulled the lens from his eye, looked at me, squinting a little as his focus was adjusted to my distance, and said, "This looks like a new swordtail."

I asked, "Could this possibly be a young specimen of the *variatus* platy or the *montezumae* swordtail or maybe a hybrid between the two xiphophorin species? All of these fishes were taken together in the same isolated pool."

Hubbs put the magnifying glass back over his right eye and gave the fish another thorough inspection. "No, I don't think so," he said in a muffled voice as he held the tiny specimen close to his eye and mouth. "This is a new species. It's a young male, or at least a poorly developed male. Here, have another look at it," he suggested.

The fish had the characteristic swordtail dark line, running down from a point of its eye, that zig-zagged to the tail, but the line was much broader in it than in any other swordtail I had known. Another black line ran along the lower margin of the muscular portion of the tail. And on top of the head and back small black pigment cells formed a series of broad reticulations; these were quite unique among the fishes of the xiphophorin group.

I examined its anal fin. It was not fan-like and transparent as an anal fin in the female should be. Nor was it like the anal fin in a perfect male: narrow, transparent, rod-like and divided into tiny clearly demarcated segments that end in a series of spines and retrorse hooks. Actually

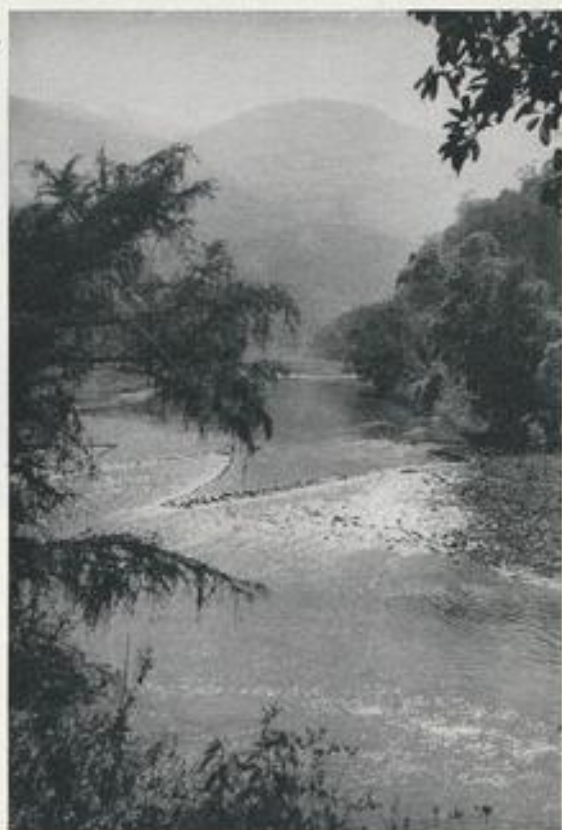


Photo:

F. G. Wood

A view of the Rio Montezuma just north of Tamazunchale, San Luis Potosi, Mexico. Below Tamazunchale this river is the home of the *variatus* platy and the *montezumae* and *pygmaeus* swordtails

the fin was spatulate, flabby, opaque and greyish-white in colour; this indicated that its tiny owner was a poorly developed or abnormal male.

The Pygmy is Named

Just to be sure I looked again into the storage bottle that had contained the entire lot, including the single puzzling specimen, in the hope of finding another more perfect one. Only the alcohol-soaked paper label remained that indicated the time, place and the personnel involved in making the collection.

The unique swordtail left us in an unresolvable dilemma. In all probability, we had a new species of swordtail, yet we could not adequately describe it on the evidence of a single specimen. We could not make it known to the scientific world because it had an imperfect anal fin and therefore lacked the essential diagnostic characters which would have differentiated it unmistakably from its close relatives. Tentatively, Hubbs and I tagged it the pygmy swordtail for purposes of cataloging it. That was the best we could do at the moment and until such a time as when somebody

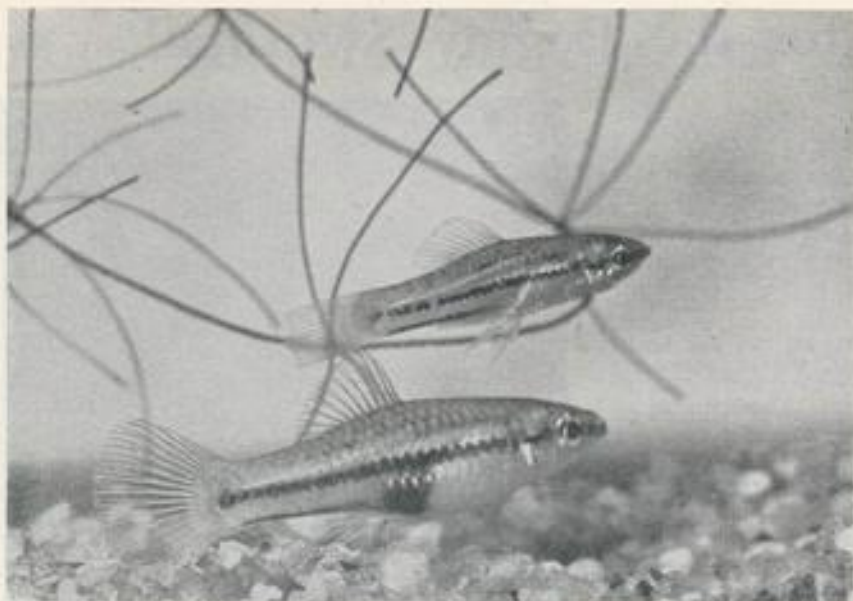


Photo:

N. Y. Zoological Society

A pair of pygmy swordtails

would organise another expedition to Axtla in San Luis Potosi. The urge to go back to Mexico immediately to solve the mystery of the pygmy swordtail was great, but greater still was the cold fact that it would take more money and time than I could afford then.

With a pair of forceps I reached into the storage bottle and removed the paper label soaked in fish-oil in order to check the location of the bothersome collection. The indian-inked legend read as follows: "Mexico, San Luis Potosi, Rio Axtla at Axtla; April 20, 1932; Collectors, Myron Gordon, John Ross and Joseph Whetzel."

Making the Collection in 1932

As I re-read that familiar label my thoughts drifted back to the time, place and circumstances in making that routine collection of fishes at the Rio Axtla. I recalled that my field assistants had been Johnny and Joe, 17 years-old sons of two Cornell University professors who had jumped at the chance of going on an expeditionary drive to Mexico. I recalled our driving south from Ithaca, New York through a March blizzard that hit us in the Blue Ridge Mountains in Virginia, and then working 2 weeks later under the strong anaesthetic influence of Mexico's heat in the Papaloapan valley in the state of Oaxaca.

By mid-April we had completed our fish collecting in southern Mexico and had returned to its capital. There we learned that the Pan-American Highway Commissioners had announced the final breakthrough in the continuous road from Mexico City to Laredo, Texas. They warned that clean-up operations would prevent opening the road to the public but we decided to take our chances in getting through. Acting upon the advice of the highway officials we left Mexico City in late afternoon to enable us to cover most of the good roads north of the city before sunset and be ready at dawn for the bad ones.

As we headed north and homeward we were pleasantly keyed-up. We had already accomplished our chief mission deep in the state of Veracruz and Oaxaca where we had collected the common *maculatus* platyfish and the *helleri* swordtail and had sent some live ones back to the laboratory.

The fact that dangerous roads were ahead meant little to us, for we had already managed to get over just about every type of terrain, seldom-travelled desert ox-trails, old Spanish post roads, abandoned and forgotten 300 years ago, ocean beaches and riverbeds, some with, and some without, water.

At dusk of the second day we had reached the banks of the Rio Axtla, a clear, fast-flowing stream and an upland branch of the much greater Rio Panuco. We looked for a *chalon*, a platform-like ferry that the Mexicans usually use to get vehicles across their streams and which they operated in other rivers by utilising the power of the flowing stream and by attaching the floating platform to a strong iron guiding cable stretched from bank to bank. The method at Axtla was different and more primitive; a team of four mules simply pulled the vehicles across the stream over a shallow section which the muleteer knew. At night, without his help, it was too hazardous for us to ford the stream over a shallow section and we had to wait until dawn of the following day.

Upstream, well within the river bed, I spotted an isolated pond which seemed not too big, not too deep, well suited for the seining type of fish-catching we were prepared for and for which we had plenty of experience. The pond lay near a cut-in slope of the river bed and must have been scooped out by swirling waters of an eddy during the past rainy season. The main course of the river flowed over the rubble 10 feet away. In the isolated pool tadpoles by the hundreds wriggled through the dark stagnant waters, repeatedly bobbing to the surface for air. Some fish were dead, floating bellies up, while others, like the polliwogs, were gasping at the surface.

The prospect of entering the stagnant and murky pool with its fetid and dying population was less inviting but this wasn't the first time in our job we had to overcome squeamishness. Once wetted and muddy we concentrated on seining, and on the very first haul we came up with a bonanza of bright, new, live-bearing fishes. In our seine I beheld my first living specimens of the red-tailed *variatus* platyfish and bright lemon-yellow top-finned *montezumae*

swordtails. Known only to a few scientists from long-preserved specimens in natural-history museums the living fishes now in our seine far surpassed in beauty my preconceived notion of what they would look like alive.

Some of the male platyfish were almost 2 in. long and their bodies glistened with a mother-of-pearl sheen of light blue-green. The male swordtails were slightly larger, deeper bodied and had peculiar short turned-up sword-like lower extensions to their otherwise rounded tails. Their flag-like metallic-yellow dorsal fins high-lighted the mud-spattered seine as it lay along the slope of the pool.

The work immediately ahead for us was obvious—we had to get these new fishes to the United States alive. Within this fetid pool were swimming highly desirable aquarium fishes, which meant the money wealth that would cancel my financial obligations of the expedition. Five chance-taking aquarium-fish societies and dealers helped me organize the Mexican trip solely on the promise that if new fishes were discovered they would be the first to share in the good fortune.

From western Veracruz we had already shipped the cold-water *helleri* swordtails from the mountain streams of Jalapa and the lowland race of the *maculatus* platyfish from the Rio Papaloapan in Oaxaca, the first fresh stocks of these species ever sent out of Mexico directly to the United States. But the latter were merely different strains of well-known species, whereas *variatus* and *montezumae* fresh from the Rio Axtla represented bright new species for American aquarists.

Organising the Shipment

By prior arrangement and in anticipation of making a find like this, we had previously forwarded by express many large fishing cans to key stations along the north-south line of the Mexican National Railroad. Our nearest cans were located at Valles, 50 miles to the north. So, after returning all the live fishes we had caught to the pool, and hoping they would survive another day in its deteriorating waters, we left immediately for Valles. Our car was dragged across the Rio Axtla to the north bank and from there on we drove over a freshly cleared land strip that eventually was to become part of the paved Pan-American Highway.

Heavy road trucks had corrugated the earthen surface,

making driving jittery and dangerous. Then I heard a persistently repeated crunching sound in the direction of the right front wheel. This turned out to be a broken ball bearing, but we continued driving slowly, hoping that the wheel would hold until we reached Valles. Visions of a long delay in obtaining one Chevrolet ball-bearing assembly in this one-track wilderness, and as a consequence losing our aquatic treasure, already in a precarious state, were maddening.

Ahead, barely off the road I saw a palm-thatched shelter—just four posts and a leafy roof—that some enterprising Mexican auto-mechanic had set up to cash in on the road-truck trade. We pulled up and I asked if by some miracle he had an extra wheel bearing. Most of his meagre stock was pinned upon nails and wires attached to the cross beams of the roof. Casually he glanced at the make of our car, reached up to a makeshift shelf, brought down a box and presented us with the precious part we needed.

"It's the last one I have," he said apologetically. "The roads here are bad, *muy malo*. Do you want me to fix the wheel for you—it won't take long."

"Si Señor," I said, "I would be most grateful to you."

I was. How much, he had no way of knowing.

It was just before dusk when we returned to the southern bank of the Rio Axtla with our ten shipping cans. We found a place near town that fed us on fried eggs, black beans and coffee; later, we set up our camp cots near the pool, guarding it as if it were the site of a gold strike.

At dawn next morning we filled the cans with fresh, clear Rio Axtla water, set them down beside the pool and began to seine. We had to work fast because we had to have the live fishes on the morning train out of Valles for their journey north to our custom agent at the Texas-Mexican border. He had been instructed to trans-ship the fish to our laboratory in New York. The liveliest and best-looking platys and swordtails were carefully transferred from their slum home to cans of fresh water. The other fishes, big and small, were preserved in formalin.

Little did I realise at the time that from the purely scientific point of view there was greater value deposited in our formalin bottle in the form of a lone unrecognised new species of pygmy swordtail than the hundreds of large live, brilliant *variatus* and *montezumae* that we placed in fresh

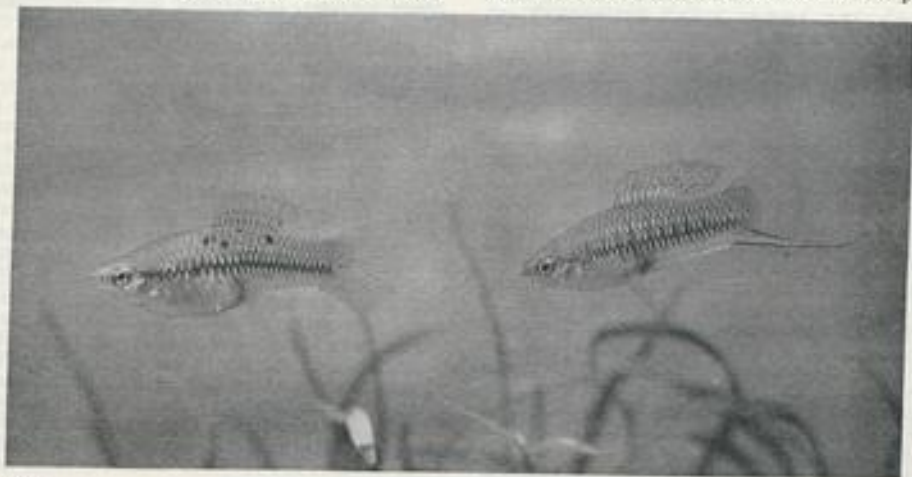


Photo:

A pair of *montezumae* swordtails from the Rio Axtla. The male has a definite sword, but it is not as long as that found in the *helleri* swordtail, and its sword has a tendency to turn up a bit. The female, on the left, is spotted: this trait is inherited as a simple Mendelian dominant. The *montezumae* reach a size of $3\frac{1}{2}$ to 4 inches

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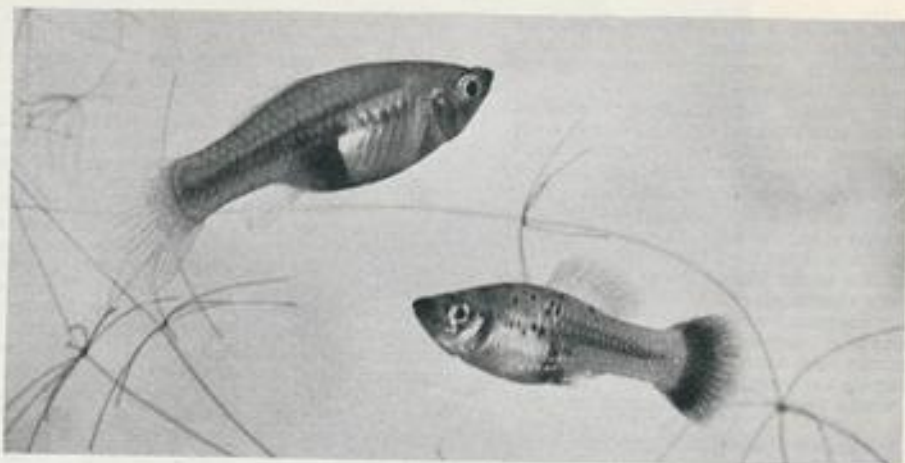


Photo :

N.Y. Zoological Society

The *varietus* platyfish from the Rio Axtla. The male has a brilliant red tail that shows up as blackish in the photograph; its large dorsal fin is bright lemon yellow. The black spots on its sides are inherited as a sex-linked dominant trait. The female, to the left, may also be spotted or not. Sometimes both male and female have a shaped mark just in advance of the tail fin. Sometimes the crescent mark is divided. All these markings are inherited.

water for shipment north. As it turned out it was fortunate that we brought some fishes back alive—but it was more fortunate still that we brought others back pickled.

The 1939 Expedition

For the next six years funds for continuing our research became scarcer with each passing year. Then, in 1938, the John Simon Guggenheim Memorial Foundation of New York City, sponsor of many artists, writers and scientists, helped me to re-establish and expand the scope of the original research project at the New York Aquarium, then in Battery Park on the lower tip of Manhattan. The New York Zoological Society offered me space for several hundred tanks on the long, narrow catwalk that went almost halfway around the octagonal Aquarium building. The walk was just below the skylights and it overhung huge concrete aquaria that were devoted to huge sharks, rays, tarpon and groupers.

To get fresh stocks of fishes I planned my third expedition to Mexico during the dry season, early in 1939. Among the fishes I wanted to find, none was more enticing than the mysterious pygmy swordtail that I had discovered in 1932 in a dirty pool of water along the banks of the Rio Axtla. But the basic purposes of my trip called for the collection of the *maculatus* platyfish and the *helleri* swordtail in southern Mexico. These two species were essential for additional work in cancer research. Little did I realize at the time that every new species of swordtail would be useful in attaining information concerning the influence of heredity in the origin of cancer. Research with some of them showed that two non-cancerous parents could transmit genes to their offspring that would heighten their chances of getting black cancer.

In January of 1939, James W. Atz of the New York Aquarium and I drove down to the north bank of the Rio Axtla. Gone were the corrugated dirt roads and growths of cacti and mesquite along the roadside. They were replaced by smooth macadam roads, irrigated citrus orchards and farms. We used the new motels that had opened along the Pan-American Highway because they saved us time spent in setting up our camps, but they were

a poor substitute for the excitement and novelty of eating and sleeping along deserted fields and river banks.

A new steel-and-concrete bridge enabled us to get across the Rio Axtla quickly. I looked around in the wide, rubbly river bed trying to spot a pool similar to the one I had fished in 7 years ago. There certainly were changes and I expected that there would be because every year rushing spring and summer flood waters recontour the river valley. Jimmy was as eager as I to solve the pygmy swordtail mystery. Now it seemed close to solution.

We approached each pool with enthusiasm and confidence. I scrutinized each specimen we caught before and after putting it in our collecting bottle. Again we found many *varietus*, *montezumae* and other typical Rio Axtla species, but no pygmy swordtails were among them. I was at a loss to account for our failure, for the places we fished in were similar to the pool of 1932. Despite our desire to pursue the now deepening mystery of the pygmy swordtail's whereabouts, we could not carry on the search at the Rio Axtla the next day. We had to leave immediately for the exploration of the states of Chiapas, Oaxaca and Veracruz. Before leaving I told Jim that we would return to the Rio Axtla about 2 months hence and I vowed I would not leave the river until the problem was solved.

In southern Mexico, we were quite successful in getting fresh stocks of the live *maculatus* and *helleri* for my cancer research at the New York Aquarium, and Jimmy had volunteered to take the shipment home by boat. This left me free to pick up the other swordtail and platyfish species in northern Mexico and search again for the elusive pygmy swordtail. It was late in April when my wife Evelyn and I arrived at Tamazunchale, about 20 miles south of the Rio Axtla. Senor Salvador Coronado, who was on leave from his duties at the Mexican Department of Fisheries, offered to help us. He had discovered the blind characin fish in Cueva Chica not far from Axtla but knew nothing of the small swordtail species.

North of Tamazunchale the road rises several hundred feet, leaves the Rio Montezuma valley behind and enters that of the Rio Axtla. Trickling brooks north of the divide at Matlapa, Patitla and Jilitla flow north-east where they join

and give much substance to the Rio Axtla at Axtla. Day after day we systematically fished each arroyo, each brook and river, every isolated pool, spring and mud hole between Tamazunchale and Axtla, but we found no pygmy swordtail. Then we concentrated on the Rio Axtla proper in what appeared to be the identical area and almost the same time of year that we fished in 7 years ago.

We found that *montezumae* swordtails preferred the deep pools to other ecological niches. We found that the *variatus* platyfish congregated in large numbers in springs that spilled over into larger running streams. But we failed to find the pygmies. Then we fished in the riffles; we uprooted the rocks in midstream and we caught the dislodged and startled fishes that were swept into our seine. The swordtails we were looking for were not there. Finally, in desperation, we resorted to the most unsportsmanlike of all ways in catching fishes; we poisoned small areas of water with derris-root powder. As a result of our operations we accumulated one of the finest faunal surveys of the headwaters of the Rio Axtla ever made—but we failed to find the pygmy swordtail.

No doubt about it, I was baffled almost to the point of complete frustration. Never before had a species whose geographical range I knew, eluded me. Previously I had found the rare *couchianus* platy after 5 days of searching in the Huasteca canyon near Monterrey. I had collected the first purple spike-tailed platy (*xiphidium*) ever to be taken from the Rio Tamesi and successfully shipped them north to Carl Hubbs. But for some unaccountable reason I could not rediscover the whereabouts of the pygmy swordtail.

After the fifth day's search, for it was as fruitless as the others, Coronado began to express doubts as to the existence of such a fish as I described. He said that neither he nor any of the local Indians he had questioned had ever seen or heard of it. I didn't argue the point although I knew from my own experience that Mexican fishermen do not bother to differentiate between the many species of small fishes that are common everywhere. To them, all small fishes are *topos*, little, insignificant ones, for which women fish with umbrella-like nets set on the bottom of a pond or stream and which they lift up from time to time; the fishes end up in their *tamales*.

Success at Last

By 5 o'clock of 14th April, 1939, Coronado and I were all in, hot, tired and ready to quit seining; we had been

fishing since dawn all along the shallow southern river bank at Axtla. We were muddy up to our cars, and the clearer, deeper waters that raced and cut into the opposite north bank were inviting. We waded across the shallows along the south shore to the steep-sided north bank. Then we walked along the edge of the high embankment to a point where the swift waters had undercut the land and formed a deep curved pool in the river bed. It seemed like a perfect spot for diving. We laid our gear on the grassy area and then dived into the clear, swift waters; the temperature was about 75° F., just right, not too hot or cold. I swam vigorously just to maintain my position in the strong current.

After a few minutes of swimming I became winded so I spurted towards the steep river bank. As I approached the undercut shoreline I got entangled in long strands of thin, ribbon-like eel grass which were rooted in the submerged soil. The strong current buffeted the grassy strands so vigorously that they waved almost horizontally in the water. As I swam through the tangle of waving aquatic grass, I must have flushed a school of tiny fish from their grassy retreat. I got just a flashing glimpse of them—a few silvery-blue streaks, that's all—yet I realised immediately that the fish were unlike anything I had ever seen previously in Mexican waters.

I called to Coronado to check my observation but he had seen nothing. The problem of seining swift and tiny fish in such a situation seemed hopeless. From the overhanging bank the water surface was 2 ft. below us. If we approached the shore line from below the surface would have been above our heads. We had no choice except to try the operation from above. We took our 10 ft. seine, stretched it out between us, got on our knees and threw the mid-section lengthwise into the water, allowing the lead line to hit the surface of the water first.

Then, lying down belly-wise we managed to twist the sticks of the seine in such a way that the lead line went down under the water's surface ahead of the cork line. Then we directed the lead line towards shore, pushing it first through the stand of aquatic grass and then against the bank. After that we hauled it up and laid it on the grassy shore. It was awkward work and I noticed that during the lifting of the seine through the air many of the tiny fish wriggled in their slippery way through its quarter-inch mesh. Still others got away into the thick grass by the time I got to my feet.

An isolated pool in the bed of the Rio Axtla. The river bed is several hundred feet wide. As the waters recede during the dry season, pools like this one become isolated and trap fishes including *variatus* and *montezumae*, and other aquatic animals. Sometimes, the pygmy swordtails which ordinarily live in fast water, are also trapped. This accounts for the finding in such a pool, one pygmy swordtail in 1932, none in 1939. During both periods, it is most likely that thousands of pygmy swordtails were swimming about not far from these pools in another part of the river



Photo:

F. G. Wood

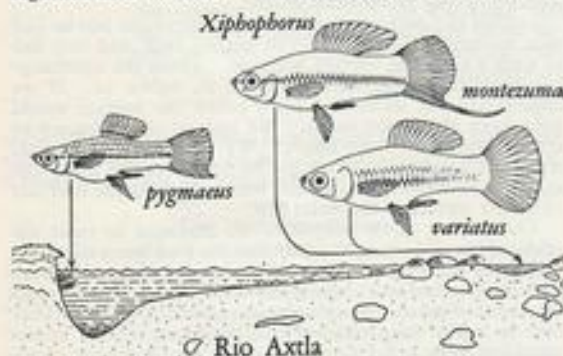
Finally, I got one quick look at the fish that stayed put, and they were a pure colony of the elusive swordtails!

"Rare only Until . . ."

All the time the pygmies had been living in deep, clear, swift water. I had never suspected that this swift-water habitat was suitable or even possible for any xiphophorin fish. Once I had learned the secret of their hiding place, I obtained more than 300 perfect pygmy swordtails within half an hour. There must have been thousands of them within a 100 ft. stretch of the river.

My experience of searching and finding the pygmy swordtails reaffirmed an old collector's saying that "a rare species is rare only until its ideal habitat is discovered—after that the species is common."

I placed a few of the small, minnow-like swordtails in a glass jar containing clear river water to enable me to watch their movements at close range. They were sleek, beautifully streamlined and swam gracefully, almost effortlessly. The females, easily identified by their fan-like anal fins, were trim but slightly larger and plumper than their inch-long, gonopodium-equipped males. Only the most perfectly formed males had what, only by definition, could be regarded as a "sword." I had to look close indeed to see



Habitat of three species of *Xiphophorus* in the Rio Axtla. The pygmy swordtail is isolated from other species of xiphophorins, despite the fact that it is found in the same cross section of the Rio Axtla. It lives along the undercut slopes in deep, fast water, whereas *X. montezumae* and *X. variatus* occur together along the slow, shallow water of the slip-off slope, as shown in the diagram. From "Copeia", 1953

the "sword" because it was so small. In comparison the "sword" of the more northern purple platyfish of the Rio Sota la Marina was much longer. Because of this and other contradictions in the stated differences between swordtails and platyfish, we found it necessary to close ranks between the platyfishes and swordtails and to place them into an identical generic group.

Since the adult "pygmy" swordtail was indeed small, Hubbs and I, some years later, formally named it *Xiphophorus pygmaeus*. There was never any doubt it was a good and true swordtail species once the tips of several male anal fins were inspected under the microscope. These gonopodial tips are only one-tenth inch long but their various-shaped hooks and spines are as diagnostic as human fingerprints.

The female pygmies are strikingly beautiful, with their purplish-blue colouring that is highlighted by glistening greenish lines. Some males resemble their females in their handsome blue colours; others are more subdued in their colouring, being slate-grey, while other males have strong golden overtones. The male pygmies' tendency for colour polymorphism parallels the characteristics of their two Rio Axtla relatives, the *montezumae* and *variatus*.

The unexpected discovery that pygmy swordtails live mainly in the swift waters of the Rio Axtla demanded a revision of former concepts concerning the habitats of the xiphophorin fishes as a group. The shallower areas of streams, the deeper, quieter pools of small brooks, the water-weed tangles of spring runs, the isolated and often stagnant pools left by receding flood water were regarded as their usual habitats. The pygmy, the most unlikely member from point of view of size and strength, was the exception. I wondered what physical qualities the pygmy has that enables it to flourish in fast water. What kind of food does it get there that may be missing elsewhere in the river? Nobody knows the answers to these questions.

In laboratory aquaria each of the three xiphophorin fishes—*pygmaeus*, *variatus*, *montezumae*—is perfectly capable of hybridisation with one another. Why is it then that in the Rio Axtla not a single hybrid has been found between any two of the three species among the more than 2,000 specimens that have been captured so far? Now we know that in the Rio Axtla the three closely related species live in relative proximity to each other. We also know that their wanderings occasionally take them into each other's favoured territory. We know, too, floods may drive them out of their own preferred habitat to that of another. After all, they live merely on opposite sides of the river.

Behaviour Patterns

If then, physical barriers in the field and structural differences in their bodies do not deter inter-mating of the species, what force is it that under natural conditions keeps them sexually true to their own species. The answer lies in the field of animal behaviour.

The problem of animal communication is still influenced more by myths and fairy tales than by the information obtained by animal behaviourists from their carefully conducted experiments. They say that fishes are capable of movements (other than those used for ordinary swimming) which are meaningful in various ways to their immediate associates. Some of these movements of the body and fins convey visual signs of aggression or passivity. Other movements, like quick thrusts of the anal fin or a circular manoeuvre of the body, may reflect a step in courtship, procedures often required by some fishes before mating. In these visual signs and portents, the colourful areas on the male's body or fins may enhance the visual effect upon the female.

For purposes of courtship perhaps each male xiphophorin in the Rio Axtla has a variety of colourful patterns. Some

(Please turn to page 216)



BOOK R E V I E W

Encyclopedia of Tropical Fishes by H. R. Axelrod and W. Vorderwinkler. Sterling Publishing Co. Inc., New York, U.S.A. £3.

THE boom in the hobby in recent years has been reflected in the large number of books which have been issued and these have played their part in educating the would-be hobbyist in the many and varied aspects of the piscine fancy. Of necessity, the majority have been written for the beginner and these tend to be overlooked by the more-experienced aquarists who prefer specialised books on breeding, feeding techniques, marine aquaria and books in the catalogue class. Most important of all, the prospective reader wants good, clear photographs of his favourite fishes and of those whose acquaintance he hopes to make. If these photographs can be in colour so much the better. Unfortunately it has not been easy to provide all these requirements in the past.

This need has been recognised by the authors of the *Encyclopedia of Tropical Fishes*, who have produced a really monumental work. This single volume is the largest book yet issued on the hobby, and extends to 736 pages with 550 monochrome photographs and over 250 photographs in full colour. This means there are over 800 photos in the book, and what photos they are! Taken by such acknowledged experts as Timmerman, Perkins, Roberts and Wolfsheimer they must rank as good as any ever made of the hobby. Almost all these photos are half or full page, the black and white being mixed throughout the book, the colour section being grouped together at the rear and extending from page 593 to 720. None of the photos are of dead fishes or mounted specimens but are taken of living fishes in tank surroundings. Many of the rarer fishes are included in the colour section.

All the more popular and common species are included in the book and all are named. I came across only one obvious error in nomenclature, one which even the veriest beginner would recognise as a printer's error. About half-a-dozen of the colour plates are heavy toned and dark, and there are three or four monochrome photos which are repeated in colour, but these are the only faults one can find in this wonderful book.

The title is perhaps a bit misleading. The word encyclopedia is described in the Oxford Dictionary as a "book of information on every branch of a subject, usually alphabetically arranged." The book does not fall into such a category because it is not alphabetically arranged, contains nothing about diseases, about starting up, about shows or any of the data required by the raw beginner. The layout is as follows. A preface and introduction are followed by some 15 pages on the "Fishbreeder's ten commandments" with 27 photos. Then follow sections on water, pH, hardness, etc., gravel and rockery, food and feeding, snails, plants and habits of fishes. The major part of the book is entitled "Breeding Procedures." There is an index of 11 pages. The authors lay stress on the book being written with special emphasis on breeding techniques. Brief but relevant details are given of each fish, tank size, breeding size, temperatures, etc., and any special points peculiar to that variety. Barbs

throughout are described as *Pomoxis*, a name which few people use in England.

The two authors are both well-known names in the hobby. Mr. Axelrod has owned his own retail and wholesale fish businesses and has imported and collected fishes all over the globe. He is also editor of a magazine in America. Mr. Vorderwinkler has written several books on fishes and in addition does translations of articles from foreign sources in Spanish, French and German.

Some good points are made as to why difficulty is experienced in breeding the so-called mystery fishes. Some fishes do not spawn in captivity because they simply haven't enough room and, like *Leporinus*, are stunted in the average aquarium and do not mature properly. Some fishes possibly seek really deep water for spawning and need a higher pressure than is found at the bottom of normal tanks. Then there is the matter of diet. The only tropical insect on the fish menu which can be supplied (in the U.S.A.) is mosquito larvae; in England even this is almost out of the question for most hobbyists. Many fishes suffer from deficiency of diet in our aquaria because what we give them to eat is very different from the food to which they are accustomed. Some fishes have never been spawned merely because not enough aquarists have tried; a small shipment arrives and most buyers are content just to look at them.

Some interesting points are mentioned about the scarlet characin or cardinal tetra. This was first spawned by Dr. Emmens, of Australia, who considers it spawns in a similar way to the neon except that it needs water a little more acid. This is a matter of opinion, as aquarists all over the world differ as to the pH, the range put forward being from pH 4.5 to 6.8, but all agree that soft water is essential. Adhesive eggs are scattered about bushy plants and the parents do not immediately eat their spawn. Sex is hard to define and only fullness of a female is any sure sign. Young need Infusoria for a full week at least, followed by newly hatched brine shrimp. Growth is very rapid.

I can recommend this book to all hobbyists and clubs. It is a fine book in every way and appears to be the heaviest book on the hobby yet issued—it weighs nearly 3½ lb. If your dealer has only guppies and black widows to offer, don't worry, you can enjoy the whole tropical fish fancy within the pages of this book.

Fish Foods and Feeding by Dr. Feroze N. Ghadially. An AQUARIST booklet. 88 pages. 55 photographs and line drawings. *The Aquarist*. 4s. 6d. (4s. 11d. post free).

AN addition to the well-known range of AQUARIST booklets is *Fish Foods and Feeding*, written by Dr. F. N. Ghadially, an aquarist who needs no introduction to readers of this magazine. This is no sketchy generalisation but quite a detailed and thorough work on all the many aspects covered by the title. Running to 88 pages, six chapters and well over 50 photographs, this 7½ in. by 5 in. publication is a veritable mine of information on feeding topics and the material is presented in very readable form. It is in no case technical and can be easily followed by any hobbyist. Nothing so elaborate as this has previously been available in the hobby and the more expert will wryly regret that it was not available to an earlier decade of enthusiasts in the hobby.

In turn the book deals with general principles, feeding problems of breeders, foods of animal origin, vegetable foods, dried, bottled and frozen foods, Infusoria tablets and substitutes and feeding appliances. The reader can turn up chapter and verse on *Euglena*, rotifers, micro worms grindal worms, white worms, earthworms, *Tubifex*, *Daphnia*, *Cyclops*, *Asellus* and *Gammarus*, brine shrimp, mosquito, blood worms, glass worm, maggots, fruit flies, ants' eggs, water snails, mussels, fish, fish eggs and fish fry, tadpoles,

egg, meat and offal, green water, algae, cereals, dried foods and frozen foods. If anything has been missed it is of no consequence.

Details of the feeding habits of fishes, nutritional requirements, effects of temperature on feeding and absence problems are dealt with, as also conditioning of parent fishes, feeding fry, change-overs from small to larger foods and feeding frequency. Methods of preparing dried foods are discussed; feeding for colour and bottling food for fishes are also included. I have not space to quote extensively but a few notes from the section on cereals may give a clue as to style: "Starchy foods are looked down upon by many people. Few things are likely to shock an aquarist more than if he is told that the dried food he is feeding contains biscuit meal or similar starchy substances. This is a wrong

attitude to take because starches form an important constituent of any sane diet. It is not the use but abuse that one must guard against. Starchy foods being cheap there is a tendency to use more of these in the manufacture of dried foods than the more expensive foods rich in animal protein."

Newcomers to the hobby will find this a wonderful guide which will save them much time, trouble and possible loss. More experienced aquarists will find it entertaining and instructive and just the book to have at the meeting to debate when no speaker turns up. Its low price makes it handy to give as a prize for table shows or club raffles and it certainly will find a place in every club library.

RAYMOND YATES

TROPICAL FISHKEEPERS' REFRESHER COURSE:

by *Pisces*

Scissors-tail

(*Rasbora trilineatus*)

ORDER: Ostariophysi, from Greek *ostarion*, a little bone, and Greek *physis*—a bladder.

FAMILY: Cyprinidae, from Greek *kyprinos*—a kind of carp.

SPECIES: *Rasbora trilineatus*, from a native name, and Greek *treis* or Latin *tri*—three, and Latin *lineatus*—streaked or lined.

THE largest scissors-tail I ever saw was about 4 in. in length. In its natural habitat in the Malay Peninsula it is credited with growing to 8 in. This places it well outside the designation of "toy" tropical. Extremely slim compared with its length, and by no means brightly coloured, it nevertheless has a grace and charm all its own. The fins are small and almost completely transparent. The caudal is very deeply forked, its two lobes being marked by an orange-yellow patch surmounted by a similar black one. This makes the caudal quite noticeable, and the partial closing of the two lobes towards each other as the fish makes sudden forward movements is definitely reminiscent of the movement of a pair of scissor blades. Hence the popular name.

Sexes are indistinguishable. The body of both male and female is completely devoid of colour, being a semi-translucent steel-grey. This fish presents a challenge to any observant breeder. I have never witnessed a spawning of it, nor do I know anyone who has, yet occasionally fry appear in a tank. Perhaps the fish spawn in darkness; it cannot be said with certainty that they do not.

The first breeder who witnesses the actual spawning of the scissors-tail should put it down in black and white with full details of time, temperature, water, plants in the aquarium, etc., and send it for publication so that everyone may read it.

To avoid being overlooked, scissors-tails should be given an aquarium to themselves, with bright overhead lighting. As they are not small fish the aquarium should, I suggest, be a minimum of 36 in. by 12 in. by 15 in. If it is space they need to grow, then we should give it to them. Temperature



Rasbora trilineatus

presents little problem. They seem happy and live long at an average of 70°F.

Their diet should contain plenty of meat, in the form of live foods or of minced fish, mashed snails, pulverised worms, etc.

Scissors-tails are not very often seen in fish exhibitions, but they are good subjects, usually giving a judge ample time to assess their value as "specimen" fish.

Search for the Pygmy Swordtail

(continued from page 214)

of the male *montezumae* swordtails have both brilliant lemon-yellow top-fins and tails while others have one or the other. Some of the *variatus* platyfish have yellow dorsals and flaming-red tails; others have just red tails. *Pygmaeus* males vary, too; some are purple, some grey while others are golden. Related animals that have strong colour polymorphism like these swordtails and platyfish are attracting a growing school of naturalists, who suggest that sexual colour dimorphism is essential to an animal's survival in those natural territories that are inhabited by two or more closely allied species.

The flashing and distinctive colouring of each species serves as an added recognition sign for the attention of the appropriate females. It could well be that the flaming-red tail of the male *variatus* is a traditional come-on sign for a female *variatus*, but it may be a meaningless flapping of the fins to female *montezumae* or *pygmaeus*. If a male lacking a red tail waves a yellow dorsal the female *variatus* and *montezumae* may be attracted at first. But if the yellow-finned male also has a distinctive sword-like extension of its tail fin, perhaps only the female *montezumae* would be induced to carry on.

The physical resemblance between the *variatus* and *montezumae* females is so striking that aquarists have frequently misidentified them. The fishes rarely, if ever, make the same error.

Frogs in Captivity—by JOHN WALKER

TOADS were dealt with in a previous article and it is proposed to deal with the requirements in captivity of frogs in this one.

As with toads, an aquarium tank will make a satisfactory home: it should be as large as possible, a fair ruling being 12 sq. in. to 1 in. body length.

As frogs are more aquatic than toads, a greater area of water is needed. This can be arranged by placing some small bricks on a log across the tank, dividing it in two. On one side of this barricade, which should be 2-3 in. high, the space should be filled with pebbles or grit, level with the top of it. On top of this should be put about 2-3 in. of earth. The vacant side can then be filled with water. Again as with toads, plants tend to be more nuisance than they are worth. Lack of colour can be overcome by putting some duckweed in the water, and putting lichen-covered pieces of bark on the earth for shelters.

By nature frogs are more nervy and more easily frightened than toads. For example, if placed on a table a toad will merely walk over the edge, whereas a frog will throw itself off in any direction, regardless of the consequences. Therefore when handling frogs, all movements should be slow and deliberate, and not grabbing. Also when handling frogs it is best to have one's hands moist, as dry hands will cause the creatures discomfort.

When selecting specimens for a collection, it is best to choose young ones, for these will nearly always feed, whereas old or adult ones will often refuse all food, some-

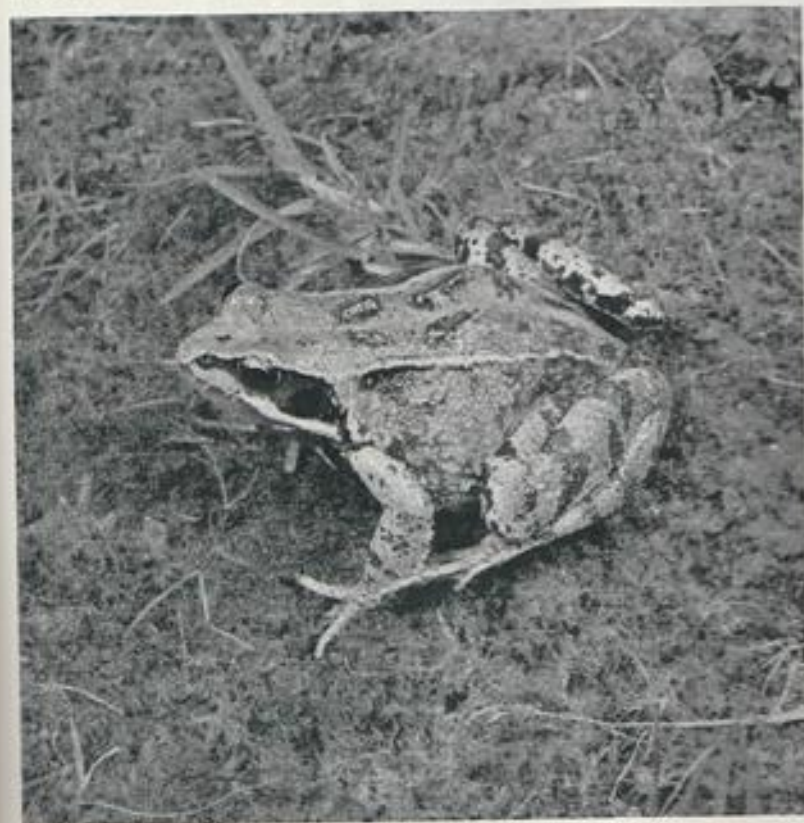
times until they die. It is also wise to keep only specimens of a similar size together, as many frogs will be prepared to stuff their smaller brethren down their throats.

For food, almost any insects will be taken, also molluscs and worms, food being caught on the tongue and, with worms, is cleaned with the front feet as it is swallowed. The front feet are also used to keep the worms in a central position if they start getting too low on one side or the other. As with toads, the eyes are used to help the frogs in swallowing. All the three British frogs belong to the typical frog genus *Rana*, and all make quite satisfactory pets.

The common frog (*Rana temporaria*), 8-9 cm., can be found in almost any shade of brown, yellow or grey, marked with brown or black. The colouring is variable and is changeable with temperature. Sometimes specimens will be found with hardly any markings, and others are nearly all blotches. In my collection I have one very attractive orange specimen with blood-red markings.

The edible frog (*R. esculenta*) is rather larger and more thickset than the common frog. On top it is generally a bright emerald green, marked with black, and below it is plain white. The edible frog can take its prey above or below water.

The marsh frog (*R. ridibunda*) is Europe's largest frog, sometimes growing to about 12-13 cm. It is similar to the edible frog in shape. In colour it is green, brown or bronze. Sometimes it is bright green in front and brown at the back. The legs are banded with black or dark brown,



Common frog
(*Rana temporaria*)

Photo: W. S. Pitt

Europe's largest frog, the marsh frog (*Rana ridibunda*), has established a colony in England



Photo:

Douglas Fisher

and spots of black or brown are scattered over the body. Underneath *R. ridibunda* is generally white. This is very definitely a frog to get young, as freshly caught old specimens are very panicky, and I have rarely been able to get them to feed.

For the more exotically minded, there are sometimes on the market one or other of the varieties of bullfrog. Of these my favourite is *R. adspersa* from South Africa. This grows to about 8 in. long, and nearly as wide. On top it

is yellow-green or olive, with a dorsal stripe of yellow, and has several other yellow stripes running down the back and sides. Also on the back are several ridges, which give the frog an unusual appearance. Round the top of each front leg is a thick red-orange band, the red from this band spreading into the surrounding body. The rest of the underside is pinky white or grey-white. These frogs will eat almost anything that moves, and should be kept at around 75°F., falling to not less than 55°F. at night.

Successful Breeding of Black Angel Fish

by H. C. PARSONS

ABOUT 18 months ago I was very much struck with the beauty of the first black angel fish I had seen, so much so that I spent the not inconsiderable sum of £7 apiece on four of them (about one-shilling body size) from a London dealer. I have been breeding normal angels for many years in considerable quantities. I might say that angels have always been my first love in my fish house, and I would feel lost without a few tanks of them around.

For a while the "blacks" thrived. They were kept and maintained with half a dozen or so "normals" I was growing on for breeding, and their diet was, as is usual with me for most fishes, *Daphnia* and chopped *Tubifex* (as long as *Tubifex* is well chopped I have never found fault with it as a food).

About 3 months after the purchase of the "blacks" I bought six "lace angels," close relatives—but fish in which the black lines of the common angels are diffused and spread over the intervening scales with cloudy black. The "lace" were very robust and grew apace; not so, regretfully, the

blacks. These became finicky eaters, and, with the exception of one which had the will to live and grow, were obviously deteriorating. I placed them in a tank alone and nursed them. With two I had a measure of success; the good one mentioned above continued to improve and another picked up and began to look hopeful, but within a few weeks the other two for no reason I could pin-point sickened and died. I was left with two blacks and six virile lace angels.

The fish were now approaching a size when I considered breeding would soon be possible, but I was in for more disappointment. First I was informed by a friend of mine who is infallible on this subject, Mrs. E. A. Allen, that both my blacks were males, and secondly, shortly afterwards I lost the smaller of the two.

A few weeks later, during a visit to me by a well-known fellow aquarist, I lost my last black. He had a black female and I lent him my male and wished him luck. Three months later, about 6 months ago, my fish was returned to me and my friend had had no good fortune.

Meanwhile, my lace angels had really developed; two were paired and breeding well and all were deeply coloured; the black diffusion had spread and settled to such a degree that the fish had to be seen in good light to be differentiated from their black cousin.

A little later, again with Mrs. Allen's assistance, I placed

in a breeding tank my black male with a "lady of lace." And this time my luck changed; the fish settled happily together, the normal wrestling tactics were indulged in, and 3 weeks after placing the pair together I had a reasonable spawn on the broad leaf of an *Echinodorus rangerii*. The eggs went through the normal phases and 8 days later I had a free-swimming batch of baby fish, which I fed immediately on brine shrimp.

When the fish were 3 weeks old differences in coloration were already apparent, some youngsters being much darker than others. Then I started to lose them, and always it seemed it was the smallest and darkest that died. From that first brood I produced 118 lace angels and 87 normals; no blacks survived.

The parents meanwhile were spawning regularly and my friend Mr. C. A. Allen volunteered, when the second batch were 4 weeks old, to try and separate the "sheep from the goats" or the darks from the normals. One Saturday afternoon he did this, and from this brood we had 304 dark and 180 normals. Looking closely at the dark ones in a nice big tank, Mr. Allen said, "I think I could pick you the truly black ones from these." He set to work and segregated 48 fish. I put these into a separate 18 in. by 12 in. tank. I have lost nine and the remainder are over one-shilling size and are the most beautiful, active black angels I have ever seen.

Since then we have sorted a further larger brood: 162

normals, 308 lace and 104 black, and we did this at less than 4 weeks after free-swimming time. I have not lost a "black" yet (touch wood)!

It appears to be true that the blacks are weaker at birth than the lace or normals, but if they can be separated quickly enough and are able to obtain an adequate supply of food (from which they were foiled in my first brood by the more robust normals and laces) they will survive and thrive. I am very proud of my tanks of black angels.

Cacti in the Fish House

THE Christmas-flowering cactus (*Zygocactus truncatum*) will probably have flowered by the start of the year.

This is a true cactus, with the areoles which denote a cactus plant. The flowers are freely borne at the ends of the shoots; these are not leaves, as some people imagine. The flowers are cerise in colour and are of a one-sided shape which is known as zygomorphic, hence the name *Zygocactus*. Some people have difficulty in flowering this plant, as many of the flower buds form and then drop off before opening. This may be due to several reasons. If the plant is over-watered it can lose its buds; if it is kept too dry for too long this can have the same effect. Many plants drop their buds if they are subjected to a draught or quickly changing temperatures.

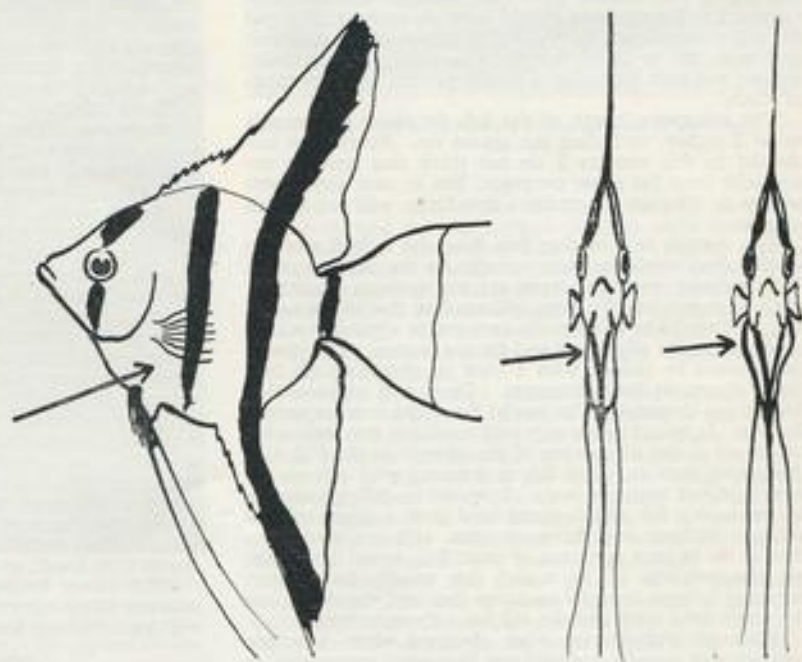
SEXING ANGEL FISH—A note by Mrs. E. A. ALLEN

THE fish must be in good condition, and to be certain about them I prefer them to be about 1½ in. in diameter. A reasonably well-grown fish should attain this size at about 7-8 months of age.

The important sexing point is the region of the body directly behind the junction of the pectoral fins with the

angel's body. If the fish is viewed head-on the body of a male in good condition is concave, that of a female is convex. In the diagrams the differences are exaggerated.

Practice in this art makes perfect, as with many others. If readers take every opportunity of sexing angel fish and are keen observers they should in time make few mistakes.



Arrows indicate the body region of the angel fish that indicates sex differences. In the head-on views of male (left) and female (right) the differences of outline are exaggerated.

Fancy Goldfish Breeding—12

by A. BOARDER

THIS month it is the turn of the nymph to be dealt with in this series of articles. This fish was not recognised in the 1947 standards of the Federation of British Aquatic Societies but was brought in the latest standards at the request of a society who favoured the variety. It can be quite a handsome fish but the majority of specialist breeders are of the opinion that the fish can occur as a throw-out from strains of fantails and veiltails, and for this reason it is thought that a special standard for it should not have been supplied. In my own strain of fantails I often get fish which have a single tail and so conform to the standards required for the nymph.

As with several of the fancy varieties the nymph can be shown in the three colour variations, metallic, nacreous and matt. The easiest way to describe the fish to the newcomer would be to liken it to a single-tailed veiltail. The body should be short and deep, with a depth of more than half the length of the body. The head should be broad and deep and run into the contour of the body without any sign of a hump or snout. The back should be nicely rounded. The mouth should be small and the nasal flaps well developed. The dorsal fin should be as high as the depth of the body and be well held. The caudal fin is to be single and well forked. The pectoral fins are not very large but the pelvic are as long as the height of the dorsal fin. The anal is single and fairly well developed.

The colour of the self-metallic can be a rich red or a chrome yellow, and the variegated should have two or

12. The Nymph

more colours. All the scales should be clearly visible and the whole fish should show the metallic sheen. The nacreous and matt types should have no scales visible and the gill plates should be soft. The colour of the nacreous and matt are to be as for the shubunkin: blue, violet, yellow, red and brown in a bright pattern with spottings of black.

The minimum length of the fish for show purposes is to be 2 inches, excluding the caudal fin. Apart from one district in this country I do not think that nymphs are specially bred for show purposes, but in case any reader wishes to take up the strain a few hints will not be out of place.

The nymph is a hardier fish than the veiltail and the scaled types would be quite suitable for the outdoor pond. The nacreous and matt types are not quite as suitable as their finnage is usually more delicate than that of the scaled fish, and would be more easily damaged in a pond in winter through attacks of fungus and fin congestion. The parent fish should be chosen with a view to obtaining the best body shapes in the youngsters. Deep and well-rounded bodies are essential. The caudal fin is the next important feature. It would be no easy task to obtain fish with a tail as shown in the illustration of the nymph in the F.B.A.S. Standards booklet. The fish is depicted with a huge tail well held out from the body. It would be difficult enough to produce a fish which could hold such a huge tail out straight without any drooping even with a scaled type, but to do so in a nacreous or matt fish would be almost an impossibility. The scaled fish usually have much stronger finnage than the nacreous fish, and the dorsal can be better held erect and the tail has a stronger frame.

Although nymphs are often obtained when breeding veiltails and fantails it would not be a good proposition to

try to breed from such fish. As they would have the strain of veiltail or fantail inherent in their genes it is probable that few of their progeny would be good nymphs. Even after a number of generations many fish would revert to the original strain of double- or web-tailed fish. There is no need to have any particular food for these fish and the usual foods, containing a fair proportion of starchy material, will be taken and should provide the necessary body form.

All forms of fancy goldfish youngsters should have had another sorting over by the time they are 3 months of age. By this time any faults will have become apparent, but many may not be noticed until the fish can be placed into a tank which can be kept under observation for some time. It is surprising how faults can be detected when a fish is constantly under view. Those types with a double tail may suddenly show a curling under one of the lobes of the caudal fin, or a split may become evident. This may heal and the fish be none the worse for it. However, a fault may show up which will never right itself; such a one is when a thickened ray is seen in the tail, which spoils the shape somewhat and would be down-pointed at a show.

Temperature of the water in the rearing tanks should be carefully checked according to the type of fish being reared. Warmth plays an important part in the colour change of the scaled types; the warmer the water the quicker will the change occur. This does not mean that the fish should be kept at a warm temperature for too long. After about 3 months the fish should be at a temperature of not above 65°F., and 60°F. will be better during the winter. Warmth alone does not make all fish change colour, as it is well known that in a strain of scaled fish some of them can change colour in a few weeks whilst others of the same hatch and kept under exactly the same conditions will not change for as many months. In my strain of fancy fish some youngsters change colour when they are less than an inch long at a few weeks of age, whereas others of the same brood do not change for some months and not until they are over an inch in body length.

Water temperature appears to have an effect on the development of the fins. If fantails are kept in over-warm water for too long their tails can grow excessively long and flowing. For raising fantails and similar types of scaled fish the water temperature can be about 70°F. for the first 8 weeks. It can then be lowered to 65° for another month, and then after that about 60° will do until the fish are 2 inches long over all. Many aquarists do not pay enough attention to the temperature of the water once the fry have hatched but it is most important to test this at regular intervals.

As stated before in these articles, the warmth of the water regulates the time taken by the fish to digest the food. Even with these coldwater fish the rate of growth can be altered considerably by the careful regulation of temperatures when the fry are small. The amount of food which a goldfish could assimilate in a day when in water at 50°F. could easily be trebled if the temperature was raised to 70°F. Care must be taken to ensure that the water remains fairly pure when this warmth is given as it is well known that the warmer the water the less oxygen does it hold. With insufficient oxygen the fish are unable to digest their foods, go off feeding and are soon in trouble.

With heavy feeding, especially when there are a fair number of youngsters in a tank it is certain that the water will soon become foul. The droppings of the fish will be

(Please turn to page 223)

AQUARIST AT HOME

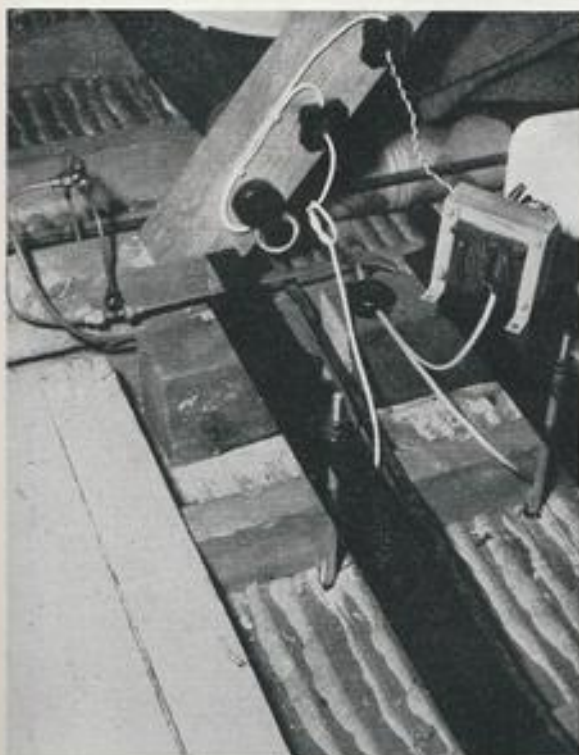
An Ingenious Display

by LAURENCE E. PERKINS (Photographs by the author)

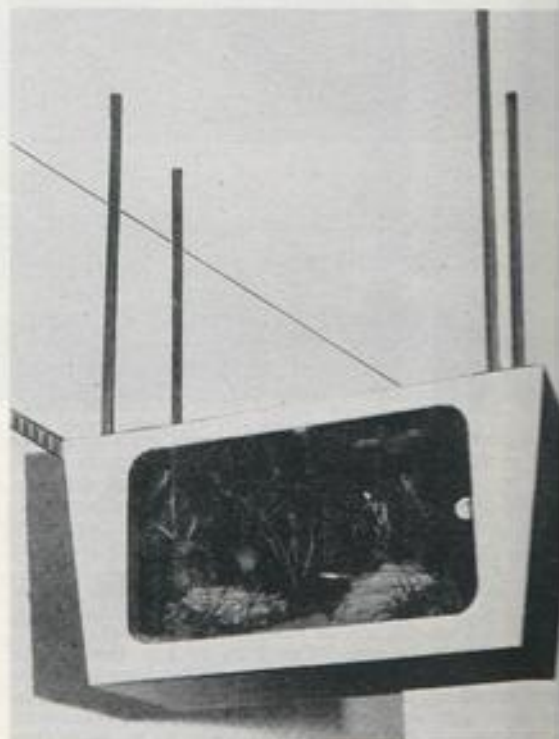
MR. H. S. Wightman, of Catford, is an aquarist in the true sense of the word, but one who obviously does not regard his hobby as a separate entity to his home and its general attractiveness and comfort. Rather has he endeavoured to introduce fishes to his home as an integral part of the amenities and he has succeeded in this to a degree which well merits special mention.

Mr. Wightman and his wife share a house with his parents and occupy the first floor. On ascending the staircase, the visitor is confronted with the first example of this aquarist's ingenuity on the landing. A 24 in. by 15 in. by 12 in. aquarium, encased in a daffodil-yellow and black exterior of contemporary design, hangs at eye level and apparently suspended from the ceiling. Containing angel fish and blind cave fish the aquarium is attractive in itself, but the unusual method of siting endows it with additional interest and prompts many an anxious glance aloft and many a timid question as to the make-up of the ceiling!

A visit to the attic above, however, soon supplies the



Method of suspension of the ceiling aquarium is shown in this picture taken in the attic. Rods supporting the aquarium are seen entering the upper surface of the ceiling; they are secured to lengths of channel iron across the joists. Wiring and air-line for the aquarium are also shown



Aquarium encased in hardboard and suspended by steel rods from the ceiling

answers. The span of the two main walls of the hall 7 ft. 6 in. and the top surfaces of these walls are visible from the attic, where they may be seen running parallel with the joists. A substantial block of timber on the top of each wall supports the ends of two lengths of 3 in. by 1½ in. channel iron. A U-shaped length of ½ in. bright mild steel passes through each of these, and is secured by high tensile steel nuts, the result constituting a cradle in which reposes the aquarium.

The tank is insulated against heat-loss by slab cork the whole being encased in ribbed panelling of hardboard. From the ceiling to the top of the aquarium casing the four visible uprights are sleeved in ½ in. copper tubing, and down one of these is run the electrical wiring and the aeration pipe-line. The idea was motivated by a desire to have an aquarium on the landing which would be at eye level to a standing viewer, but which would not involve the use of an ungainly and unduly high stand.

Mr. Wightman's fish room appears to be the skillful result of an endeavour to retain this room as a generally usable adjunct to the reception rooms proper, for although the multi-tank unit forms the main feature of the room it is so smoothly blended with the furnishings that it does



Part of the large central aquarium of the unit with the controlling switches for lighting beneath it

not aggressively obtrude nor is there any evidence of the usual paraphernalia which immediately hall-marks a fish room as such and as nothing else. This room measures 12 ft. 4½ in. by 8 ft., and along one of the long walls extends a unit comprising a 36 in. by 20 in. by 12 in. aquarium flanked on each side by two others of 15 in. by 12 in. by 12 in.

A 6 in. by 2 in. joist, extending from wall to wall at floor level, supports nine 2 in. by 3 in. uprights at the front, and a second, similar joist running parallel supports five uprights at the rear. Two 2 in. by 3 in. joists at the top form the base upon which rest the aquaria. The upper panelling, which forms the facework of the aquaria, is of door panelling mounted upon a wooden framework for rigidity and fixed to the main joists by no more than eight screws. By the removal of four of these the whole panel may be tilted if it becomes necessary to remove any of the aquaria.

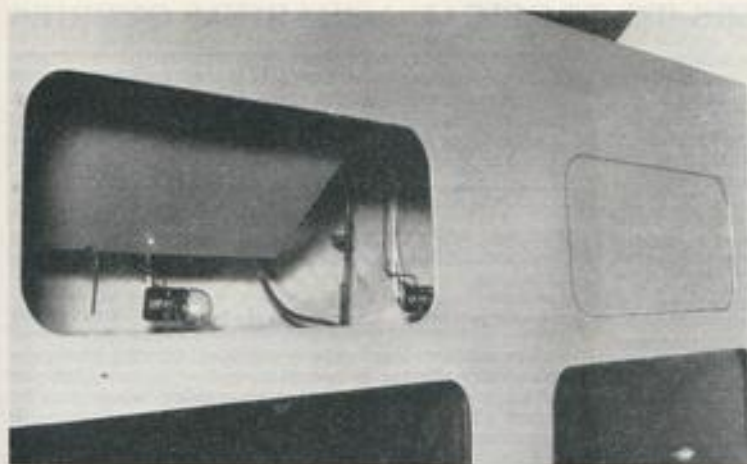
Above each tank is a servicing panel, hinged at the top

and opening inwards, a reflector plate of aluminium acting as a counterbalance. Six small switches mounted beneath the central aquarium provide individual control for the lighting of each tank, with an over-riding master switch. The lower panelling is constructed of ribbed hardboard incorporating two detachable panels which give access to the electrical gear and storage space for nets, siphons, fish foods and the like. The whole unit is finished in a pastel shade of green and is extremely pleasing to look upon.

Low-voltage lighting is employed for all Mr. Wightman's tanks, car bulbs (12v, 24w) wired in parallel and run from the mains via a 30 amp. transformer being used. The heating circuits for each aquarium are separately fused with 1 amp. fuses housed in clock connectors which, owing to the incorporation of a securing screw in the plug, cannot be accidentally removed. External thermostats are fitted throughout and aeration is provided by a pump situated near the electrical gear. The pump feeds, as

Neat appearance and smooth finish of the aquarium unit in Mr. Wightman's fish room are seen in this view of part of the unit





A servicing panel above one of the aquaria in the unit is shown in the open position and discloses one of the 12 volt lamps used for lighting

well as the aquaria in the fish room, the suspended tank on the landing via $\frac{1}{2}$ in. copper tubing channelled into the walls during initial interior decorating.

The central and largest aquarium in the fish room contains an unusual community, comprising two scats, three Malayan angels, one *Labio bicolor*, a clown loach, a *Plecostomus* catfish, a spotted catfish, a pair of red sword-tails and a pair of guppies, the last-mentioned as eternal

Electrical equipment beneath the aquaria of the fish-room unit is reached by removal of one of the lower panels



providers of live food! Dispersed among the other tanks are thick-lip gouramies, harlequins, zebras, danios, tiger and rosy barbs, neons, etc. As a keen and active member of the Catford Aquarists' Society, Mr. Wightman has several awards to prove the quality of his fishes, which have every reason to feel and appear in the best of spirits in view of their excellent living conditions.

In conclusion it should be mentioned that as the fish room will shortly be required for a nursery, Mr. Wightman is planning to move the contents into the attic where, after partitioning off the required space, an exact replica of the existing set-up will be erected. Had it not been for his wife's desire to place on record her husband's ingenious craftsmanship, of which she is justly proud, his light would still repose beneath the proverbial bushel, for he is modest to a degree.

Fancy Goldfish Breeding

(continued from page 220)

too much for any plants in the tank to absorb, and so a large amount of mulm will form and the water can soon start to smell. It is amazing how many goldfish can live in smelly water but it is bad policy to allow these conditions to continue for long. Almost overnight, especially in very warm weather, the water can turn too foul and the fish can then be in trouble. A sign of this can be the appearance of patches of bubbles on the surface of the water in the mornings.

About once a month the water can be completely changed in the rearing tanks. This change is beneficial to the fry. I have found that it is not wise to change completely the fry water to fresh tap water. After having had this change the fry seem to go off their food for a couple of days. It pays to have a spare tank (I use an old cold-water cistern floated over with cement) in the garden which is kept filled with tap water to be used for replenishing the fry tanks. The spare tank has some growing water plants and houses a few *Daphnia*. This water is in ideal condition for refilling the fry tanks after they have been cleaned out. Make sure, however, that no pests such as dragon-fly larvae are present to cause danger among the fry.

Next month's article will deal with special breeding for the comet goldfish.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

My black mollie has contracted swim-bladder trouble. Can you suggest treatment for this fish?

Place the fish in slightly saline water maintained at a temperature a few degrees above normal. The shallower the water the better. Feed the fish on scraped red meat, chopped earthworms and the like. If the fish does not improve within 7 to 9 days, it is kindest to put it out of its misery.

I have just started keeping tropical fishes in a tank measuring 24 in. by 12 in. by 12 in. I have some guppies, a pair of neons, an angel fish and four rosy barbs in it. The water looks perfect, has no smell, and the fishes look healthy, but a friend has told me that the water should be kept oxygenated by a small air pump. Is this correct?

There is no need to install an air pump unless your tank is overcrowded—and your tank is not overcrowded. A good growth of healthy plant life will help to keep the water pure and well oxygenated.

I have been told that I should not add any salt to a tropical aquarium containing catfish. Is this true?

The majority of catfish do not like salt in the water, and some species are more easily upset by saline conditions than others. It is advisable to go careful on the salt when adding any to an aquarium inhabited by catfish.

I should like to breed beacon fish. Please will you tell me something about their breeding requirements and conditioning?

Beacon fish need clear water about 10 inches deep. The back and sides of the aquarium should be filled with clumps of feathery foliated vegetation such as fine-leaved willow moss or *Myriophyllum*. The temperature of the water should average about 75° F. The sexes should be separated for a week or two before placing them in the spawning



Photo:

Lawrence E. Perkins

A hardy and distinctive addition to the community aquarium is the black widow (*Gymnocorymbus ternetzi*). The predominantly black coloration of young specimens offers a pleasing contrast with the bright hues of other characins.

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of fish-keeping being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

tank, and while they are kept apart, plenty of live or meaty food should be given to them to bring them into tip-top condition.

I have just installed a modern coke-burning stove in my fish room. Do you think fumes from this stove will harm the fishes?

The modern closed coke or solid-fuel burning stoves are remarkably efficient in operation, and we do not think you have any need to worry about your fishes being upset by fumes. You should, however, provide the room with proper ventilation.

I spawned some tiger barbs 6 months ago, but the young fish are nowhere near full size. What food should I give them to accelerate growth?

Food alone will not accelerate growth. Young fish need plenty of swimming space in well-oxygenated water. Foods to help growth include chopped earthworms, scraped red meat, chopped cooked heart and cereal foods such as Bemax and fine oatmeal.

Are *Anostomus anostomus* suitable for keeping with other fishes in a community aquarium?

A. anostomus are not pugnacious fish, but as they may attain a length of about 5 inches it would not be wise to keep them in the company of very small fishes.

When I switch on my toplight, all the fishes in the tank dash madly about, and the angel fish in particular lose all their colour and look quite distressed. Do you think that suddenly flooding the aquarium with light is bad for fishes?

It is not a good policy to illuminate an aquarium suddenly with bright light. Always switch the room light on first, then the aquarium toplight. The sudden transition from dark to bright light is enough to kill some fishes, especially nervy species like angel fish.

Some time ago I bought some Malayan snails. I appear to have hundreds of the snails now, but cannot find them owing to their habit of burying themselves in the compost. How can I rid the aquarium of most of these snails without emptying the aquarium and hand-picking the compost?

After dark, Malayan snails emerge from their daytime retreats and crawl over the surface of the compost and up the leaves of the plants and sides of the glass. It is not difficult to capture some of the snails every night after dark by shining a pocket torch into the aquarium. Another method of attack is to remove all the fishes from the aquarium, and throw a few crushed cabbage leaves or lettuce leaves into the water. When the leaves decay they will cause a certain amount of pollution which will send the snails to the surface of the water in search of more oxygen. After handfuls of the snails have been removed from the aquarium, the decaying matter should be removed, the bottom of the aquarium should be siphoned to remove all dirt, and the water drawn off should be made good by fresh water which has stood to mature for a few days (or boiled water allowed to cool to normal aquarium temperature before being introduced into the tank).

How much light does a tropical aquarium need to keep the plants in growing condition?

You did not say in your letter whether your aquarium is illuminated by natural daylight or not. If the tank is

placed quite close to a window there is no need to worry about artificial lighting except from a decorative point of view, or during the shortest or darkest days of winter. But where the natural light is poor, or the aquarium is placed some distance from a window, electric light is absolutely necessary to keep the plants in healthy condition. Two 60-watt bulbs in a reflector fitted not more than 6 inches above the surface of the water should be ample to keep a 24 in. by

12 in. by 12 in. tank in perfect condition; that is, if the light is kept burning for at least 7 hours every day. It is better to illuminate the aquarium with a very bright light for a few hours every day, than burn low-wattage bulbs for long periods. In short, plants will grow better with 5 hours of really bright light than with 10 hours of poor light. In fact, in a poor light most aquarium plants will soon turn yellow and wither away.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I wonder if you would be good enough to recommend three or four good coldwater plants for my tank. I am a beginner and am somewhat confused by the lists of plants advertised.

Useful plants for your purpose are *Lagarosiphon major* and *Egeria densa* for the back and back corners, *Hygrophila polysperma* and *Vallisneria spiralis* var. *torva* for the middle with perhaps some *Pontinalis antipyretica* for near the front. Do not have too many kinds of plants and see that they are planted in small clumps, not single stems stuck in at regular intervals all over the bottom of the tank. The plants should soon grow and make a good show.

How often should I change the water in my coldwater tank?

Once the tank is established you should not have to change the water at all. Soon after a tank is first set up the water may not be too good in condition but once the water plants start to grow well there should be no need to change the water again for many years. Once a week regularly the tank should receive some attention, when some of the mulm at the bottom must be siphoned off. Whilst this is being done a quantity of water will be drawn off. This is thrown away and the tank is refilled with fresh water. A tank about 24 in. by 12 in. by 12 in. will need the removal of 3 or 4 gallons of water at each servicing. The replacement of this amount of fresh water will ensure that the tank keeps in good condition and that much of the mineral salts which could become too concentrated for the good of the fish will be removed. Very often more harm than good can come from continually emptying and refilling a tank.

I have heard that it is fatal to feed goldfish on bread. Is this correct please?

This statement is not correct. I often feed my goldfish on brown bread. I do not use white bread as I consider that much of the nourishment from the wheat has been removed in the making of white flour. I consider that boiled wheat or wheaten brown bread is a very good food for goldfish but, of course, I do not recommend that it should form the sole food. Many other types of food should be given, including live foods such as garden worms, white worms, *Tubifex*, gentles, etc. The idea that white bread will kill goldfish has probably been encouraged by the fact that small boys try to keep sticklebacks, etc. in small jars and then feed the fish on lumps of bread. The water soon becomes foul and the fish die; not through eating the bread but because the uneaten bread has turned the water foul.

Why is it that some young fancy goldfish in a hatching change colour quickly whereas others take much longer?

This is because of the particular make-up of the fish and may be nothing to do with the conditions under which they are kept. In some strains of goldfish it will be found that at some time in the past either a shubunkin or a pale-coloured fish has been used for breeding. It is amazing how long after this has happened that some of the strain can carry this trait. I have known fish bred from a strain

of apparently all-red fish throw a few fish which have changed colour in a few weeks and look more like young shubunkins than scaled goldfish. It will be found that those fishes in a scaled strain which change colour first are not always the best to keep. It is quite probable that they will either be all silver or have very little red at all. Such fish are all right for keeping but are not as likely to succeed at a show as those which are all one colour.

How much food can a goldfish eat in a day in relation to its size?

This is a question which has many facets to it. Firstly, a young growing goldfish will require much more food than an adult one. Secondly, the temperature of the water controls the amount of food which a fish can eat, to a large extent. In cold water the fish will not eat nearly as much as in warmer water. The warm water means that the fish can move about much more actively and so needs more nourishment. When the water is cold the fish becomes almost torpid and the need for food does not occur. Another determining factor is the amount of oxygen in the water. This latter point is often lost sight of by aquarists. When the water contains plenty of oxygen and lacks foul gases the fish are in the condition to digest their food quickly and so need it more often. Once the water becomes the slightest bit foul the fish lose their appetites and become sluggish. Then when more food is added the water turns sour and the fish are in trouble. It is probable that more fishes are lost through this cause than from any other. A 3 months old healthy goldfish could eat as much food as would lie on a sixpence at least three times a day, although it would be quite impossible for the fish to eat this amount in a short space of time.

In their natural state many fish of the goldfish types will be browsing about among the water plants and at the bottom searching for food almost all day long. In warmish water the food is soon digested and voided, giving the need for more to be eaten. The fact that goldfish eat more food when the water is warmer should not encourage anyone to try to keep goldfish at too high a temperature, as when this happens much of the oxygen can be driven out of the water and the fish could not then assimilate their food. Anything over 75° F. is not likely to suit coldwater fishes for long.

I have a goldfish which some time ago started to get very swollen. I had hopes of a family but nothing happened except that the fish got bigger and bigger. It then began swimming upside down and lying on the bottom of the aquarium. I gave it a potassium permanganate bath and placed it in green water but it still seems very blown up although otherwise in good condition. What is the cause of the trouble?

It is probable that the fish is a female which is full of eggs. There may not be an active male in the tank to encourage the fish to lay her eggs or the conditions are not just right for it to spawn. The large number of eggs may be pressing on the swim bladder and so the balance of the fish is disturbed. You can try keeping the fish in shallow water and in as warm a position as possible. The fish may soon recover under such conditions.

AQUARIST'S Notebook



by

RAYMOND YATES

IT has been truly said that the best food for fish is fish, but this means in natural conditions. Most tropicals will make a hearty meal of eggs or fry of other fishes (or their own if opportunity offers) and fish which die in the tank are inevitably pulled to pieces before their owner discovers his loss. Fish from the fishmonger intended for the table does not prove so appetising when served to our finny pets. White fish is rejected by all but the most ravenous and fried fish is quite out of the question. Small pieces of kipper are fairly popular and most fishes will snap up roe, which should not be overfed. Far and away the best from all angles is tinned salmon and its cheaper counterpart, tinned tuna. These can be fed fresh from the can or dried. If dried they last indefinitely and are always relished by tropicals. These foods flake into very tiny pieces if needed and are therefore just the thing for very young specimens. Snails are also most partial and will gather in large numbers over the area where this tinned fish has been used. Smoked fish (kippers) is accepted very readily by some tank inmates.

For nearly 6 years aquarists in the Manchester area made Saturday rendezvous at "Marina," a go-as-you-please aquarium shop where one could stay yarning all day for the cost of sixpennyworth of *Tubifex*. The proprietor, "George" as he was affectionately known to all his customers, was only too happy with a shop full of visitors all more or less known to each other. It is said that if you stay in The Strand long enough you will meet everyone you ever knew, and "George's" shop was in this category. All good things come to an end, and pressure of other business forced "George" to concentrate on more mundane matters; his aquarium business closed with a grand sale at which there were some wonderful bargains going. I met him the other day and we had a long chat over happy times gone by. He is doing very well but misses the fun of the fish business, although, as he admits, he enjoys having Saturdays to himself now. He has a new house on the site of the old Manchester aerodrome and has so far no tropicals although he keeps a few goldfish "at the bottom of the garden." He asked me to send his best wishes to all his old associates in the North.

The Merseyside Society's news-letter comes out fortnightly and is very well done, with interesting news, jokes and practical tips. This club has set itself the task of delving into the past to try and trace back its history and officials to its foundation—no easy task. Old members with data could contact the secretary. Keen on photography, the members recently showed slides in colour of the B.A.F. at Manchester, Shirley Aquatics and the Liverpool show. Auctions are held (the last realised ten pounds) and there are regular table shows, but a note makes it clear that "The usual table show will depend on whether YOU bring an entry." Other clubs please copy. Two trophies were won by the club at the recent Blackpool show to follow up their third in the B.A.F. Free advertisements are offered to members, which are a good way to let people know if anyone has anything to dispose of.

Mention is made in the news-letter of the Southport Aquarist Society's coach trip to Corwen in Wales to visit the salmon hatchery. Attention is drawn to a business card which recently came their way, which read "Mr. So and So., Aquarist, Herpetologist, Ichthyologist, Expert advice given on all aquatic subjects. Light Carting done at moderate charges." The story is also told of two well-known members who recently went on a *Daphnia* hunt. It seems that they

left their car parked in a secondary road next to a small wood in which were the ponds. Whilst inspecting their catch by twilight they suddenly heard a loud speaker booming out "Will the owner of car number . . . please come out of the wood!" On reaching the road they saw a police car, and had to give an explanation of just what they had been up to. However, the innocent explanation was evidently an old joke to the officer concerned, as he merely looked askance but said nothing.

Clown loach are more frequently met with nowadays than a few years ago and they are not nearly so difficult as was once found. They have several exasperating habits, however, quite apart from their love of looking as if they were booked for a fishy Valhalla. They dearly love to hide away, and if no hide-out exists they'll soon make one! They also eat at night and tend to ignore food dropped in during the day, which means the other fishes eat it up and they risk starvation if not properly cared for. I find mine do very well on odd garden worms, very occasional *Tubifex*, boiled ham, tongue, Bemax and liver, plus dried tinned fish. They also enjoy cutting small holes in the leaves of *Cryptocoryne* plants. If they do go hungry they have the annoying habit of chewing each other's tails ragged, and they do not look so attractive when this has happened. It is a fact that even the best of friends fall out when they are starving. Don't let them get this way; feed immediately before leaving the tank in darkness for the night. The clowns will find the food even if the other fishes cannot. *Corydoras* catfishes are in competition with them in this respect.

Portsmouth Club is quite revolutionary. Their quarterly magazine is now being issued monthly. No wonder the editor pleads for copy! However, each issue contains some ten pages plus covers and is packed with interesting notes. A correspondent makes some good points about running a successful club. He suggests a combination of determination and enthusiasm and looking around, first for new members and secondly by having an attractive programme. Too many clubs overlook the fact that we live in competitive days. One cannot fight television with a series of embarrassing rows at meetings. People want to hear about fishes. Advice tendered is to elect a good committee and let them get on with the job—if you don't trust a man why employ him, as the Eastern proverb goes. Best clubs usually have a social side and roughly equal numbers of the sexes. People want a "matey" evening and a good programme, not a series of amendments. Where a member is a continual nuisance throw him out or make him chairman, never let "barrack-room lawyers" rule the club.

Portsmouth show was again first class, some 400 tanks being on view over 3 days, but the public failed to respond. A similar story comes from Nottingham. Some people just don't know what they are missing in these centres. A member (Mr. Collins) has his own method for sealing leaky tanks. He uses a solution called Bondcrete and removes old mastic in part, applies two coats of the solution, each being allowed 2 hours to set. The editor recently in Switzerland was interested to find some hotels with tanks outside displaying small salmon and trout for the guests to choose their own lunch. These were unfortunate fishes, their quarters being so cramped they could hardly turn round.

Frogs in Captivity—by JOHN WALKER

TOADS were dealt with in a previous article and it is proposed to deal with the requirements in captivity of frogs in this one.

As with toads, an aquarium tank will make a satisfactory home: it should be as large as possible, a fair ruling being 12 sq. in. to 1 in. body length.

As frogs are more aquatic than toads, a greater area of water is needed. This can be arranged by placing some small bricks on a log across the tank, dividing it in two. On one side of this barricade, which should be 2-3 in. high, the space should be filled with pebbles or grit, level with the top of it. On top of this should be put about 2-3 in. of earth. The vacant side can then be filled with water. Again as with toads, plants tend to be more nuisance than they are worth. Lack of colour can be overcome by putting some duckweed in the water, and putting lichen-covered pieces of bark on the earth for shelters.

By nature frogs are more nervy and more easily frightened than toads. For example, if placed on a table a toad will merely walk over the edge, whereas a frog will throw itself off in any direction, regardless of the consequences. Therefore when handling frogs, all movements should be slow and deliberate, and not grabbing. Also when handling frogs it is best to have one's hands moist, as dry hands will cause the creatures discomfort.

When selecting specimens for a collection, it is best to choose young ones, for these will nearly always feed, whereas old or adult ones will often refuse all food, some-

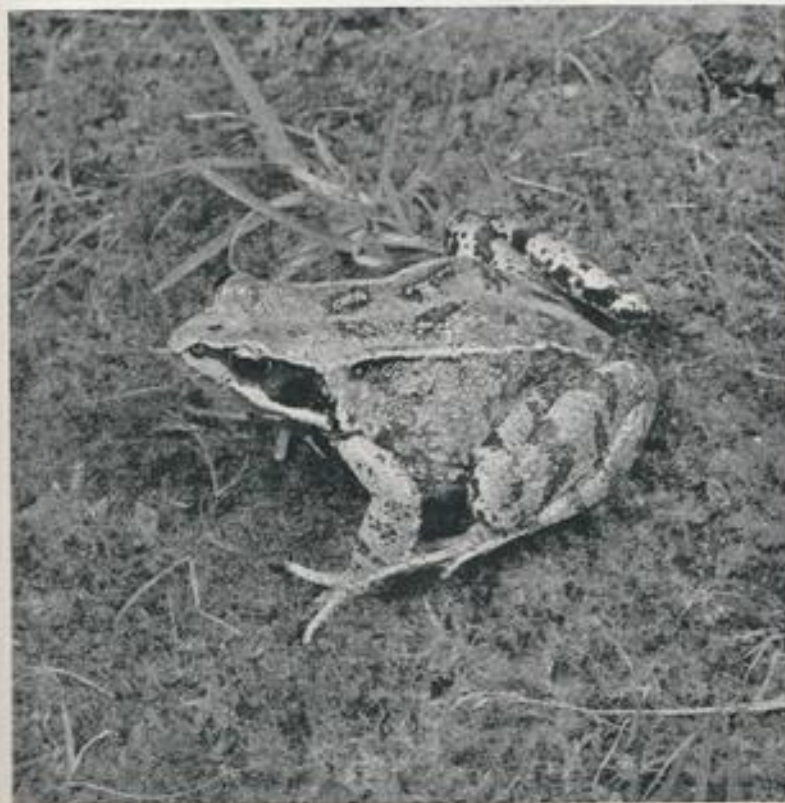
times until they die. It is also wise to keep only specimens of a similar size together, as many frogs will be prepared to stuff their smaller brethren down their throats.

For food, almost any insects will be taken, also molluscs and worms, food being caught on the tongue and, with worms, is cleaned with the front feet as it is swallowed. The front feet are also used to keep the worms in a central position if they start getting too low on one side or the other. As with toads, the eyes are used to help the frogs in swallowing. All the three British frogs belong to the typical frog genus *Rana*, and all make quite satisfactory pets.

The common frog (*Rana temporaria*), 8-9 cm., can be found in almost any shade of brown, yellow or grey, marked with brown or black. The colouring is variable and is changeable with temperature. Sometimes specimens will be found with hardly any markings, and others are nearly all blotches. In my collection I have one very attractive orange specimen with blood-red markings.

The edible frog (*R. esculenta*) is rather larger and more thickset than the common frog. On top it is generally a bright emerald green, marked with black, and below it is plain white. The edible frog can take its prey above or below water.

The marsh frog (*R. ridibunda*) is Europe's largest frog, sometimes growing to about 12-13 cm. It is similar to the edible frog in shape. In colour it is green, brown or bronze. Sometimes it is bright green in front and brown at the back. The legs are banded with black or dark brown,



Common frog
(*Rana temporaria*)

Photo: W. S. Pitt

limbs (much reduced in size), and then was set upon and torn to pieces by a finger-nail-sized shore crab which had lain hidden by day in the gravel, and came out only at night with a ferocious appetite.

In the west country the common hermit is invariably accompanied by a big anemone, *Calliactes*, sometimes by four of them standing picturesquely upright on the shell. Be content with this one hermit and his retinue, then all may go well. Introduce another hermit similarly encumbered and trouble starts. However well fed the two hermits may be, each makes a nightly habit of searching the stomachs of the other hermit's anemones and dragging out every scrap of food found. Before long, of course, this means a fight to the death between the hermits. The anemones on the shell of the losing hermits automatically catch and swallow any spoils of battle, and are promptly robbed by the survivor. Segregation seems the only prescription for a lasting peace.

On such lines I have kept for 6 months a specimen of the so-called snap lobster (in America the "pistol prawn")

Alpheus ruber. Much more needs to be known about this shrimp-sized, bright-red macrurid.

The "finger" of one claw has a sort of spring-trigger joint so that it can snap as loudly as can one's thumb and forefinger. Why? Some say it is a mating call, like the "stridulation" of the crawfish, *Palinurus*. Others say it is to kill small prey by concussion. One would like to know much more. Given a stone, to act as a base, *Alpheus* at once goes to ground beneath it. Working from this point it tunnels a sandy floor and throws up picturesque, ever-changing earthworks.

Another problem is waiting solution. Although millions of hermits have been kept in aquaria for years, no one has yet witnessed the fertilisation of the eggs. Authorities think, plausibly enough, it is accomplished lobster-wise. It seems likely but still remains, until proven a fact, theory only. An eye-witness account means keeping two hermits, he and she, in one tank. The snag will be obvious. The marine aquarist need never, like the late Alexander the Great, yearn for new worlds to conquer.

An Upside-Down Aquarium is a Pleasing Novelty

by THOMAS S. COX

AS a small fish-keeper for many years I know that fishes have feelings and sensations as intense as those of many other more highly esteemed creatures. So, as many bird-keepers like to let their pets out of their cages, I let my goldfish come out of their pond to look around the garden.

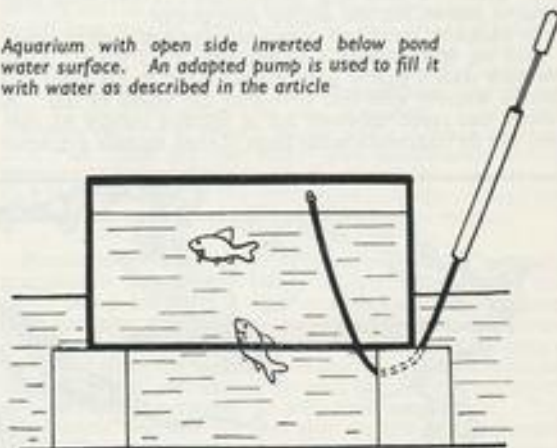
The principle involved is very simple. In the first instance I submerged a round goldfish bowl in my pond. I then reversed it into the upside-down position and partly withdrew it from the water, so that the open neck remained submerged and the bowl remained filled with water though its body was lifted well above the pond water level. In this position I supported it with two horizontal iron rods, and in a few moments the goldfish swam up into the inverted globe and, their red and gold colours magnified and gleaming in the sunshine, made a colourful and pleasing spectacle.

Friends seeing for the first time the fish in the bowl, have imagined that they were imprisoned and have assured me the fish would die, until they saw them dive down and appear in the main body of the water.

To-day, I have disposed of the glass bowl, and use a rectangular glass tank for the "look-out tower" for my fish. The glass tank stands upside down with the bottom edge below the pond water level, and rests upon four submerged flower-pots.

To get this larger tank filled with water, I have to draw out the air with a bicycle pump converted into a suction pump. To contrive this pump, I first reversed the cup washer inside the pump so that the pump now sucks instead of pushes. I then screwed on two long ordinary pump connectors, purchased from a cycle shop. On the

Aquarium with open side inverted below pond water surface. An adapted pump is used to fill it with water as described in the article



end of the second connector I fixed a brass football-pump adaptor, virtually a non-return valve, costing 9d. at a sports-goods outfitters, and held in position with a sleeve of rubber tube.

My suction pump was then complete, except that to get the pipe end up into the air chamber of the glass tank I bound a thick piece of wire along the length of the pump and the connectors, and then bent the wire and connectors into a suitable U shape for inserting the valved end under the edge of the tank up into the air chamber.

I now work the pump handle up and down in the normal manner, and the water rises to the required height in the tank as the air is sucked out, and my fish are able to swim up to this higher water level as they please.

This simple idea seems to enhance the pleasant relaxation that fish-keeping gives, and even as I am writing this, I can look out beyond the lawn and see that some of my fish have left the pond, swum up into the tank, and are slowly turning about, looking around the garden.

FRIENDS & FOES

No. 63

Water Beetles (continued)



Magnified larva
of *Haliplus*

FAMILY: Haliplidae, from Greek *haliploos*—covered with water.

GENUS: *Haliplus*.

THE first time I encountered the larvae of this beetle was in what would normally be the last place to look—in a small aquarium (18 in. by 10 in. by 10 in.) of tropical fishes. After positively identifying the creatures I went straight to the garden pool from which I had taken water to fill the tank, and searched carefully, not for more larvae but for their food plant *Spirogyra*. Some of this, perhaps only a strand or two, bearing the eggs of the beetle, must have been introduced with the water. I found it in plenty; hitherto I had been unaware I had any.

Lest some aquarists become worried upon reading this, let me reassure them. The larvae are absolutely harmless to both fish eggs and fry, and may indeed be eaten by the larger fishes, although I have not witnessed such a thing.

The larvae feed upon the cells of *Spirogyra*, a soft, slippery and brilliant green alga not so common as popularly supposed. They suck the plant dry, working systematically from cell to cell, but never fast enough to destroy the plant totally. Rather pretty creatures, they have a banded appearance which makes them conspicuous away from their natural habitat.

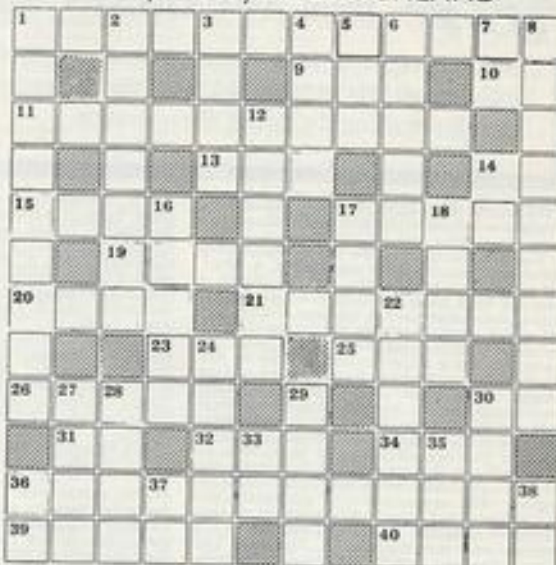
Adult beetles are quite small, about $\frac{1}{4}$ in., and are easily distinguished from other beetles by the presence of a large flat plate which covers the first (basal) joint of the third pair of legs.

There are 18 known members of the Haliplidae, 16 in the genus *Haliplus*. The remaining two belong to the genus *Cnemidostus*, meaning "with leggings on," and are not so easy to find.

C. E. C. Cole

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1 *Macropodus opercularis*; beautiful, savage anabantid (8, 4)
- 2 Chopper (3)
- 3 This refers to a male creature who gets the heater going (2)
- 4 *Ceratopteris thalictroides*, plant for tropical tank (6, 4)
- 5 "Wad some pow'r the giftie — us" (Burns) (3)
- 6 The old ego (2)
- 7 Yarn sounds like the caudal fin (4)
- 8 Willow used for making fishermen's creels (5)
- 9 Jaggle (4)
- 10 Hog (4)
- 11 All cops produce this bivalve in disorderly conduct (7)
- 12 Two return to anything in Lancashire (3)
- 13 A bandied from lice leaves less than truth (3)
- 14 *Aequidens* of the cichlid family (5)
- 15 I leave the Detectives for a different service (1, 1)
- 16 Neon loses direction, is still not badly off (2)
- 17 Orfe (4)
- 18 In a dory trouble lies at the heart (3)
- 19 Peaceful, lovely, member of the labyrinth tribe, also known as hair-fin fish (5, 7)
- 20 Islands (5)
- 21 Expires (4)

CLUES DOWN

- 1 and 2 X-ray fish (9, 7)
- 3 A net (4)
- 4 Free from danger (4)
- 5 Devonshire river (3)
- 6 Shade-loving plants suitable for the river bank or water garden (5)
- 7 Hush! (2)
- 8 Gasteropod in which the "foot" has become a swimming organ (9)
- 9 Insect superlatively more pleasant this way (6)
- 10 I am at the head of the mere (2)
- 11 Roe in a smash with the world's best car is a mistake (5)
- 12 Egg shaped (4)
- 13 Is the French feature of some water gardens (4)
- 14 Lid forms outside this reptile (6)
- 15 —and strays (5)
- 16 Sea these are manatees or dugongs (4)
- 17 Fin in canal (4)
- 18 Associated with signs for most, but aquarists see direction on top (4)
- 19 Goldfish variety loses its tail (4)
- 20 Short grace (1, 1)
- 21 After 500 the Welshman is first class (3)
- 22 Prefix meaning double (2)
- 23 Prefix meaning change of place or condition (2)
- 24 Is the last clue (2)

PICK YOUR ANSWER

1. "Hear you this Trion of the minnows?" was written by: (a) Barrie; (b) Byron; (c) Shakespeare; (d) Shaw.
2. The bitterling (*Rhodeus amarus*) is now believed to have become naturalised in: (a) Cheshire; (b) Cornwall; (c) Suffolk; (d) Yorkshire.
3. *Mollinix parsonsii* is native to: (a) Colombia; (b) Guatemala; (c) Texas; (d) Venezuela.
4. Which is the smallest of the following species? (a) *Tilapia macrocephala*; (b) *T. ovalis*; (c) *T. sparrmanii*; (d) *T. zillii*.
5. Narrow-striped rambora is the popular name of: (a) *Rambora maculata*; (b) *R. pauciperforata*; (c) *R. taeniata*; (d) *R. reticulata*.
6. *Aphysionion australe* was named by: (a) Boulenger; (b) Lorenberg; (c) Meinken; (d) Rachow.

(Solutions on page 231)

News

from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 5th of the month preceding the month of publication.

THE annual show of the **Scottish Aquarium Society** was held in Glasgow and again proved most successful.

The best fish in the show was a wagtail platy which had been bred this year by Mr. A. Watt. In addition to winning the Beltrous Shield it won the Peter McNish trophy for best tropical fish in show and this fish was one of a team of six which won the Smith trophy for best in breeders' class, tropical section. The best cold-water fish was a calico fantail exhibited by Mr. K. A. M. Robertson, which won the Robin Kerr trophy. The breeder's trophy in the coldwater section was won by Messrs. Gibson and Hood with six shubunkins. This exhibit was judged the best of the breeders' class, tropical or cold-water. The inter-club trophy again went to Greenock and District Aquarist Society for the best furnished tank which was in the coldwater section. The newest trophy of the society, the S.A.S. Furnished Aquarium Trophy for the best furnished aquarium set up by a member of the society, was won by Mr. D. Button. The Sawers Cup was won by Bellahouston Secondary School for best furnished tank set up by a school. The Strachan Kerr trophy and Water Life Cup went to Master A. McLaren for best coldwater furnished tank set up by a junior, and best exhibit by a junior.

Other results were as follows:—Common Goldfish: 1st, D. McAra; 2nd, Messrs. Gibson and Hood; 3rd, G. Reid. Shubunkin: 1st, 2nd and 3rd, Messrs. Gibson and Hood. Fantail and Veiltail: 1st, K. A. M. Robertson (Fantail); 2nd, K. A. M. Robertson (Veiltail); 3rd, W. Pollock (Veiltail). A.O.V. Goldfish: 1st, K. A. M. Robertson (Black Moor); 2nd, W. Gibson. A.O.V. Coldwater Fish: 1st, D. M. Button (peacock-eyed bass); 2nd, D. M. Button (golden orfe); 3rd, K. A. M. Robertson (diamond bass). Pair of Guppies: 1st, A. Robertson (veiltails); 2nd, A. Robertson (veiltails); 3rd, H. Kerr. Pair of Swordtails: 1st, A. Cross (green); 2nd, A. T. M. Robertson (red). Pair of Platys: 1st, A. Cross; 2nd, G. Dalrymple; 3rd, G. Reid. Pair of Mollies: 1st, Kildonan Secondary School; 2nd, D. McAra; 3rd, A. Cross. Pair A.O.V. Livebearers: 1st, A. Cross (mosquito fish); 2nd, A. T. M. Robertson (zebra); 3rd, G. Reid (zebra). Pair of Characins: 1st, G. B. Kirkland (rosy tetra); 2nd, Dr. A. Young (penguin); 3rd, Dr. A. Young (pristella). Pair of Barbs: 1st, D. O. Carr (nigger barbs); 2nd, K. A. M. Patrick (schuberti barbs); 3rd, E. McDonald (rosy barbs). Pair A.O.V. Small Egglayers: 1st, A. Watt (*Aplet. agassizi*); 2nd, D. M. Button (*Aplet. pertense*); 3rd, A. Watt (lyretails). Large Cichlid: 1st, R. Christie (blue acara); 2nd, Dr. A. Young (*Tilapia zillii*); 3rd, G. Reid (zebra cichlid). Angel Fish: 1st, D. M. Button; 2nd, D. M. Button; 3rd, G. Reid. A.O.V. Large Egglayer: 1st, E. S. Headley (catfish, *Plecostomus*); 2nd, A. M. Patrick (*C. paleatus*); 3rd, D. O. Carr (*C. aeneus*). Pair of Fighters: 1st, D. O. Carr; 2nd, D. M. Button; 3rd, G. Reid. Pair of Gouramis: 1st, A. Watt (pearl); 2nd, A. T. M. Robertson (dwarf); 3rd, A. M. Patrick (pearl). Pair of A.O.V. Labyrinth: 1st, D. McAra (paradise fish). Breeders' Class—A.V. Coldwater Fish: 1st, Messrs. Gibson and Hood (shubunkins); 2nd, Messrs. Gibson and Hood (shubunkins); 3rd, K. A. M. Robertson (orandas). Breeders' Tropical Livebearers: 1st, A. Watt (wagtail platys); 2nd, E. S. Headley (green lacertal guppies); 3rd, A. Cross (green swordtails). Breeders' Tropical Egglayers: 1st, D. O. Carr (lyretails); 2nd, W. Bisset (glowlight tetras);

3rd, R. Christie (blue acara). Members' Furnished Tank (Coldwater): 1st, D. M. Button; 2nd, Dr. A. Young. Members' Furnished Tank (Tropical): 1st, D. M. Button; 2nd, A. T. M. Robertson; 3rd, A. M. Patrick. Junior Furnished Tank (Tropical): 1st, Master A. Love. Junior Furnished Tank (Coldwater): 1st, A. McLaren; 2nd, A. Young, junr. Schools' Furnished Tank: 1st, Bellahouston Senior Secondary; 2nd, Allan Glen's School; 3rd, Kildonan Secondary School (Girls). Clubs' Furnished Tank (Coldwater): 1st, 2nd and 3rd, Greenock and District Aquarist Society. Clubs' Furnished Tank (Tropical): 1st and 2nd, Greenock and District Aquarist Society; 3rd, Paisley Aquarist Society. A.V. Reptile or Amphibian: 1st, Allan Glen's School (axolotl); 2nd, A. Lang (axolotl); 3rd, K. A. M. Robertson (axolotl).

MORE entries were reported from the **Bristol Aquarist Society** show, these being 50 up on last year's number, notably in the tropical section. The trophy for the most points in the show was won by Mr. W. H. Webb of Hereford and his well grown pair of marbled cichlids also gained for him the best fish in the show award.

Results are as follow:—Common goldfish: 1st and 3rd, A. Dominey; 2nd, H. T. Jago. Bristol Shubunkins (3 in.): 1st, L. G. Emery; 2nd, F. H. Amos; 3rd, M. Schiller. Bristol Shubunkins (5 in.): 1st and 2nd, W. Hicks; 3rd, D. S. Paul. Veiltails: 1st, W. Butler; 2nd, V. E. Capaldi; 3rd, Z. Webb. Moors: 1st and 3rd, V. E. Capaldi; 2nd, J. C. Juson. Telescopes: 1st and 3rd, V. E. Capaldi; 2nd, R. W. Savage. Nymphs and Comets: 1st, R. Palmer,

2nd, A. Deminey; 3rd, H. C. B. Thomas. Scaled Fantails: 1st, N. O. Grimston; 2nd and 3rd, A. W. Rudge. Calico Fantails: 1st and 2nd, F. W. Chappell; 3rd, W. H. Ellis. Pond or river fish: 1st and 2nd, S. J. Davis; 3rd, L. G. Emery. Bristol Shubunkin (bred 1957): 1st, 2nd and 3rd, W. Hicks. Moon (bred 1957): 1st and 2nd, G. Harper; 3rd, H. V. Jenkins. A.O.V. Fancy Fish (bred 1957): 1st and 3rd, D. S. Paul; 2nd, V. E. Capaldi. Breeders' Shubunkins: 1st, W. Hicks; 2nd, H. V. Jenkins; 3rd, L. G. Emery. Breeders' Veiltails, etc.: 1st, Z. Webb; 2nd, D. S. Paul; 3rd, N. O. Grimston. Shubunkins (matched pairs): 1st, H. V. Jenkins; 2nd, W. Hicks; 3rd, G. Harper. Furnished Aquaria (Coldwater): 1st and 2nd, S. J. Davis. Furnished Aquaria (Tropical): 1st, L. E. J. Challenger; 2nd, J. E. Wheeler; 3rd, Mrs. I. Stone. Furnished Aquaria (inter-club): 1st and 3rd, Bristol A.S.; 2nd, Bristol Tropical P.C. Aquatic Plants: 1st, Miss M. Hill; 2nd, S. J. Davis; 3rd, R. S. Barnes. Fighters: 1st, J. Holmes; 2nd, R. Somers; 3rd, W. H. Webb. Labyrinths: 1st, W. H. Webb; 2nd, L. Littleton; 3rd, H. G. Rundle. Barbs: 1st and 2nd, W. H. Webb; 3rd, C. W. MacRae. Characins: 1st and 2nd, W. H. Webb; 3rd, C. W. MacRae. Cichlids: 1st and 3rd, W. H. Webb; 2nd, H. G. Rundle. A.O.V. Egglayer: 1st, H. G. Rundle; 2nd, W. H. Webb; 3rd, R. S. Wigg. Mollies: 1st, H. G. Rundle; 2nd, R. Mayes; 3rd, R. Somers. Short-tail Guppies: 1st and 3rd, R. Forest-Jones; 2nd, R. Vince. Longtail Guppies: 1st, R. Vince; 2nd, R. Jones; 3rd, L. E. J. Challenger. Female Guppies: 1st, D. L. Edmonds; 2nd, R. Jones; 3rd, R. Forest-Jones. Swordtails: 1st, R. King; 2nd, L. Littleton; 3rd, W. H. Webb. Platys: 1st, J. Holmes; 2nd, J. Wear; 3rd, R. Somers. A.O.V. Livebearer: 1st, Mrs. I. Stone. Breeders' Livebearers: 1st and 2nd, W. H. Webb; 3rd, H. G. Rundle. Breeders' Egglayers: 1st, R. S. Wigg; 2nd and 3rd, W. H. Webb.

A CLUB has been formed within this department of the Civil Service, under the auspices of the Creed Social and Sports Association, called the **Creedex Aquarists' Society**.

Interest of the members lies mainly in tropical fish, though there are one or two cold-water enthusiasts. The main achievement of the club so far has been to install a community tank in the reception room of the department's office building.

THE committee of the **Bradford and District Aquarist Society** are pleased to report that the annual show resulted in a profit—a result which these days is quite an achievement. At a recent table show the winner was Mr. C. R. Wilson; Mr. J. Annal being second and Mr. C. R. Wilson also third.

THE result of a three cornered contest between Chelsea Aquarist Society, Riverside Aquarist Society and Staines Aquarist Society was a win for Chelsea. The annual home competition of the **Chelsea Aquarium Society** resulted in a win for M. H. H. Duncan; recent lectures have been on "Characins" by Mrs. Meadows (F.B.A.S.) and "Food for fry" by Mr. Bell (A.S.L.A.S.).

A FILM show was presented by **Colwyn Bay and District Aquarist Society** the films shown being "Underwater Life," and a colour feature "Coral Wonderland." This was a new venture by the society and there was a good attendance. The members were also pleased to welcome visitors from the Llandudno Society.

MANY colourful varieties of tropicals were displayed at the **Cambridge and District Aquarist Society** show, but the best fish in the show award went to a large specimen of the common goldfish owned by Mr. H. C. Fromant. The results were:—Goldfish: 1st, 2nd and 3rd, H. C. Fromant. Other Coldwater: 1st and 2nd, H. C. Fromant (golden orfe, catfish); 3rd, B. K. Elkerton (shubunkin). Livebearers: 1st, C. Holmes (moon platy); 3rd, T. W. Aggrove (swordtail). Cichlids: 1st, N. Radford (angel); 2nd, H. C. Mansfield (angel); 3rd, N. Radford (*A. retzigi*). Anabantids: 1st, S. Wright (combtail); 2nd,



The Aquarist's Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue substantial metal emblem for the aquarist can now be obtained at cost price by all readers of *The Aquarist*. The design is pictured here (actual size). Two forms of the badge, one fitting the lapel button-hole and the other having a brooch-type fastening, are available.

To obtain your badge send a postal order for 2s. together with the **Aquarist's Badge Token cut from page vi** to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

R. Human (fighter); 3rd, N. Radford (fighter). Guppies: 1st and 2nd, J. Palmer; 3rd, R. A. Grant. A.V. Eelgrayer: 1st, J. Palmer (serpae); 2nd, H. C. Mansfield (noes); 3rd, H. C. Mansfield (H. roscus). Catfish: 1st, C. P. Gibson (C. aeneus); 2nd, H. C. Fromant (C. jali); 3rd, N. Radford (P. pleurocatus). Barbs: 1st, C. P. Gibson (B. caesiogutt); 2nd, J. Palmer (tiger barb); 3rd, C. P. Gibson (nigger barb). Pairs: 1st, C. P. Gibson (taco barbs); 2nd, R. Human (B. bicoloratus); 3rd, J. Palmer (zebra). Breeds: 1st, C. P. Gibson (nigger barbs); 2nd, C. P. Gibson (zebra); 3rd, B. K. Elkerton (goldfish).

THE CARASSIUS CLUB were recently entertained by the area herpetologist, Mr. C. Abel, with his amusing and interesting experiences, and also a favourable report by Mr. A. Summers of this season's golden orfe breeding. The fancy goldfish breeders provided wit and comment on various prepared and live foods, and there was also a well reasoned discussion on the colouring of metallic goldfish.

THE death is announced of the well-known Workington aquarist Mr. Bert Smith. A member of the **Workington Aquarists' Club** his expert knowledge was often sought by schools and he also tended an aquarium in the children's ward at Workington Hospital.

IN the inter-group show competition between South West Middlesex Aquarist Association and North West London the result was a win for the latter group with 124 points to 86. Individual winners were: Fancy Goldfish; Mr. G. Moore (Uxbridge); A.V. Guppy; Mr. Baynes (Riverside); A.V. Characin; Mr. R. Skipper (Hendon); A.V. Carps and Minnows; Mr. Bowd (Feltham); A.V. Tropical Catfish; Mr. E. R. S. Landau (Willesden); Egg-laying Tooth Carps; Mr. B. Calrow (Hendon); A.O.V. Livebearers; Mr. Bowd (Feltham); A.V. Anabantids; Mr. K. Pye (Hampstead).

A PLEASING and enjoyable show was held by **Blackpool and Fylde Aquatic Society** recently, the individual winners being as follows: Furnished Tropical; Mr. G. Hadley; Furnished Coldwater; Mr. V. Fletcher; Best fish in show; Mr. L. A. Childs; Fancy Goldfish; Mr. N. L. Wilkinson; Livebearers—Swordtails; Mr. W. Leigh; Platys; Mr. F. Taylor; Mollies; Mr. A. G. Gower; Guppies; Mr. D. H. Hammond; B. and F.A.S. Trophy; Mr. A. G. Gower; Characin; Mr. L. A. Childs; Labyrinths (other than Fighters); Mr. A. Morgan; Fighters; Mr. A. L. Partington; Minnows and Barbs; Mr. C. A. Whitsay; Cichlids—Dwarf; Mr. C. A. Whitsay; A.O.V.; Mr. D. Hughes. Breeders' Section—Coldwater; Mr. N. L. Wilkinson; Livebearers; Mr. F. Taylor; Egg-layers; Mr. L. Connell; Schools furnished (Coldwater); Claremont Junior School.

THE formation of the Doncaster Aquatic Society has been announced, and the first meeting was held on the 2nd November when 14 members were enrolled. The meetings are to be held on Thursday evenings at 7.30 p.m. in the Library, Y.W.C.A., Cleveland Street, Doncaster; the hon. secretary is Mr. G. V. Dixon, Cedar House, 1, Greenfield Lane, Balby, Doncaster.

THE meeting of Dundee Aquarium Society was held in the Y.M.C.A. There was an inter-club table show between Dundee Aquarium Society and Perth Aquarist Club, Dundee winning by 25 points to 9. A general discussion then followed on a wide range of subjects of topical interest. Meeting was presided over jointly by president Robertson of Dundee and Mr. A. McKillop of Perth Aquarist Club.

THE officers elected at the annual general meeting of the Hounslow and District Aquarist Society were: Chairman, Mr. L. Stallord; secretary, Mr. Worms, 302, Ellerslie Road, Hounslow; treasurer, Mr. C. H. Bollington; show secretary, Mr. L. Cleaver; publicity secretary, Mr. B. C. Bould; librarian, Mr. Poole. Highest points scorer of the year was Mr. Groom. A successful year was reported, table shows having been well supported. The meet-

ings of the society are held fortnightly on Wednesdays at 20, Heath Road, Hounslow, Middlesex.

AT the annual general meeting of Northampton and District Aquarist Society, Messrs. J. A. Catterall and N. E. Lyon were re-elected secretary and treasurer respectively. Other officers elected were: Chairman, Mr. W. H. Snedker; vice-chairman, Mr. S. J. Hoelock; Committee: Messrs. G. Pulley, L. W. Roy, H. Platt and J. Wright.

Prizewinners in the table show were: Cold-water Fish—1 and 3, Mr. T. Dascombe; 2, Mr. J. Strad; Tropical Plants—1, Mr. L. W. Roy; 2 and 3, Mr. W. H. Snedker. Mr. N. E. Lyon was judge.

A FILM show was given to members of the **North of Scotland Aquarist Society** by Mr. G. Steele, the subjects being "Bartling Bettas" and "Silver Springs". The showing had quite a large audience. After the film show the members inspected newly acquired club rooms in Belmont Street, Aberdeen.

MEMBERS of the Medway Aquarists' Society heard, at the last meeting, Mr. E. C. Kaititzky speak on plants. On this subject he has so much knowledge to impart and the chairman, Mrs. P. Amos, had to call the meeting to a close with still many questions unanswered. Recently, members of Medway Aquarists' Society had a chance to welcome back to fish-keeping, Mr. K. Downes of Dartford, who was a founder member of that Society.

THE main topics at the last meeting of the Carassius Club were the Comet Variety of goldfish, the Hi-go! carp, and the merits of various fish foods. Mr. C. Abel presented the club with an exhibit aquarium for meetings. Mr. A. E. Smith provided the "fish of the month," the Comet. Speakers: Messrs. Snell, Summers, Mason, Rydler, Evans, Cole and Knight.

FISH Diseases were among subjects discussed at a recent meeting of **Brockley and District Breeders Circle (Aquaria Society)**, attention being mainly directed to methods of utilising salt rather than other chemical means. More than one member has made somewhat specialised study of this aspect of fishkeeping and "Treating Tropicals on a Commercial Scale" is to be a continuation topic in the near future.

Furnished show tanks are receiving a great deal of thought recently. Such enthusiasm is being shown that rocks and gravel for furnished tanks is being brought hundreds of miles, after collection of isolated coastal beaches, and distributed to various members—while the neighbourhood has been scoured for containers in which to bring back "natural" waters from carefully selected and tested streams and wells.

The secretary has formed a link with the South London Field Studies Society which has enabled many samples of water to be obtained from a wide area. Experiments taking place show promise from the breeding and conditioning angle.

Societies in London, unable to afford printing work, etc., are invited to contact Brockley's secretary (H. J. Vosper, 23, St. Asaph Road, S.E.4) for the group have the use of a rotary duplicator and are willing to aid whenever possible.

THE headquarters of the Southall and District Fishkeepers' Society as from 9th January, 1958, and thence alternate Thursdays, will be "The Beaconsfield Arms," West End Road, Southall, Middx. New members are always welcome as are old friends and ex-members.

THE annual general meeting of the Bristol Tropical Fish Club was held on the 21st November, and the following officers were elected for 1957-58:—Chairman, Mr. L. R. Somers; Vice-Chairman, Mr. M. J. Wallace; Hon. Treasurer, Mr. V. A. Webster; Hon. Secretary, Mr. W. E. Ridler; Assistant Hon. Secretary, Mr. L. Littleton.

Meetings are held on the third Thursday of each month. Enquiries concerning membership

will be welcomed and should be addressed to the Hon. Secretary, 9, Friendship Road, Knowle, Bristol, 4.

RECENT activities of the Southport Aquarist Society have included a visit by members and friends to the Dee and Clwyd River Board Salmon Hatcheries near Corwen in North Wales. The visitors found it most interesting to watch the processes in which females are stripped of their eggs and in which the eggs are fertilised by milt from the males. In this demonstration eight females were stripped of some 6,400 eggs. It is understood that a 98 per cent. fertility rate is obtained by this method.

There has also been a film show which included a film on the salmon and its breeding habits, and on the breeding of salmon on a commercial basis. The Society is holding its annual dinner on the 7th January.

TABLE shows and a "Fishy Forum" conducted by Mr. J. E. Edwards have been among the recent events of the **Guildhall and District Aquarist Society**. At the December meeting on Wednesday, the 11th December, a Quiz has been arranged by Mr. John Rydler.

AT the December meeting of the Hackburn and District Aquarists' Society the trophy for the best furnished aquaria (judged in aquarists' homes) was presented to Mrs. Thompson of Preston, with 95 points; the second prize, a medal, being won by Mr. Butterworth with 87 points and the third prize by Mrs. Hasworth, with 86 points.

Mr. Strack, who made the presentations, judged the tanks and after the presentations gave a talk on the setting up of furnished aquaria and also told competitors in the contest where they had lost points. The competition was open to all aquarists in the district and was successful in obtaining some new members for the Society.

IN the absence of Mr. Loder, who was unable to attend because of illness, Mr. Partington of the **Middleton and District Aquarist Society** addressed the meeting. There was a good attendance, including some Salford members. Mr. Partington spoke of the many different ways of heating a tank, and of how to deal with any of the emergencies that might be encountered in the hobby. He produced many, very good drawings to illustrate his talk.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:—Hendon and District Aquatic Society (Mrs. B. Robertshaw, 30, Mountaine Court, Highfield Avenue, London, N.W.9); Oldham and District Aquarists Society (Mr. A. Sloan, 93, Kew Road, Fallsworth, Manchester); Stroud and District Aquarist Society (Miss P. A. Huxford, The Knowle, Far Westrip, Nr. Stroud, Glos.).

Crossword Solution

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

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1 (c), 2 (d), 3 (b), 4 (b), 5 (c), 6 (d)



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