

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,
MIDDLESEX

Telephone: HOUslow 9301

PUBLISHED MONTHLY

SUBSCRIPTION RATES

The Aquarist will be sent post free for one year to any address for 19/6. Half-yearly 9/9. Canada and U.S.A. \$3.00 yearly; \$1.75 half-yearly.

QUERIES

Postal replies are made to all specialised queries accompanied by a stamped, addressed envelope. This privilege is afforded only to registered readers and direct subscribers. Subscription forms can be obtained on application. In all cases letters should be addressed to the Editor.

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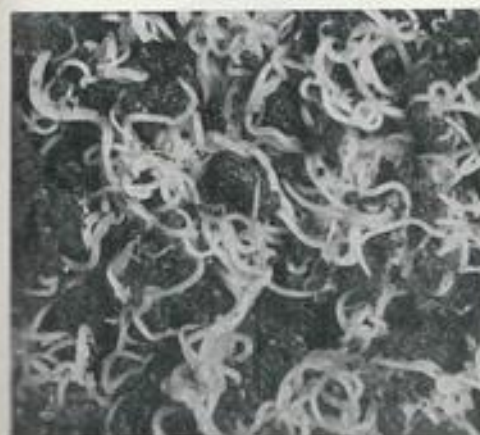


Photo:

F. N. Ghodially

An old and well-tried food for fish rearing is the white worm. Part of a culture of the worms is shown magnified above, and methods for culture are described on page 70.

VOL. XX No. 4

1955

Editorial

IT would be perfectly understandable if the organisers of this year's National Aquarium Exhibition in London considered that the Fates have been less than kind to them. Attendance by the public last month was sadly down on previous years' figures, a most undeserved neglect of a good show for which the Railway Strike can probably to a large degree be held responsible.

The support from exhibitors and traders had been secured as usual, the National Aquarist Society officials had organised the event with the experience of an impressive number of yearly "Nationals" behind them; everything was, in fact, set fair, and then—a terribly low gate. It is not just the financial loss which a poorly attended venture of this kind can suffer that produces a depressing effect, although this is indeed a serious matter.

To all the indefatigable voluntary show officials the sight of fine exhibits and stands carefully displayed to empty gangways is heart-breaking. This may not be readily appreciated by those who have not been actively engaged in preparing for and running a large exhibition, but it is usually true that an exhausted and tired official at the end of a crowded show is also a happy man. All his efforts have been worth while. If few visitors turn up when all the work of preparation is over the effect is profoundly anti-climax. So much so that here and now we would like to try and help restore any lost confidence and promote new interest in the future by giving expression to the sincere thanks of all keen aquarists who so much enjoy and look forward to "Nationals."

We all know how much these London exhibitions have done to publicise the hobby and to keep aquarists from widely separated parts of the country in at least annual touch with one another. For this thanks are well deserved and freely given. It would be a sad loss if because of the set-back this year any decision not to stage the "National" again were taken. We hope such pessimistic steps are not envisaged, cruel though 1955 has been.

British Aquarists' Festival — 5-9 OCTOBER 1955



THE British Aquarists' Festival to be held this year by the Federation of Northern Aquarium Societies in collaboration with *The Aquarist* at the Belle Vue Zoological Gardens, Manchester, will be the show with the new approach.

Every effort is being made to avoid the presentation of rows and rows of aquaria on monotonous staging, and the grouping of entries from within a society to form an individual artistic display will provide spectacular and colourful aquarium settings that should not be missed seeing. Neither should the chance to enter in this national show be missed by any British society with ideas and good fishes to exhibit. There are cash prizes offered by *The Aquarist* for the best society display as well as the handsome trophies for all classes which have been so admired at Festivals of previous years.

Cash Prizes

For society entry displays—First, Twenty-five pounds; Second, Fifteen pounds; Third, Ten pounds.

Trophies

Daily Dispatch Challenge Trophy (Best Fish in Show), Cussons' Trophy (Best Furnished Aquarium), Hand Trophy (Best Junior Furnished Aquarium), Belle Vue (Manchester) Trophy (Best Coldwater Fish), North-West Section of Goldfish Society of Great Britain (Best Shubunkin), Harrogate A.S. Trophy (Best Guppy), A. Fraser-Brunner Trophy (Best Pair of Live-

bearers), *Aquarist and Pondkeeper* Trophy (Best Pair of Egglayers), East Lancs Trophy (Best Pair of *Hyphessobrycon*), A. J. Bland Trophy (Best Fighting Fish), National Aquarist Society Trophy (Best Cichlid), Whitwell and Smakkala Trophy (Best Angel Fish), *Aquarist and Pondkeeper* Trophy (Best Plants), Leeds and District A.S. Trophy (Best Common Goldfish), St. Martins Aquaria Trophy (Outstanding Breeder's effort for Tropicals).

Classes

Classes 1 to 5 are open only to societies.

- Class 1. Tropical Furnished Aquaria.
 - Class 2. Coldwater Furnished Aquaria.
 - Class 3. Six pairs of any Tropical and/or Coldwater Fishes.
 - Class 4. Display only.
 - Class 5. Complete exhibit (being a combination of Classes 1 and 2 and Classes 3 and 4).
- Societies can make entries either in Class 1 or in Class 2 but not both.
- Class 6. Pair of any variety of live-bearer.
 - Class 7. Pair of a.v. coldwater fish.
 - Class 8. Pair of a.v. cichlid.
 - Class 9. Pair of a.v. labyrinth (except *Betta splendens*).
 - Class 10. Pair of *Betta splendens*.
 - Class 11. Pair of a.v. barb.
 - Class 12. Pair of a.v. characin.
 - Class 13. Pair of any other variety of tropical fish.

(See also page 81)

Two examples of societies' grouped entries at last year's F.N.A.S. Assembly Show are shown on this page. Above is the opened book presentation made by *Danecaster and District A.S.*, below is seen the sunken galleon scene staged by *Leeds and District A.S.*



North American Aquarium Sunfishes

by A. BOARDER

Illustrated by A. FRASER-BRUNNER

IN the two preceding articles of this series I have described the external features used to identify the various species of sunfishes and have given some general notes on their aquarium care and breeding habits. In this final article notes on some of the individual species not so far discussed are given together with the numerous popular names under which they have been described here and in the U.S.A.

The crappie (*Pomoxys annularis*), is also known as:—crappet, bachelor perch, sac-a-lait, bridge perch, white perch, timber crappie, white crappie, newlight, campbellite, Chinquapin perch, John Demon, Tinmouth, tin perch, goggle-eye, goldring, pale crappie, papermouth, shad, speckled perch, silver perch, suckley perch and strawberry perch. The colour of the fish is a pale olive above and silvery white below. There are dark markings on the sides which form vertical bars, although these are not very well defined. This species grows to a length of 12 inches and is a popular game fish in America. It occurs in many waters in America, for if not a natural inhabitant it has been introduced into most rivers and lakes. As this fish can grow fairly large it is unwise to keep the crappie in an ordinary tank. It would do quite well in a pond, however, and if the pond was large and well cared for the fishes could winter there.



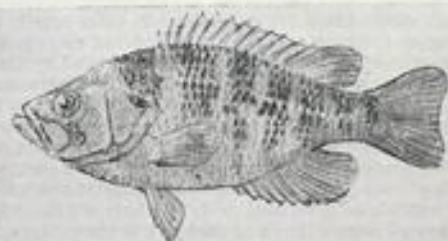
CRAPPIE
(*Pomoxys annularis*)

Calico bass (*Pomoxys sparoides*) are also known as:—crappet, spotted trout, bachelor, barfish, roach, grass bass, sand perch, razorback, black crappie, calico bream, bitterhead, white perch, tinmouth, sunperch, Chinquapin perch, musklick bass, crappie, Dolly Varden, straw bass, millpond fish, speckled bass, silver bass, lake bass, goggle-eye, and rock fish. As was mentioned in an earlier article, many of the popular names for this fish in America are the same as for the crappie, and so it can be readily understood how easy it is to get confused with such naming. The calico bass is rather similar to the crappie but is darker in markings and these markings do not form bars as in the previous species described. There are also two more spines at the front of the dorsal fin than are seen in the crappie. This fish also

grows to about 12 inches under good conditions and requires very much the same treatment as for the crappie.

The Sacramento perch (*Archoplites interruptus*) is another handsome fish which does not seem to have been imported into this country. It is very similar in coloration to our own perch, as there are dark bars running down the sides of the fish in the same fashion. It is found in the rivers of Sacramento, and San Joaquin rivers, California. It has a large and ugly mouth and can reach 12 inches in length.

Rock bass (*Ambloplites rupestris*) is also known in America as:—red-eyed bream, red-eyed perch, red-eyed sunfish, goggle-eye, bream, white bass, sun perch, sunfish bass, lake bass, crapet mondoux, crapet noir and crapet vert. The last three names are French and the confusion which exists over the names can be realised when such different colours



SACRAMENTO PERCH
(*Archoplites interruptus*)

are given to the fish as black, white, green and red! This fish is fairly well known in this country and is often imported. The younger fishes have distinct blackish bands along the body but as the fish ages these bands tend to disappear and many dark spots remain on the scales. It is sometimes confused with the common sunfish, but has a different number of distinct rays in front of the anal fin. The common sunfish has three such spines whilst the rock bass has six. The body is more elongated than the common sunfish. Another fairly large growing species, getting to at least 12 inches in length. This species is found in the Great Lake Region and down to Louisiana. Quite a good fish for the tank when small but thriving better in a pond as it reaches over six inches in length. The southern rock bass (*Ambloplites cavifrons*), is thought by some naturalists to be not a true species but a variation of the preceding species. It has been bred on the Continent and probably in this country.

The mud bass (*Acantharchus pomotis*), is also known as:—mud sunfish, bass sunfish and mud perch. This is a much smaller growing type than the previous fishes described as it rarely gets longer than four inches. It can be distinguished from many species by its rounded caudal fin and the distinct dark bars running along the body. It may be found in slow-moving waters near the sea from southern New York to South Carolina.

The warmouth (*Chaenobryttus gulosus*) is also known as:—black warmouth, bigmouth, buffalo bass, goggle-eye, mud chub, warmouth perch, warmouth bream, redbeye, wide-mouthed sunfish, sac-a-lait, perch-mouth bream, suntrout, Indian fish, more-mouth bream, jugmouth and black sunfish. This is not a handsome fish and is not seen in this

country. There are three large spines in the front of the dorsal fin and small spines or projections on the gill plates. It is found in the eastern United States and in South Carolina. It reaches a length of about 10 inches.



CHINQUAPIN BASS
(*Apomotis punctatus*)

Chinquapin bass (*Sclerotis punctatus*) are sometimes named spotted bream or bream. The colour of this fish is brownish with a black dot on each scale, quite small. It has eight strong spines at the front of the dorsal fin, the fourth the longest. It is found in the rivers of South Carolina and Florida. It grows to four inches in length. There is a sub-species, *S. miniatus*, about the same size, which has larger spots on the body, red in colour with an edge of black. In this sub-species the last dorsal spine is the longest; it is found in southern Illinois, Louisiana and Texas. The Mississippi bass (*Lethrogrammus symmetricus*) is a rather plain type of sunfish with an oval body. There are three spines at the front of the anal fin, and there is a slight indentation of the caudal fin. It is native to the Mississippi Valley, Illinois and Texas. It grows to about three inches in length.

The yellow bass (*Eupomotis microlophus*), is also known in America as:—yellow bream, branch perch, strawberry bass and shellcracker. This fish has a short but rather broad ear-flap. It is olive in colour above and silvery below. The pectoral fins are very long and reach beyond the vent. It can be found in Virginia and Florida and reaches about 10 inches. The bluegill (*Helioperca macrochira*) is also known



BLUEGILL
(*Helioperca incisor*)

as:—black-eared pond fish, blue Joe, blue-sunfish, blue bream, blue perch, blue-mouthed sunfish, copper-nosed bream, dollardee and copper-headed bream. This species has a long ear-flap which has no pale margin to the black mark thereon. The young fish show irregular greenish bars but they fade as the fish matures. This is a fairly common species found from the Great Lakes down to Florida and the Rio Grande. It reaches eight inches in length.

The large-mouthed black bass (*Huro salmoides*), is known in America as:—dotted painted tail, speckled hen, salmon-shaped growler, jumper, green trout, bride perch, green

perch, yellow pond perch, yellow bass, white trout, white salmon, white bass, striped bass, straw bass, spotted bass, slough bass, rock bass, pale river bass, mud bass, moss bass, march bass, grey bass, cow bass, hayou bass, Oswego bass, black huro, black bass, Huron black bass and green bass. This fish is quite different from the usual sunfish as the body is very long and resembles a mackerel. It also has a strangely shaped mouth, this being more like that of a salmon. In colour they are greenish above and silvery below, and there is a dark blotchy line running along the centre of the fish. The front portion of the dorsal fin is almost separated from the secondary part. These fish are a popular game fish in America and they can grow to two feet long. They are found almost all over the United States, east of the Rockies. As small fish they are suitable for the tank but owing to their size could not be kept long there and would have to be removed to the outdoor pond.

The small-mouthed black bass (*Micropterus dolomieu*) is also known as:—black perch, black freshwater bass, brown bass, green bass, gold bass, dwarf bass, little bass, minny bass, hog bass, river bass, rock bass, spotted river bass, streaked-cheek bass, bass hog-fish, bronze backer, jumper, mountain trout, swago bass, swego, white trout, trout bass, trout perch, yellow perch, yellow bass, achigan noir, achigan petite bouche. Although this species has the name of small-



COMMON SUNFISH
(*Eupomotis gibbosus*)

mouth it is really a fairly large-mouthed fish; the name is given to distinguish it from *Huro salmoides*. The colour does not vary much from that of the large-mouthed bass except that the dark markings appear as vertical bars in the younger fishes whilst in the large-mouth the markings form a longitudinal line. It is found in districts from Manitoba to South Carolina. This species is not so good for tanks as it prefers running water.

Mention has been made of the number of spines in the front portion of the anal fins of the sunfishes. Those with five or seven spines include:—the crappie, calico bass, peacock-eyed sunfish, Sacramento perch, rock bass, and mud bass. Those with three spines include:—the black-banded sunfish, diamond bass, warrmouth, Chinquapin bass, Mississippi bass, red-spotted sunfish, yellow bass, common sunfish, long-eared sunfish, blue-gill, blue-green sunfish, red-breasted bass, large-mouthed black bass and small-mouthed black bass. Those fishes with elongated ear-flaps are:—blue-gill, long-eared sunfish, common sunfish, yellow bass, red-spotted sunfish.

All the species described could be kept in cold water aquaria in this country with the exception of the black-banded sunfish, which prefers a temperature not lower than 45° F., and in fact, many have been kept quite successfully as tropicals. As a rule the sunfish require tanks on the large size, and if 36 ins. by 12 ins. by 12 ins. tanks can be used several kinds could be kept for a few years as long as the fish received plenty of live foods.

White Cloud Mountain Minnows

by JACK HEMS

GIVEN the right conditions, the white cloud mountain minnow (*Tanichthys albonubes*) will spawn over and over again every year for at least three years in any aquarium measuring about 18 ins. by 12 ins. by 12 ins. But there is a world of difference between having the species lay its eggs, and seeing large numbers of fry darting like splinters of green and red glass in the water, and growing larger and more vigorous every day. For the adult fish often develop the annoying habit of picking newly-hatched fry from the glass sides of the aquarium or leaves of the plants and eating them.

But let me make it clear from the start that the species is not a cannibal fish, nor a persistent molester of its young in the accepted sense of the word; for, strangely enough, once the fry have become free-swimming, the parent fish seldom take much, if any, notice of them.

In a thickly planted aquarium, so choked with underwater vegetation that the parent fish find it difficult, if not impossible, to penetrate to every part of their surroundings, fry will be seen in every stage of development throughout the spring and summer months; the eggs, scattered every few days in dense clumps of greenery, will hatch out and most of the fry remain safe from the parent fish. And to be perfectly fair to the parent fish, not all newly-hatched fry found hanging on fixed objects will be eaten: but sufficient of them will be snatched from their resting places—where they stay quiescent for a day or two after hatching out—to make the owner of a pair or trio of these fish doubt the words of the writers who tell their readers how easy the species is to breed—which brings us back to where we started; for, given the right conditions, the fish will spawn freely, and, if proper care is taken to protect the fry in the initial stages of growth, scores of baby fish may be saved and raised to maturity every season.

Actually, there is no true breeding season for the white cloud mountain minnow living in captivity. It will spawn in the winter as well as in the summer, but most tropical fishes, and *T. albonubes* is no exception, spawn more readily in the spring and summer months than when the days are dark and cold.

The conditions which suit the fish are easy to provide: clear, shallow water (five to eight inches deep), and a sunny or bright position. The species does not seem to have any marked preference for either acid or slightly alkaline water. But judging from my own personal experience, good results are usually obtained when the water is on the acid side, and soft and well matured. Water which has been strained through scalded peat and then left to stand for about 10 weeks is quite suitable.

The floor of the spawning aquarium should be furnished with wads of filamentous algae, fine-leaved willow moss or the like, and the sides close to the top of the water should be masked by sprays of *Myriophyllum* or closely curtailed by the hanging roots of water hyacinth or floating fern. As will be readily realised, plant life on the bottom of the water and at the top will provide excellent protection for newly-hatched fry. To save as many baby fish of each spawning as possible, I offer two suggestions. One is to have several small untenanted aquaria set up as outlined above and maintained at the same temperature, say, 72° or 74° F. Move the

adult fish from tank to tank every four or five days. By the time the fish have been returned to their original home, any eggs laid during the first two or three days will have hatched out (within three days) and the fry become large enough to be transferred into a separate rearing tank, or allowed to stay with the parents.

Well, this is one way of breeding the fish; the other way, which readers, possessed of only one or two aquaria, may care to try out may be carried out as follows: obtain a genuine pair, or two, of white cloud minnows and place them by themselves in a tank planted up with the recommended bottom and surface-seeking aquatics. If the fish are seen to be in breeding condition—easily discerned by the female's plumper sides, the male's intensified colours, and also by the way the male will keep paying court to the female, spreading his dorsal fin, and showing off in front of her—keep a close watch on the glass side of the aquarium nearest to the light. If the glass is clean (not clouded with algae), and the fish have spawned without your being aware of it, it will not be long before you will notice what looks like tiny silvery-white hairs with a mere dark, pin-prick of a head adhering to the glass just below the surface of the water, though you may find a few strong individualists among them resting lower down, or on the leaves of the plants.

If you agitate the water ever so slightly with a piece of cane or glass rod, the baby fish will sway like pendulums in the wash of the water before relinquishing their hold, and spiralling away to settle elsewhere—all in a matter of a few seconds. But it is unwise to disturb the baby fish unless it is absolutely necessary. I mentioned the matter merely to point out how easy it is for the newcomer to the hobby to distinguish the fry from any other small water creature such as a tiny leech or planarian worm or baby snail: and here I must warn intending breeders of these fish to exclude all snails from the aquarium, for snails eat fishes' eggs.

Now, having seen fry adhering to the glass, make haste to transfer them as quickly as possible to fresh quarters—another aquarium, a large-mouthed jar or even the ubiquitous goldfish bowl. These containers must be filled with old water, to which should be added several cupfuls of water from the spawning tank. The fry must not experience any change of temperature. If the weather is warm, it should be very easy to maintain the temperature at the desired level. A goldfish bowl or jar may be stood on a thick cover glass of the aquarium; a small tank may be kept warm by raising it on four small wood blocks and fixing a 15 watt electric bulb underneath it. Other methods will suggest themselves to the thoughtful aquarist.

To return to the baby fish. Obtain a soup spoon, and bend the bowl of it at right angles to the handle. In other words, fabricate a ladle or scoop. Now when you notice a baby fish clinging to the glass side, lower the spoon into the water, and then bring it up against the glass close to the tiny fish. A little agitation of the water will usually result in the speck of life releasing its hold on the glass and sinking or spiralling into the bowl placed ready for it. Gently raise the bowl of the spoon out of the water, and immerse it gently, ever so gently, into the nursery tank. The tiny fish will swim out of it if you tilt the spoon, and settle straight away on a fresh resting place.

With practice, the aquarist can capture upward of a score of baby fish every day. I have always found it easier to catch newly-hatched fry in the evening. If it is too dark to see them, an electric bulb on a length of flex held at the back of the tank will show up the little fish clinging to the glass. When the fry reach a sturdy quarter-of-an-inch in the nursery aquarium, they may be returned to their original home; that is, to live with their parents.

It is easy to feed white cloud mountain minnow fry. From the start they will take powder-fine dried food, hard-boiled yolk of egg, Infusoria, or the powdery dust of oatmeal. After the first few days, they will feed ravenously on micro worms. As soon as they begin to show some development, just feed them in the normal way with the usual small dried food or small live food. Young white cloud mountain minnows are very beautifully coloured, and look like miniature neon tetras.

The species is remarkably hardy, and will endure a temperature which most other so-called hardy tropicals would find too low to maintain life. To give an instance, two white cloud mountain minnows in my possession have lived right through the winter of 1954-55 in an unheated room. The only heat they had was obtained from a heated tank placed alongside their own. The temperature of this tank averaged about 72° F. The water in the white cloud minnow tank often touched 48° F., but during all the long days of winter they remained active and fed well.

While on the subject of hardiness, I think it would be as well to point out that the fish cannot endure much heat. A temperature above 80° F. soon kills them. Generally speaking, a temperature around 68° F. suits the species very well.

The species is an ideal one to keep at comfortable living-room temperature. But if kept in an unheated aquarium in a centrally-heated home, do make sure that the aquarium is placed well out of the way of cold draughts. After spending a winter in cool conditions, a gradual rise to 72° F. and plenty of nourishing food will soon bring the fish into tip-top condition and ready for breeding in the brighter and warmer days ahead.

Paignton Aquarium

THE Aquarium that is different . . . that's how we have started here at Paignton, and there is no doubt that aquarists who have seen it, like it. In the first place we decided to make it entirely marine. The reason was obvious—because we were right beside the sea, but we decided to exhibit only the very local flora and fauna. And that precisely is where the difference came in. The Paignton Aquarium is in two sections, the first being tanks, and the second a series of exhibits, set-pieces and models to show some of the life histories, etc., of the creatures that live in the sea.

Tank exhibits consist of anemones of various species such as plumose, dahlia, opcelet, strawberry and beadlet with the cloak anemone around its hermit crab. Another tank shows a typical rock pool collection of gobies, urchins, crabs, etc. One tank is devoted to dogfish eggs, and the public can see the young dogfish embryo developing and moving within the egg. All the smaller tanks are filtered separately and aerated by single diffusers, and after some 10 weeks half of these tanks attained a balance and needed no frequent changes of water. The larger tanks are circulated each day for a few hours according to tidal conditions within the harbour, whence the water is lifted some 20 feet by a screw-rotor pump. To aquarists this Aquarium should have a special appeal, for many of the tanks are of the normal two-foot type used for home aquaria.

To readers on holiday in Devon, may we extend an invitation. You'll find us on the South Quay of the harbour, and if you choose to let us know you are a keen aquarist, we'll gladly take you behind the scenes. We might even persuade a few folk to take up marine aquaria, for there is no doubt of the possibilities.

L. A. J. Jackman

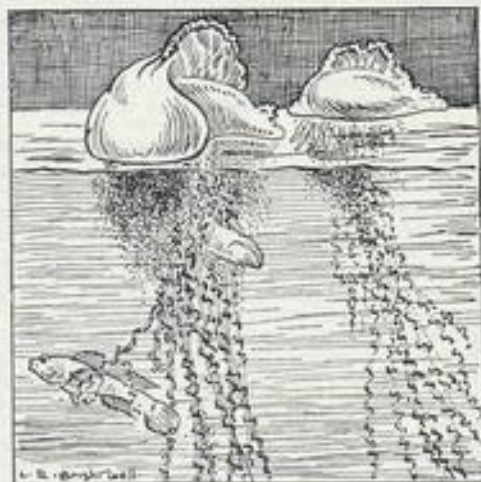
JOURNAL OF A Marine Aquarist

by L. R. BRIGHTWELL

IT is so long since Plymouth, headquarters of the Marine Biological Association, was noticed in this column, that we offer no apology for reintroducing the Mecca which has done so much to further oceanic research, and encourage the steadily growing army of marine aquarium enthusiasts. Please note "enthusiasts," not "fans." We are not interested in the fan, whose mind seldom gets beyond a desire to grasp breeding problems as a step towards mastering show points, and the inevitable cup. When are we going to meet the naturalist who will enliven us with stories of guppies, neons, angels and the rest, not as they figure in the lounge tank, or on the show table but in the wild, with plenty of local colour, climate, plants and natural enemies? There is not half enough of that.

But one has only to turn the pages of *The Aquarist* to see how a genuine desire to study the wonders of the sea through the media of aquarium tanks is sweeping forward like a tide. Books and films devoted to sea-floor exploration are fast ousting space thrillers, and the newly-formed National Sub-Aqua Swimming Clubs (favourably looked upon and fostered by the Lords of the Admiralty) further encourage a very healthy trend. The Brighton and Hove Sub-Aqua Club, indeed, has publicly announced that it has resolutely set its face against harpoon gunning and similar childish games, and is devoting itself wholly to the development of under-sea photography, a science and art—yet in swaddling clothes. And in the forefront of these vigorous pursuits, is the mother lodge, at the eastern extremity of Plymouth Hoe.

Recent developments are the reorganisation of the tank room, the building of a large new wing to the magnificent library, and the launching of the 146-foot long research vessel, *Sarsia*—named after one of the hydroid medusae. R.C. *Sarsia* has three echo-sounders, radar, an amazing assemblage of nets, and two perfectly equipped laboratories.



Portuguese men o' war in a laboratory aquarium killing, holding and absorbing gobies with their stinging threads

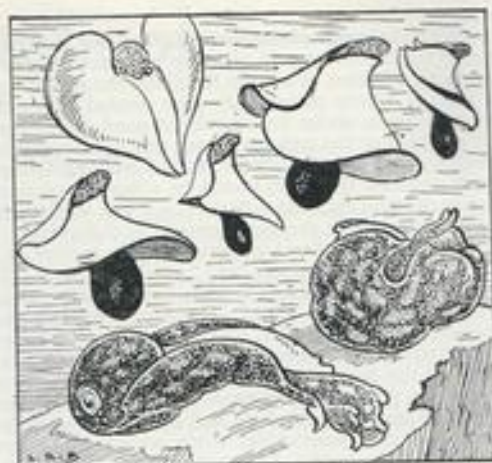
The ingenious devices by which delicate apparatus is made sea-proof in tumbled waters makes one think of Dickens' immortal picture of the old ships' instrument dealer's shop in chapter four of *Dombey and Son*. Up-to-the-minute sanitation, a quite terrestrially luxurious bathroom, and almost Dorchester lounge are accepted as matters of course. The marine laboratory amidships even contains a small aquarium.

A development of the last few months is a device for mastering that much vexed problem, how to bring the common squid, *Loligo vulgaris*, back alive. Whereas the tough "cuttle fish" (*Sepia*), will live for six months, or even much longer in a tank, the more graceful *Loligo* seldom survives even transit from mid-water to deck when part of the trawl's takings. To meet this difficulty, a light trawl is used for half-an-hour at a time instead of the customary one-and-a-half to three hours' tow, and the squid, sorted out from accompanying bream and whiting, is at once put into a sort of iron chest, filled with water to overflowing, and the lid then securely closed. Thus these fairy-like creatures are saved from undue wave movement, and if rushed with all speed to permanent quarters, once the ship has docked, may survive for a considerable period.

A big event of last year was the arrival of living Portuguese men o' war at Salcombe and in the Yealm estuary. A later arrival of these deadly siphonophores at Bognor was luckily met by a competent naturalist, Mr. E. M. Venables. It is said (but for this we will not vouch) that a stray example was beached at Brighton, and at once thrown by an official (armed with a pointed stick) into a litter basket, the said official taking it for a waterlogged plastic shopping bag!

The living examples, quickly accommodated in a small tank in the laboratory, provided an unforgettable spectacle. The delicately tinted sails, surmounting the translucent azure and violet floats (each eight inches long by three across) looked as though made of the most delicate Venetian glass, tinted a vivid sunset pink. From beneath these fairy boats dangled the hundreds of strings of nematocysts like azure beads, and capable of extending, it is said, for a distance of 50 feet. More than once have these organs claimed a human life, and it was fascinating to watch how swiftly small fishes were shocked into instantaneous death and slowly drawn upwards to the waiting mouths.

The writer, having touched one of the tendrils with the tip of a rod, thoughtlessly allowed the rod tip to come in contact, only momentarily, with his upper lip, quite 40



Flying sea slugs (*Acerca bulla*). Upper figures after N. A. Holme and J. E. Morton, Plymouth, 1954

minutes later. The result was startling, but luckily he remembered a rough-and-ready first aid mentioned to him some time previously by a student in the excellent biological department of Brighton Technical College. This was the juice of the fleshy *Mesembryanthemum edule*, the glowing dahlia-like flowers of which brighten so many gardens in the genial west country.

Relief was almost instantaneous, but recent library browsing has shown that in 1947, the United States Naval Medical Service discovered calcium gluconate to be an even more effective specific than morphine, which had been previously in general use. *Physalia* poisoning at its worst produces general paralysis, and other symptoms associated with certain forms of epilepsy.

Another event of the year was the unexpected appearance of the strange "flying sea slug" (*Acerca bulla*) a creature allied to the sea hat (*Aplysia*) which occurred in vast numbers in a sea-water tank (used for lavatory flushing and fire fighting) in Devonport dockyard. Later in the year I hope to report on the aquarium movement now creeping along the south coast, and the sensational success which has already rewarded a first year try-out at Mevagissey.

Artificial Fertilisers for Aquarium Plants

MANY horticulturists are becoming very "artificial-fertiliser-minded" these days and various methods are being adopted to enable the gardener to apply fertilisers in a concentrated form. This idea may be of considerable interest to aquarium keepers who may consider the use of these concentrated forms of fertiliser in their tanks. The application of manures and fertilisers to pond plants is fairly well known, but where tanks containing fishes and other animal life are concerned there is always the danger that something may be introduced into the tank which may do harm to the occupants other than plants.

Before dealing with the use of such fertilisers it may be well to consider how plants benefit from such treatment. Water plants are like ordinary ones as far as their actual requirements are concerned and the fact that they have accommodated themselves to an underwater existence does not mean that they require any but the same basic requirements as their land-growing relatives. Plants have a very complicated make-up and require many chemicals and

minerals to enable them to obtain all that is necessary for their growth. Most plants must have a fair amount of nitrogen, phosphorus, sulphur, potassium, calcium and magnesium. Also but in smaller amounts they require iron, manganese, sodium, chlorine and silicon. Added to these the following are necessary in very small amounts and are usually referred to as the trace elements:— copper, zinc, boron, etc.

A great deal of the necessary nutrients are to be found in good healthy loam and usually in a tank occupied by fish there will always be particles of fish manure etc., on which the plants can feed. All plants can only take in the majority of these substances in a soluble form and so of course the fact that water plants are being considered mainly means that the necessary moisture is always present. The carbon obtained by land plants from atmospheric carbon dioxide is obtained from the same gas dissolved in the water, by water plants. Having considered plants as a whole it is now proposed to examine the requirements of water plants grown

in tanks.

Providing the water plants were all that was required in the tank it would be easy to plant up in suitable composts and with the addition of certain fertilisers the plants would grow apace. Where plants only were needed it would be sufficient to place about four inches of good, well-decayed turf at the base of the tank and cover this with coarse sand or gravel. Once the plants were set and growing the application of artificial fertilisers would be a fairly easy matter. As long as the tank received sufficient light and warmth there would be no stopping the rapid growth of the plants. To carry the process further a compost similar to that of the John Innes Potting Compost No. 2 could be used. This is composed of 7 parts loam, 3 parts peat, 2 parts sand, to each bushel of which is added:—1½ ounces ground chalk, 1½ ounces sulphate of potash, 3 ounces hoof and horn grit and 3 ounces of superphosphate. A good layer of this on the base of the tank would ensure healthy plant growth. After about a year of strong growth much of the chemical value would have been used up and if re-planting in fresh compost was not practicable, some added concentrated fertilisers could be used. Although these fertilisers can be given in a very concentrated form such as a "pill" placed in the compost, it is not likely that the nourishment can spread to all parts of the soil, and the extra strength in one spot could possibly kill a root. A general fertiliser which could be very lightly spread over the whole base is preferred.

Now we come to the question of what effects these fertilisers could have on fishes. Well, it is well known how even small amounts of certain minerals can poison fishes and their eggs, and so great care must be taken to see that the water is quite pure before any fish are introduced into a tank which has been treated as suggested. The safest and best way to start a tank for plants and fish is to see that the plants are growing well long before any fish are put in the tank. If a tank was planted as described and left for about a month it would be found that the plants had made very good growth, especially if the planting was done in the late spring or summer. The water should then be all cleared out and fresh water carefully added. Make sure when so doing that none of the bottom soil or compost gets disturbed. After a day or so the water could be tested for smell and pH values and corrected to neutral if necessary. If all appears well some *Daphnia* and snails could be introduced as a test. If they lived for a day or so some fish could then be added. Do not put in all your best fishes at one go but try one or two of your less valuable ones. It may be necessary for another change of water but providing healthy cuttings of plants were used in the first place and the plants had rooted well there should be little danger of harm to the fishes.

With the natural manures from the fish and the products from small amounts of decaying uneaten foods dropping to the bottom, it is possible that the plants would require no extra artificial fertilisers at all. After some years the tank might need re-planting but it must be realised that providing the planting was carried out satisfactorily in the first place all could run on for years. Too rampant growth of the plants could fill the tank and leave nothing in the shape of swimming space for the fishes. The only difficulty comes when one needs to introduce a fresh plant into an old established tank. The compost has become so riddled with roots that a new subject has little chance of getting any nourishment whatever and may soon fail. In such a case some form of added fertiliser may be necessary but when fish in the tank have to be considered great care must be used.

To sum up it seems that where plants only are the chief consideration some form of artificial fertiliser can be used with advantage, but when fishes also have to be considered it may be unwise to add any form of concentrated fertiliser while the fishes are occupying the tank.

Exhibiting British Fishes

I HAVE dealt with all the standards for the cultivated fishes in previous issues of *The Aquarist*, but I feel that it might be helpful to prospective exhibitors if I deal now with the showing of British fishes for which no standards have been provided. In the first place I should like to make quite clear that in my own opinion the provision of such standards is quite unnecessary. After all, our fresh water fishes are generally all alike, as far as individuals of the same species are concerned, so that standards would be invidious. Such fish as green tench, rudd, perch, dace, roach, gudgeon, bream, pike and sticklebacks will not vary much from each other in the same species. The only difference can be in the size and condition.

The size is often decided by the show committee, who may limit the size of fish to, say, six inches. I have judged many such fishes and I know that the chief point to look for is condition, as the shape of body and fins will be almost exactly alike in a hundred fishes of the same kind. Condition however is the main point, as this not only means that the fish shows off to advantage but that the condition of the fish often decides whether the fish is well coloured or not. Where all the fish in a class are in good condition the judge can only choose the largest fish. I do not see what else he can do. As a rule the owner has done little towards the development of the fish he shows (he may have caught it when adult), but the manner in which it has been kept will show up quite clearly when under the inspection of the judge.

When such fishes are entered for a show you should make quite sure that your fish does not exceed the given limits. Where a length is stated it is generally assumed that this is the length of the fish not counting the tail. If, however, the schedule states so large over all, this of course includes the tail. Obviously, if any scales are missing this will mean a down-pointing by the judge, and this also applies to split fins or other damage. When choosing fishes for the show bench make sure that the fish is trained for the small tank well beforehand. It is amazing the difference in the behaviour of a fish which is used to such a tank in comparison with the fish which has been caught at the last moment from the pond and is rushed off to the show. If a fish is placed in a small show tank fairly often for about a month before the show it may make all the difference to whether the fish will win a prize or not. When fish are well-trained and in good condition they show off all their points to advantage and will certainly beat the fish which is strange, unhappy and in bad condition.

When the judge has to choose between a number of British fresh water fishes of different species it is a most difficult task. Some judges have their own preferences for particular species; most will be guided not only by the condition of the fishes but where all things are fairly equal they may choose the fish which in their opinion is the harder to keep in good condition in captivity. For instance, a judge may think that it is more difficult to keep a carnivorous fish such as a pike or perch, than it would be to keep a rudd or similar fish.

Where fishes have been bred by the exhibitor, such as in breeders' classes, it is often the matter of matching which is held to be important, as well as the difficulty of breeding. These fishes when shown should always have their names on the top of the tank as a guide to visitors. In conclusion, a word to the show organisers:—do provide tanks of sufficient size—to save the big chaps from getting round-shouldered!

A. Boarder

THE AQUARIST

AQUARIST'S Notebook



by
RAYMOND YATES

WHENEVER I am introduced to someone who is described as a "fish expert" or an "expert in the hobby," I look round for a way of escape. Some of these gentlemen, on acquaintance, prove splendid fellows with a breadth of knowledge and a depth of interest rarely met, coupled with a charm of manner and an unassuming air which makes it a great pleasure to be in their company. Unfortunately, these are very much in the minority. The other "experts" are all too frequently of the self-styled variety, the sort who cause such endless trouble in clubs and sometimes between clubs. Their one idea is to impress you, although they have the opposite effect. You meet them in the dealer's telling all and sundry all the answers to the hobby, at the club, disagreeing with the speaker, or asking ridiculous questions or just laying it on thick to anyone who will listen. Another bore is the lecturer who has to tell you every time he sees you where he spoke last month, where he is speaking this month, and where he will speak next month, complete with anecdotes as if he were on back-slapping terms with every club committee in the country.

I have no use for these people, and I am afraid I leave them in no doubt of my opinion of them. The danger of such types is that they can drive people away from clubs or dissuade good aquarists from taking over official jobs. Where they exist they should be quietly but firmly brought back to earth; ridicule will do it if nothing else will. The truth is, of course, that there are no experts in our hobby. There are people with long experience in fishkeeping, although that does not automatically mean they know all the answers. There are cold-water fanciers, tropical enthusiasts, breeders, dealers, biologists, marine specialists, microscopists, photographers, lecturers, writers and judges, but there is no one, to my knowledge, who can honestly claim to be 100 per cent. in all these aspects. The subject is too wide. Many of us are well up in some section or even two or three sections but no more than that. You can always tell the really good aquarist—ask him some frightfully difficult question and he'll tell you he doesn't know, but will try and find out for you. The bore will give you the answer then and there, with a solemn air, that is, if you can keep your faces straight.

Many fanciers quite honestly believe that only large dealers have the best and most unusual fish. It is quite a reasonable supposition but I have often found it proved false. It is true that there are many go-ahead dealers in a big way who have enormous numbers and varieties of fish on show, and who are constantly importing new and rare varieties. On the other hand, there is the large dealer of the "stick-in-the-mud" type who offers 40 or 50 varieties year in and year out with little if any change. Going into one of these shops one knows immediately what fish will be in each tank, as they are never changed. The sort of dealer who offers the usual "bread-and-butter fish" which always sell plus those varieties which he can obtain and keep with ease, is not really interested in his customers at all. His general attitude throughout is "take it or leave it." The small dealers often offer a great deal of rubbish, but their prices are much lower and they occasionally pick up from breeders and fanciers really good fish which would never be taken to the larger dealer.

The small dealer, too, is often a mine of information and he is ready and happy to have a chat with his customers and to pass on useful ideas and data. Some dealers with squalid-looking shops in back streets frequently turn out to have some splendid fish on sale and some of these dealers go out of their way to import many new and unusual varieties.

They have, of course, a large clientele who often travel long distances to visit them because they know there is always sure to be something worth buying. Some time ago I walked into such a dealer's and he came forward and asked me if I could tell him the name of an aquarist, who lived 40 miles away, whom he described. I recognised the fancier concerned, gave the dealer his name and address, and within 10 minutes he had him on the telephone, with the news that he had at last obtained a certain rare variety which he knew this fancier was after. Even the novice aquarist should make a point of having at least four or five dealers on his visiting list.

Now that tinned salmon is available to all its use as a fish food should not be overlooked. It is readily eaten by all fish but as it tends to flake up very finely in the water, it is mainly useful for small fish or fish with tiny mouths. Even when a piece has been allowed to become dry the fish are just as eager to eat it when a portion is put in the tank water. This makes an excellent "live-food" for small fry. Fish are not choosy about the grade, even the cheapest varieties of "pink salmon" prove just as acceptable.

Hobbyists with cameras who have not tried to photograph their own fish are missing something. We can't all be in the Laurence Perkins class but quite good results can be obtained by an average photographer with a little care. Of course if you are complete with flash equipment well and good. Otherwise good interiors can be obtained of your tank by using photoflood bulbs in your cover, two being just about right for a 20 gallon tank. These give out tremendous heat (800 watts each) so must not be left on more than a few seconds, if possible. To get a good result you have to get close up to your tank so you need a portrait attachment. There are two of these—one allows you to photograph up to three feet away and the other up to about eighteen inches. I prefer the very near focus lens. You require a fast film such as H.P. 3 or Super XX.

Set the camera in position on a tripod or stand, measure your distance to the centre of the tank (that is half-way between front and back glass) for focus, have the room in darkness except for a candle and switch on your flood lamps. This is just to see what the tank looks like and how the fish take it. Usually they dive for cover first time. See the aerator is off and the front glass free of algae. You will want your fish as still as possible for the photo and care must be taken to see that large fish like angels do not come high up between the front glass and the lamps or they will be entirely in the shade and look frightful. Put out the light, wait two or three minutes and then switch on. There is a period of about five seconds before the fish quite know what to do. This is your chance—take your photograph.

What exposure to give?—well, it all depends on the lens, the lighting and the fish. I have been very successful with 1/10 or 1/15 of a second at f.8 but you could give a slightly faster exposure if your camera doesn't give these speeds. I do not favour using the full aperture of the lens because good definition is essential. The main snags are that the picture is often slightly crooked and you have to guess what will be in the view, remembering that you are only eighteen inches away from a large tank front. The surface looks very light owing to the floods, and if tall plants are in the tank

some uneven lighting can occur where a leaf cuts off the lighting.

Last autumn I was rather surprised to notice water lilies growing in certain sections of the Lancaster canal. It is true that this is not an industrial area but, somehow, water lilies in a canal in the north seem unusual. There are many stretches of water in Britain which would look the better for the addition of such charming plants, and perhaps pond enthusiasts with any to spare might care to establish this plant in nearby waters. Once set up it will look after itself, and in wide stretches of water is unlikely to be disturbed by vandals. Quite a number of aquatic plants have been introduced this way with success, including hornwort, *Vallisneria*, *Heteranthis*, frogbit, willow moss and the Cape fragrant water lily. In another direction some of us have introduced *Tubifex* and *Daphnia* into suitable waters, and even fish. One fish, which is far too rare nowadays, is the minnow, although there are many waters in which it would do well.

The use of peat for breeding certain varieties is well known, but some city dwellers find difficulty in obtaining supplies. Peat dug up from some nearby moorland is not recommended but then everyone hasn't got a nurseryman around the corner. In every town there is a seedsman however, and from him can be obtained a peat block, sold under the trade name of "Petapac," at low cost. This block has been made into 10 or 24 seedling pots made entirely of peat, costing 1s. 6d. and 2s. respectively. The size of the complete block is roughly 11 inches by four by two inches.

Giant danios are noted for their toughness and long life. I heard of one recently at a northern show which certainly did not let the side down. It seems this fish jumped out, and appears to have been on the floor for some hours. Discovered, it was put back in its tank and for an hour or two it certainly looked very woebegone. However, it soon perked

up, disposed of the last remnants of the dust and dirt which it had picked up from the floor and waited for the judging to commence. Such tenacity deserved reward and sure enough, when the judging was completed, this fish had won first in its class.

In the town hall at Swinton, Lancashire, there is a rather novel tank which has been made by a member of the Swinton Aquarist Society, Mr. Edward Jones of 49, East Lancashire Road, Swinton. There are two main features about this tank which are out of the ordinary. The first is the bottom, which is not flat but conic, being fitted with a tap to draw off sludge through a bottom filter. The bottom front of the tank is raised four inches above the table, on which it stands, and the tapered bottom sinks to two inches below the bottom of the front glass. This enables quite a large amount of gravel to be used without it being too obvious in the aquarium. When the tap is turned on the pressure of the water forces out a fine sludge from the base and this saves disturbing the plants whilst providing extra water space. The bottom is steel and it would seem that any ordinary tank could be converted with little difficulty. The second feature is the hinged cover, which folds back and is self-locking and which fits flush with the inside edges of the tank top. Mr. Jones has bright ideas and it is a pity he is not commercially in the trade to offer these improvements to hobbyists in general.

When carrying fish in a container every effort should be made to avoid jarring the can. For this reason it should never be allowed to stand on the floor of a bus or train or even motor car but, if possible, held in the hand, a method which is tiring but which reduces shock to a minimum. The padded seat of a vehicle is better than the floor, particularly where vacuum flasks are in use. For short journeys it is better to completely fill the container, thus preventing any movement of the water. A carrying box lined with thick latex (foam) rubber into which the carrying jar exactly fits eliminates a great deal of vibration.

FRIENDS & FOES No. 38 Rat-tailed "Maggot"

ERISTALIS

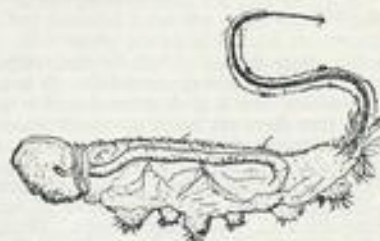
PHYLUM:—Arthropoda, from Greek *arthron*—joint, and *podos*—foot.

CLASS:—Hexapoda, from Greek *hex*—six, and *podos*—foot.

THE genus *Eristalis* comprises several species of flies, not all of which are found in water. Some live in almost complete filth, and these are not likely to be of great interest to aquarists. The imagines are beautiful creatures, but such an adjective cannot be used when considering either larvae or pupae. Hideous is a more correct appellation for these.

The female fly visits those sections of pond or lake where pollution is greatest, and upon the surface of a floating leaf deposits a bunch of small greyish eggs. In moderate spring and summer temperatures the eggs hatch—small maggot-like creatures wriggle to the edge of the leaf and launch themselves into the water. Like caterpillars, they are possessed of voracious appetites, and scarcely pause to rest between meals, which consist of large portions of rotting animal and vegetable matter.

Most interesting feature is the telescopic tail through which they obtain a supply of atmospheric air. As they penetrate further and further below the water surface the tail is increased in length by sliding



Newly hatched rat-tailed "maggot" seen from the side ($\times 15$)

out fresh sections. A fully grown "rat-tailed maggot" (about three-quarters of an inch) can stretch its tail over three inches. Feeding on a rotting twig at the water surface, they frequently wrap their tails around it, always taking care to see that the extremities are in free air. They are dirty white or brown in colour and resemble pieces of unclean blanket wool.

The larvae can be kept in jam jars for observation of their habits. Several pairs of stubby projections serve the purpose of legs, enabling the maggot to move quite rapidly over the bottom of the container.

C.E.C.C.

Tropical Fish-breeding in FLORIDA

by H. I. SMITH

MIAMI, Florida, as a millionaires' playground has many attractions, and during a stay of three months in 1943, I enjoyed many of the things that my modest purse allowed. A visit to Martha Raye's Five O'Clock Club, where drinks are on the house at 5 p.m., a journey by boat into the Everglades to see the Seminole Indians in their reserve; an afternoon deep-sea fishing with spectacular results; an evening spent watching Jai Alai, a Basque game, resembling squash, played with wicker banana-shaped baskets attached to the players' arms, as well as the wonderful bathing to be enjoyed at the fabulous Miami Beach.

My second visit last year was made with a different end in view, for in the intervening years I had become a keen aquarist. And so it was that I found myself winging southwards on a free week-end. A telephone directory gave me the information I wanted and soon I was heading west to the outskirts of Miami on the invitation of Mr. "Mac" Entel, owner of the Sumac Tropical Fish Hatchery Inc., Box 256, Miami 44.

Mr. Entel met the bus at the terminus and drove me in his station wagon to his hatchery. The arrival was unexpected—no gates, fences or anything to prevent anyone from wandering from the byway to enjoy a sight which most aquarists would give much to see.

Mr. Entel told me that he had been in business for five years; his hatchery had risen on virgin ground and had become successful on a well-known formula—"know how" and hard work.

The heart of the farm consisted of two utilitarian concrete block-built houses surrounded by over 100 open concrete tanks varying in size from 6 ft. by 4 ft. to 20 ft. by 8 ft., all about 3 ft. deep. In addition, to the rear were four large open pits mainly containing superb black sailfin mollies. One of the houses was devoted entirely to the breeding of the egg-layers and contained for the most part tiers of slate-bottomed tanks. In many cases the breeding pairs were together in part of the tank divided off about eight inches from one end. Weighted sprigs of *Myriophyllum* were used as a spawning medium. The more active of the egg-layers, for example—zebra fish, were placed in wire cages whose legs raised the base an inch or so above the slate tank base. At a suitable age the fry were transferred to the outdoor tanks to be grown on.

The other house was used mainly as an office and for storage, food preparation and for experiments in developing new lines; for example, Mr. Entel was trying to develop a new platy from two of Dr. Myron Gordon's developments—the "bleeding heart" and the Turkish fury. This house also contained several pairs of angel fish and rows and rows of glass jars containing fighters.

A verandah outside the breeding house had a long wooden bench where sorting and packing were carried out. Trapping in plastic traps was the sole method used to catch fish. The fish were then sorted (only fully grown adult fish are required in the American market) packed in plastic bags placed in double cardboard containers and taken to the airport and put aboard north-bound planes.

Mr. Entel's speciality was his *Apistogramma ramirezi*,



A view of some of the concrete tanks used for hatching and rearing at the Sumac Hatchery

with which he had been singularly successful in breeding on a commercial scale, a feat not rivalled by most of his competitors.

The livebearers enjoyed natural breeding conditions in the outdoor tanks, well planted with familiar types of plants. The underwater forests of purple-hued *Myriophyllum* were a joy to behold. Judging by the masses of plants thrown away there appeared to be no difficulty in maintaining adequate cover for the young fish. An unfamiliar feature was the numerous clusters of pink wax-like eggs of the huge "mystery snail," laid well above the water line.

As well as being a breeder, Mr. Entel imports fish from South America and in spite of the precautions taken he suffers casualties, as was evidenced when he showed me a tank containing several hundred neon tetras suffering from white spot disease.

As a gesture of goodwill to his trade friends in the northern states, Mr. Entel provided the service of intercepting shipments of fish from South America, freshening them up for a few days and then re-despatching them.

What a boon to British tropical fish enthusiasts if the cost of maintaining the water at a suitable temperature was negligible! This is the case in Florida. All that is needed is an underground well and a pump. The climate is eminently suitable for outdoor tanks, for most of the year, but it can and does get too hot, or the reverse. How convenient then that the underground water temperature maintains a steady 72° F. throughout the year!

All the tanks at the Sumac Hatchery were piped to this convenient supply with the aid of a petrol engine-driven pump. Should the weather become either too hot or too cold, the water is pumped up and supplied to each tank with either a heating or cooling effect as required. Gauze-covered outlets allowed the surplus water to run to earth.

Mr. Entel, with the help of a negro employee and a concrete mixer, had constructed all the tanks, and during my visit he completed the seventeenth of 18 reception tanks each 6 ft. by 4 ft.

Mr. Entel was reticent about his method of making Infusoria, though sacks of lettuce leaves were in evidence. His brine shrimp eggs were aerated for bigger percentage hatchings. Feeding the adult fish was carried out twice daily, with a paste of meal base to which chopped liver, dried shrimp alfalfa meal and other ingredients were added.

(Please turn to page 72)



1 Materials required for the culture: shallow wooden box, pure peat and silver sand

2 Sand and peat are mixed thoroughly and water is added to make the mixture suitably damp

3 Porridge cooked in five depressions

CULTURES of white worms or enchytrae have now been known to aquarists for a long time. This worm is indeed a fine item of diet worthy of introduction in the menu of any fish large enough to eat it. The adult worm is usually about $\frac{1}{2}$ inch long, though in any culture there will also be younger individuals which are much smaller and hence suitable for smaller fish. Let us state from the start that all factors necessary for the propagation of this worm are not clearly understood, and hence often the beginner has set up a culture that the more experienced aquarist has envied. However, let us consider the known requirements and see how they can be met.

This creature likes to live in a fairly damp, loosely packed medium. It thrives best at a temperature between 50° and 60° F.; much lower temperatures retard its activity while a much higher temperature may kill off a thriving colony very rapidly. It likes to live in a fairly dark place. It can be fed on all sorts of things as will be shown later on, but most aquarists rear white worms quite successfully on bread or oatmeal porridge.

To start a culture a suitable box is the first requirement. As we are going to maintain a damp mixture within it, and wood allows drainage of excess moisture better than metal or plastic, a box made from wood is preferable to one made from impervious materials. It is best not to paint or treat the box in any way. Broadly speaking, the size of the box is immaterial. Some aquarists like to keep their cultures in fairly large boxes such as soap boxes, kipper boxes etc., while others maintain equally successful cultures in quite small boxes like the one illustrated (measuring approximately 12 ins. by 10 ins. by 3 ins.) or even smaller. To my mind the large box offers no real advantage, for though of course it can produce more worms than a smaller box as more colonies of worms can be maintained in a larger container, the same ultimate result can also be obtained in a neater, more manageable form by using a number of smaller boxes. However, this is a matter of personal taste; the size of the box being determined by the likes and dislikes of the aquarist and not the worm.

Culture Medium

Next let us consider the medium itself. All sorts of media seem to work fairly well. I have seen thriving cultures set up in silver sand, aquarium gravel, garden soil, peat, leaf mould and various mixtures of these, but most aquarists agree that a mixture which is fairly loose and porous so that it can hold moisture and not pack down too tightly gives the best results. One such mixture that works at least as well and probably better than many others can be made by mixing three parts of peat to one part of Caley sand or silver sand. (It is most important to obtain pure peat and not a variety such as bulb fibre, which is peat to which

Culturing White Worms

by Dr. F. N. G.

Photography

chemicals have been added for agricultural purposes.)

These should be mixed well and sufficient water added to make the mixture damp but not too wet. The degree of dampness should be such that if a handful of the mixture is squeezed firmly, no water can be expressed from it, but the lump formed by this means if placed gently on a flat surface retains its form, although it crumbles readily if an attempt is made to roll it or move it about. Another popular mixture is one containing about two parts of garden soil to one part of peat and one part of sand. Some like to sterilise the mixture before use as this kills off any undesirable creatures which may be accidentally introduced into the culture. This is a worthwhile step where garden soil or a mixture containing garden soil is used but it is somewhat superfluous where a peat-sand mixture is employed. Various methods are available for sterilisation.

Perhaps the simplest is to place the mixture in a bucket, add a fair amount of water to make a fairly fluid mixture and boil for about 15 minutes, stirring all the time. Allow to cool and settle, drain off surplus water and spread out the mixture to dry; when it reaches the correct degree of dampness it is ready for use. Another way is to place the required quantity of thoroughly dampened mixture in a large biscuit tin and heat it in an oven. Care must be taken to see that the mixture does not get too dry and char or burn. However, perhaps the neatest way of sterilising the mixture is in a pressure cooker. About half-a-pint of water is placed in the bottom of the pressure cooker and the mixture packed into a flour bag or another similar cloth bag; it is either stood on a small perforated metal platform or suspended from the lid of the cooker in such a way that the bottom of the bag does not hang in the water. After closing the cooker, the water is brought to the boil with the steam outlet open to allow the steam to displace the air in the container and when steam begins to issue freely the steam outlet is closed and the pressure allowed to rise to 15 lbs. per square inch and maintained at that level for 20 to 30 minutes. The steam arising from the water penetrates the mixture in the bag and sterilises it very efficiently.

The damp but not too wet mixture is now placed in the box to a depth of about two to three inches fairly loosely, no attempt being made to pack it down tightly. If too



... consistency is placed
... in the medium

4 Masses of white worms from another culture are transferred to the depressions containing porridge

5 A brown paper sheet excludes light and glass placed over this retards water evaporation

Worms for Fish Feeding

... GRADUALLY

... by the author

... shallow a layer of medium is used it tends to dry up too fast, and if it is too deep it needlessly adds the bulk without conferring any real advantage, and perhaps encourages the worms to wander, making collecting more difficult. The next stage comprises making shallow depressions in the surface of the medium and placing some food followed by some worms obtained from another culture. This has to be obtained in the first instance from an aquarist or a dealer but later on of course new cultures can easily be seeded from existing ones. Some however prefer to scatter or stir up the worms and food such as uncooked oatmeal or rolled oats in the medium rather than keep these localised, but such a technique does not allow for any errors; in case of over-feeding the food is bound to rot and pollute the medium, and harvesting the worms is made more difficult as they are scattered all over the place.

Bread appears to be the most commonly employed article of diet for these worms. Whether to soak the bread in water or in milk, whether to use brown bread or white, whether to use stale bread or fresh, these and numerous



Some white worms from a culture shown magnified approximately twice natural size

points have been hotly discussed in aquarist societies for years, but it appears that the worms do not care much what they get. Another very popular food is Quaker oats cooked to a stiff porridge either with water alone or with water and a small quantity of milk. These are, so to speak, staple items of diet which may occasionally be supplemented by all sorts of things such as uncooked kippers, cheese, mashed potatoes, scrambled eggs, raw bacon, pork sausages etc.; whatever is fed the rule should be to place only as much food as will be completely consumed in three to four days before it goes bad or mouldy and turns the medium sour. Thus with a new culture containing only a few worms only a very small quantity of food is needed, but as the worms multiply larger quantities should be gradually introduced.

Proper Environment

As already mentioned these worms like a dark humid environment. Hence the compost must at all times be maintained at the correct dampness. To assist this the box should be covered by a sheet of glass and a piece of brown paper to cut out most of the light. Usually enough water is brought in via the damp food introduced to keep the medium at the correct dampness, and if the medium contains a fair amount of peat any extra addition of water is usually unnecessary or only very rarely required. Not only should the medium be damp but the air over it should also be maintained in a fairly humid state. Further to prevent evaporation, besides the usual coverings some aquarists place another small piece of glass directly on top of the medium. Some believe that the weight thus laid on top of the medium helps to bring the worms to the surface, while others omit it believing that this leads to poor aeration of the medium and hence promotes souring of the culture.

At any rate this extra piece of glass is by no means absolutely necessary. Successful cultures can be maintained without its aid, but there is at least one point in favour of the procedure and that is that the worms tend to collect in fair numbers on the glass, where they can be easily collected. Alternatively the glass may be dipped vertically in the aquarium, when the worms drop off while bits of food and medium remain adhering to the glass and hence can be withdrawn with it from the water. When this piece of glass is not used the worms are best picked up with a pair of forceps in the vicinity of the food where they collect in clean masses in large numbers.

There is no difficulty in obtaining large numbers of clean worms from a thriving culture in a few moments; if difficulty is experienced the culture is not really thriving and the worst thing that one can do is to use "ingenious" methods to fish out the worms and thus further deplete the culture. Such techniques as warming the box of worms to bring them to the surface, placing portions of culture

medium in a bowl of water and picking out the worms as they collect in little balls, are deplorable as they represent a very short-sighted policy. It pays better in the long run to concentrate on obtaining a good thriving culture and setting up multiple cultures to prevent as far as possible a shortage of this valuable live food rather than to resort to such tactics.

Some complications that occasionally arise while culturing this worm may now be mentioned. As porridge is used for feeding both white worms and micro worms, the aquarist having both these cultures will naturally want to make up the required amount for both these cultures at the same time. However, care should be taken to feed the white worms first and then the micro worms, for if, while doing the reverse, micro worms are accidentally introduced in the white worm box, they will thrive there, often wiping out the white worms; and liquefy the porridge, which may then foul the medium. Even when the medium has been properly sterilised and when peat is used mould often tends to appear on the surface of a newly set-up culture medium. This trouble is not usually serious and can be easily overcome by lightly raking the top $\frac{1}{4}$ inch of the medium with a fork at frequent intervals. This soon discourages the mould, which cannot stand this sort of continuous disturbance. Of course, this is different from old uneaten food going mouldy; that is usually due to gross overfeeding and/or neglect, and the remedy is obvious.

A rare but interesting complication sometimes seen is that the food (bread) turns a vivid red colour. This is due to the action of chromogenic (colour producing) bacteria contaminating the food. The withdrawal of all food from the culture for some time followed by a change to another variety should cure this trouble. In summer time cultures sometimes become contaminated by fruit fly larvae (*Drosophila*). The food is soon liquefied and turned into a greyish slimy mass with hundreds of tiny crawling maggots. Incidentally fish love these little maggots but the flies that hatch out do not add to one's popularity with the family. The trouble can be arrested by removing the rotten food and a fair amount of the surrounding medium followed by removing the cultures to a cooler place. Finally, the culture sometimes becomes infested with tiny, white, hard-shelled creatures (mites?). White worm multiplication is slightly retarded by this pest but it does not come to a standstill.

Unfortunately most fish do not care for these latter creatures though some fish like the Siamese fighters can be induced to eat a few. Most aquarists after a time do not bother about these creatures and accept them as inevitable contaminants. Others are of the opinion that they are mainly seen in cultures where bread is used and that a change in diet to porridge and other items tends to eliminate this pest in time. Mr. Tomlinson of Rotherham Society claims to have cured this nuisance completely by very light occasional spraying with an insect powder called "Extirmo." It contains DDT and pyrethrum and might prove toxic to fish, but apparently in the very mild dose he uses no ill effects occur for I can vouch for the fact that both his fish and his white worms are flourishing and breeding prolifically.

In time the medium tends to settle and pack down and the feeding spot begins to look a bit unhealthy. It is time then to fork and stir up the contents of the box after removing all the food. This gives the culture a fresh lease of life. But perhaps the commonest cause of failure is due to imposing too great a strain on a single culture. One cannot hope to remove hundreds of worms from a tiny box every day for ever. Multiple cultures must be maintained so that while some are in use others are standing by, "building up." A culture that has been well looked after usually does well for about 12 to 15 months, after which it is best discarded. Most aquarists find that their cultures do not do too well during the summer months. This is partly due to the higher prevailing temperature but also in no small measure to neglect of the cultures, as other live food such as *Daphnia*,

mosquito larvae etc., are more readily available during these months. Failure to feed for a week or fortnight can deplete a culture very markedly, and drying off of the medium will also produce similar results.

Some care must be exercised in feeding this worm to the fish. There is no doubt that a small fish may choke to death while attempting to swallow too large a worm. Occasionally a fish may swallow a worm the wrong way, when the end of the worm may be seen protruding from under the gill cover. This should cause no alarm as almost invariably the worm is extruded and the fish is none the worse for the experience; but on rare occasions it will be seen that the fish is in distress as its breathing is hampered by the presence of the worm. No time should then be lost. The fish should be caught, held gently in the net and the worm extracted by a steady pull with a pair of tweezers.

Too many worms should not be indiscriminately thrown in the aquarium, for those that fall to the bottom uneaten often wriggle through the compost (particularly where a coarse variety is used) or under rockwork where they die and pollute the water. These worms can live for about 24 hours in water before they drown. One of the best ways of feeding these worms is in a floating feeder, easily available from most dealers; as the worms gradually wriggle through the holes in the feeder they are eaten up before they fall to the bottom. Any that escape are quickly dealt with if there is a catfish in the tank!

Though this worm is a first-class live food, do not make the mistake of feeding fish exclusively on the diet. There is no substitute for a well-balanced mixed diet, for the ideal food providing every known and unknown substance requisite for health and growth just does not exist.

Tropical Fish-breeding in Florida

(continued from page 69)

My host was very interested in the hobby in Britain and on my production of a copy of *The Aquarist*, he registered two surprises. One was the low price of fish compared with the price in America. The other was the technical and comprehensively informative nature of the articles in that particular copy of *The Aquarist*.

I gathered that the aquatic trade in the U.S. is more "cut-throat," and commercial breeders tend to keep their methods to themselves, a condition which is reflected in their publications on the subject.

Several hours in Florida sunshine is great, but coupled with such surroundings it was a perfect way for any aquarist to spend his time—and how much less expensive than a visit to his heah racecourse or Miami Beach!

So it was that I thanked and took my departure from my generous host who normally never entertained visitors to his hatchery, making me the exception when he learned that I was British and had travelled close on one thousand miles for this unique experience.

Cacti in the Fish House

WHEN watering cacti remember the golden rule, give enough at a time to damp all the soil in the pot but do not water again until the soil has almost completely dried out again. Warm water may be used as although not absolutely essential it has been found that warm water soaks into the soil much better than cold water. This is especially true if there is a fair quantity of peat in the potting medium. Also if it is required to keep the house at a fairly high temperature there seems little sense in lowering the temperature by giving icy cold water.

Flame Fish

(*Hyphessobrycon flammeus*)

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

FAMILY:—Characidae, from Greek *charax*—a sea fish.

SPECIES:—*Hyphessobrycon*, from *hyphe*—little, and Greek *brycon*—tear in pieces. *Flammeus*, from Latin *flammeus*—flame coloured.

THE flame fish is another of the exotic species which almost completely disappeared from this country during the war years. Many an aquarist, home on leave, viewed what few aquaria remained in his fishhouse, and sighed for a few of these little beauties to brighten things up a little. Small wonder that the search for specimens proceeded far and wide as soon as hostilities ceased and there was time to look round again. And many a newcomer to the hobby saw them for the first time and fell under the spell of their beauty.

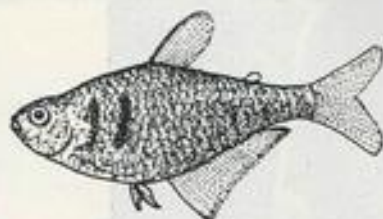
The largest specimens seldom reach an inch and a half, and so are ideal to inhabit a comparatively small aquarium—say 18 ins. by 12 ins. by 12 ins. They can be included as members of a community tank, in spite of the meaning of their scientific name. It is true that having been given quite efficient teeth they like to use them, and if not given any live foods for long periods, may be tempted to remove a piece of fin from another fish; in 99 cases out of every 100 faulty diet is the cause of an outbreak of fin-nipping—the remedy is obvious.

Flame fishes look more delicate than they really are, and this tempts many aquarists to keep them in a temperature very near the eighties. The result is an unnecessary speeding up of their metabolism, and a consequent shortening of their lives. They will breed at 75° F. and are perfectly happy in the lower seventies. In suitable environment, at this temperature, with the right food, they should live for three or four years. Any "hotwater fans" who read these words are asked not to change their methods suddenly, but to re-acclimatise their fishes gradually—a couple of degrees at a time, spreading the changes over a week or 10 days.

Sexing and Breeding

Sexing *H. flammeus* is comparatively easy. The female anal fin, in a mature specimen, has a distinctly concave outer margin, and her body swells noticeably when she is full of roe. The male anal fin has an almost straight outer margin, and no matter how ripe the fish becomes the body shape is constant. Colours and markings of both sexes are identical. The vertical bars behind the opercula do not show in very young fishes to anything like the same degree as in mature specimens.

When breeding is contemplated, several thickets of fine-leaved plants such as *Cabomba*, *Ambulia*, and *Myriophyllum*, should be placed in the breeding tank; the temperature, if lower than 75° F. should be raised to that level, and a proportion of live food such as *Daphnia*, gnat larvae and pupae, etc., should be introduced daily. If previously fed on dried food only, the difference in condition will be noticeable in two or three days—the flame colour will intensify, the overall sheen increase, the general liveliness and alertness of the fishes will improve, and soon one or the other of the breeding fishes will give indications of its urge to reproduce. Sometimes it is the female who reaches prime conditions first, and she will make passes at the male,



Male flame fish

prodding him, pushing him, and making short rushes in his direction.

Very shortly the roles are reversed, and the male chases the female into and through the thickets of plants. When sufficiently excited the pair will pause side by side, trembling violently, and it is now that the female releases a batch of slightly adhesive, tiny, transparent eggs, which fall among the leaves of the plants and lightly rest upon them. Generally, in the excitement of the chase, both fishes ignore all eggs until the female is spent. To protect them when spawning is complete net out the breeders. In doing so it is possible, indeed probable, that you will dislodge some of the eggs from their precarious holds upon the plants, but this will not affect their viability.

Waiting Period

Seventy hours afterwards or thereabouts, the fry will burst their eggshells, and wriggle free—tiny, transparent, difficult even for sharp eyes to see. A word of warning here—they may easily be a week or 10 days old before you see them for the first time, so do not act hastily and assume the spawning has been infertile; do not replace the breeders or reset the aquarium—be patient. Continue to add algae water and Infusoria—the best first foods for flame fry, and follow with tiny *Daphnia*, new-hatched brine shrimp, micro worm, etc.

With food such as this, the fry will grow rapidly and will soon repay your care by swimming in shoals around the aquarium. In three to four months, providing they are amply fed, and spread among a number of aquaria, they will be nearly half as large as their parents.

It may help with spawnings if the water of the aquarium is neutral or slightly acid. Although I have bred flames in strongly alkaline, untreated water, in their native habitat near Rio de Janeiro, they are in swampy water, almost certain to be decidedly acid.

Book Notice

MESSRS. Spratt's Patent Ltd. have added a new booklet on fish-keeping to their informative series dealing with the care of various pets. It is entitled *Aquarium and Pond Handbook* and is primarily concerned with coldwater fishes; the goldfish and its varieties receives special emphasis in a chapter concerned with breeding in aquaria and ponds. Black and white drawings depict common water plants in addition to four colour plates showing a number of the coldwater fishes mentioned in the text. This 76 pages booklet, specially recommended to the attention of the beginner, is obtainable from aquatic dealers, price 1s. 6d. or (postage extra) from Spratt's Patent Ltd., 41-47, Bow Road, London, E.3.



Photo 1

J. Francis

One stem of
moneywort or
creeping Jenny
growing in an
aquarium

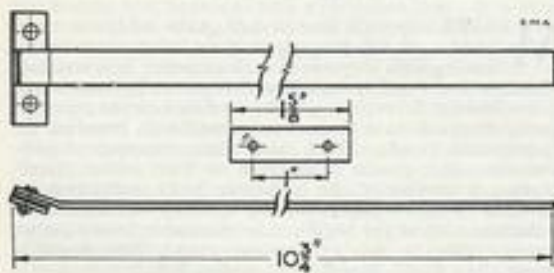
Makeshift Water Plant

BEGINNERS and aquarists in a small way are frequently at a loss for suitable water-plants with which to stock their tanks, bowls and jars, and are unaware that in most gardens there is to be found a plant that will readily adapt itself to their requirements. This plant is moneywort or creeping Jenny (*Lysimachia nummularia*), a yellow-flowered loose-strife. Select sprays of this plant rather longer than the depth of water in your aquarium, remove all withered leaves, and attach a small weight to the end where it was severed from the parent plant. As it grows, it will now rear itself above the surface of the water and fine thread-like roots will be produced from every joint of the stem. While this growth continues it will be found to provide all the functions of a true water-plant and be a subject of real beauty during its flowering period.

M. H. GAUNT, Glasgow.

Aquarium Scraper

HERE is an easily made algae-remover that provides a use for old razor blades. From a strip of steel 14 ins. long by three-eighths of an inch wide and one-sixteenth thick cut two strips each 1 1/4 ins. long. These are clamped firmly together and drilled with one-eighth inch diameter holes five-sixteenths of an inch from each end. The remaining length of steel strip provides the handle for the tool; it is bent at an angle about half an inch from one end and one of the small drilled strips is soldered beneath this bent end. If two 1/2 in. by 1/2 in. bolts (preferably nickel-plated to prevent rusting—cycle shops can supply them) are now placed in the holes of the short strips they can be



Practical Tips

*Details of gadgets for aquarium use
and other ideas submitted by
"Aquarist" readers*

used to hold a razor blade between the strips and tightened in position with two nuts. All the parts except the small bolts should be given a coat of enamel paint before final assembly.

L. R. PALMER, London, W.7.



Emergency Aquarium

AN emergency aquarium or isolation tank for small tropicals can be made from a gallon glass jar such as is used for pickles. A batten-type lamp-holder (A) is screwed to the metal lid of the jar (B), using small nuts and bolts of the Meccano type (steel). The greaseproof lining to the lid should be left in position to keep condensation from the metal and to stop moisture from creeping behind the lampholder. Next, a ring of holes about 1/2 in. diameter is made around the edge of the lid to admit air to the jar. Heating for water placed in the jar can now be provided by inserting a "Nite-Light" bulb (1s. 8d. from Woolworths) in the lamp holder (C). This is a low-consumption bulb (about 5 watts) and the water temperature can be raised 10 to 20 degrees according to the amount of the bulb that is immersed. Care must be taken to keep the water level well below the lamp-holder contacts, of course. At a room temperature of 60° F. the lamp will easily maintain the water temperature at 68°-76° F. for 24 hours, and so enable the jar to be used in emergency as an aquarium, providing it is not overcrowded with fishes.

J. BROOKS,
London, S.W.1.

Microscopy for the Aquarist—10 by C. E. COLE

WHEN using magnifications which necessitate movement of the glass slip or slide in order to adequately cover the area of the object, the pressure of the stage clips frequently causes movement to be jerky—there is considerable lack of control. For this reason some microscopists merely rest the glass slide on the stage, and dispense with the clips. This is a poor means of overcoming the difficulty, for movement is now too easy, and a jerk on the table or accidental touching the glass slip with the hands causes too great a movement. What is best to do?

One method is to use only one clip to hold the glass in position. A greater measure of control is possible, but results are not ideal by any means. What we want is something which is capable of easy movement, upon which we can place the slip. The following "gadget" can be made by any handyman for a copper or two, and ideally serves its purpose. It is based upon an accessory I obtained many years ago with an ancient microscope. I had never seen anything like it before, nor since. As microscope stages are not always the same size I have left out overall measurements. The projecting arms shown in the diagram should be at least three-quarters of an inch in length.

Aluminium sheeting can easily be obtained and is soft enough to cut with ordinary scissors. The outline can be drawn upon the sheeting with pencil, or scored with a sharp instrument—a penknife, a bradawl, or even a nail. To prevent scratching of the stage the edges of the metal should be perfectly smoothed. Emery paper will do this. A piece of soft material must be glued to the back. Ample movement in all directions is possible with this slip holder. The only better way of overcoming the difficulty of movement of the slip is to obtain a mechanical stage, which is very expensive, and certainly not necessary in the early stages.

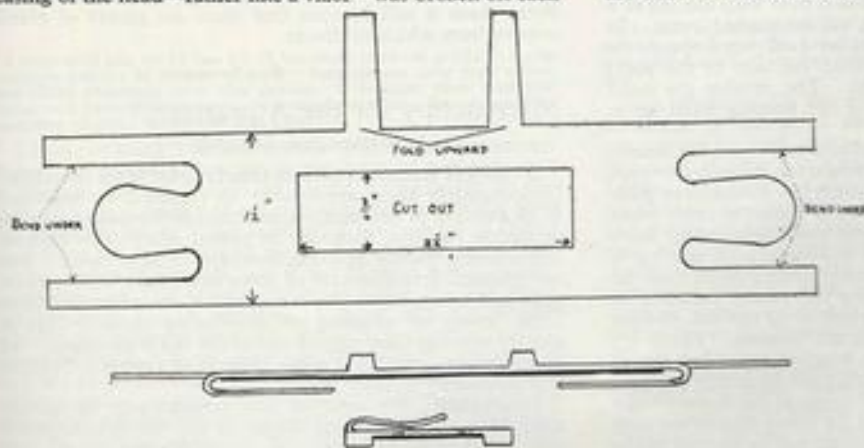
And now to revert to our examination of the *Daphnia*, commenced last month. Should you possess a culture of water fleas, isolate one or two in clear water in a small jar. Within a day or two they are certain to moult, and an examination of the moulted carapaces will reveal many details we probably missed in the living specimens. One of the first things you will notice is the absence of any head parts when you pipette the cases from the bottom of the jar. This is so consistent that you can be forgiven for assuming that in *Daphnia* the moult is not complete. I thought so myself until I was able (under the microscope, and later projected on to a screen) to witness an actual moult. The casing of the head—rather like a vizor—was broken off each



time at the "shoulders," and immediately separated from the rest of the carapace.

Examine the strong, branched antennae. Now they are still, and under strong magnification, you will be able to see that from end to end, the long, spine-like hairs growing from the different sections of the antennae are themselves clothed with a row of much finer hairs. Together they form a fine mesh net. As the *Daphnia* beats down in the water with these antennae, the hairs offer resistance to the passage of water, and lift the body of the creature. The down stroke at an end, the body of the *Daphnia* begins once more to sink. The "oars" are feathered as the antennae are once more raised for a fresh stroke.

(continued overpage)



Illustrations above show views from the side of the claw-tipped tails of *Daphnia magna* (top), *D. pulex* (middle) and *D. simacephalus*.

On the left diagrams show the construction of a convenient movable slide carrier for the microscope stage.

In the Water Garden in JULY by Astilbes

THE water garden should now be at the height of its glory with many of the plants in full flower. It is a good plan to make notes concerning what has been done and what should be altered or improved. It may not be possible to be able to make any changes at this time of the year but it is so easy to forget what the pond actually looked like in the height of summer when planting time comes along once more.

With ponds which are fairly new and have not been established for more than three years, little change in ideas may become necessary. It is more in the older established ponds where some alterations may be apparent. Some plants, which have made too rampant growth, may have to be removed from the pond altogether. The more tender types of plant may have been almost crowded out by this type and if no steps are taken to adjust matters the stronger plants may smother the more delicate ones. Not only may some of these stronger plants have got out of hand but many of the other plants may have grown to such an extent that they touch one another.

Some ponds have a quantity of floating plants, especially the types of duck weed. *Lemma minor* is probably the one most often grown and it has definite advantages in certain cases. Unfortunately this small plant can become a pest if left to itself for long. The tiny bright green leaves can soon cover the whole surface of a pond and become rather difficult to clear. It may be interesting to consider the value of the duck weeds where fish ponds are concerned. It is a fact that many fishes are fond of this plant, and when left for long periods without artificial feeding they will eat quantities of it. Thus the fishes can obtain plenty of nourishment in the absence of the pondkeeper. Another point in the favour of duck weed is that the water is shaded from too much strong sunlight and this tends to choke out the green floating algae and often the blanket weed types as well. I have known ponds which have been so green with algae that it has been impossible to see into them a few inches, become quite clear after a quantity of duck weed has been allowed to cover the surface for a short period. Once the duck weed has done the required task it may be rather difficult to remove the plant.

Small ponds may not provide much of a problem but a larger pond may need considerable time to clear adequately. Much of the plant can be removed with a net, and if surface sweeping is carried out once a week the pond can be kept fairly free. If a pond can be flooded over with the aid of a hose, most of the floating plants will be washed away. In summing up, the question of whether duck weed should be introduced deliberately into a pond, the size of the pond must be taken into consideration. The smaller the pond the easier will it be to clear it of the floating weed when necessary.

For pond-side plantings few plants can equal for beauty the irises, and for early summer flowering the *siberica* types are ideal. Unlike the usual iris which has rhizomes or thick tuber-like roots, *I. siberica* makes a mass of thick roots and is not quite so rampant at the pond-side, being more compact in growth. The plants will increase in size but it will be found that they are kept under control easier than the rhizome-rooted types. *I. siberica* has many varieties or hybrids and the beauty of the plant is in the tall, slender leaves and the tall-stemmed delicate flowers. These are generally much smaller than the bearded types but are so dainty and variedly coloured that they are especially decorative at the water's edge. The stiff stems of the flowers make them very suitable for cutting and for home decoration they can hardly be bettered. They should not be planted in the



Photo: *Circular pond in its Hertfordshire garden setting* H. Juel

water but delight in a rich soil with a good humus content where plenty of moisture is available.

A popular variety is *I. siberica* v. *Perry's Blue*. This grows about four feet high and the flowers are blue and four inches or more across. *I. siberica* v. *China Blue* is a slightly smaller growing plant with pale blue flowers. There are several other varieties, some of which only grow about two feet high. Although most thrive in a sunny position near the pond it is possible to prolong the flowering period of this type if some clumps can be placed where they get less sunshine.

There is another group of irises which are most attractive, the clematis-flowered ones known as *I. Kaempferi*. These like a well nourished lime-free soil at the pond-side. They are rather stronger in growth than the above-named types but among the many varieties can be found some very pleasing colours. Some of the favourite forms are: *Blue Peter*; *Brocade* (a violet-purple); *Crown Princess* (lavender-blue); *Dancing Girl* (a double white tinged with blue); *Dawn of Spring* (another double with wine-red colouring); *Landscape at Dawn* (with large blooms eight inches across in a rich lavender shade dotted with yellow); *Mikado* (rosy-crimson); *Water Nymph* (large and snow-white). From these it will be seen that there are plenty of grand colours from which to choose.

Microscopy for the Aquarist

(continued from preceding page)

Worthy of attention, too, are the remarkable leg coverings. Unfortunately these are usually all jumbled up together. With a couple of fine needles, mounted at the end of wooden or plastic handles, they can be teased apart—not without considerably damaging them, however, in most cases. The complicated arrangements of hairs and filters will surprise you, and bring home the necessity for the animal to have some means of cleaning or unclogging them. This is exactly why the claw-tipped end of the tail is provided. In murky water containing a fair amount of suspended solids, it is constantly in use.

Incidentally, the number and arrangement of spines, together with the general shape, of the tail is extensively used for identifying different species of *Daphnia*.

COLDWATER FISHKEEPING QUERIES *answered by* A. BOARDER

Some years ago I bought two dwarf water lilies. The first year I had them in quite shallow water but this year I moved them to water about 18 inches deep. There are plenty of leaves but when the buds get to the top of the water they rot off before flowering. Where have I gone wrong?

Many water lilies only open their flowers when the sun shines or at least during the day time. They then close in the late afternoon. If the buds actually do not open it may be a matter of the water depth, although normally they would open somehow. It may be that there is not sufficient nourishment in the pond for the lilies. Again, some lilies take a year or two to get well established before they flower. I consider that it is best to plant them in good rich loam without the addition of any other matter. A couple of turves can be tied around the roots and it will be found that the water lily will soon get established in this. Roots will also be sent out into any mulm in the pond and providing there are some fishes therein there should then be sufficient nourishment for years. The main reasons for non-flowering of lilies are:—Insufficient nourishment, wrong depth of water and wrong species (that is, tropical types in cold water).

I am thinking of building a pond in my garden; I know something of the task but are there any special instructions which you can give me concerning the job?

There are certainly plenty of tips I could give you on the making of a pond but I do not know how much you already know. Briefly, you should mark out the position and extent of the pond first with pegs, testing with a long board and spirit level to see that the finished edges will be the same. Then excavate well. Allow for about three inches of concrete. Remember that the better you make this mixture the better the pond and the less trouble will it be for ever after. Thin concrete ponds will surely crack in time through frost and you will find it very difficult to mend the cracks permanently. If you can incorporate some form of reinforcement at the same time it will be a great advantage. Even stout chicken wire could be used for this purpose, seeing that it is well covered by the cement mixture. It is advisable to well firm the base of the pond before putting any concrete in. When you do start to concrete see that all the ballast is clean and free from earth. The cement should be fresh and must contain no lumps. The top layer (about $\frac{1}{2}$ inch) should be of three parts sharp sand to one part cement, and if this can be laid on quickly in one operation it will do a great deal towards making the pond waterproof.

I have a 24 ins. by 12 ins. by 12 ins. tank with six goldfish types together (about 9 inches of fish). Sometimes they dart about and slide sideways over the gravel. I thought they had gill flukes and gave them the salt treatment, but they do not seem to improve much. What else can I do?

I have not known the salt treatment to be any use against flukes. Something stronger in the form of a disinfectant is needed. Either T.C.P. or Dettol will usually do the trick and the strength of solution will depend on the time the fishes are left in. For instance, a teaspoonful of Dettol to a quart of water would mean that the fish must only remain in for 15 seconds, but if the solution was a quarter teaspoonful of Dettol to a gallon of water the fish could remain safely for 15 minutes. I think that the weaker solution for a longer period is the safer method. It must be realised that it is no use giving fishes such treatment if they are to be returned to the same tank amongst possibly infected fishes. Once treated they should be put into a clean tank with fresh water. All the fishes in a tank may need the same treatment to make sure that there would not be a recurrence of the trouble.

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.

How can I keep and breed meal worms?

The keeping and breeding of meal worms in quantity is not an easy matter. The "worms" are actually the larvae of a beetle, *Tenebrio molitor*, and so turn into these when mature. You can try breeding them in a box or old aquarium in bran or corn meal. Some people supply moisture in the form of sliced raw carrot or potato. Keep a cloth over the top of the mixture, and a net would have to be provided over all to prevent the beetles from flying away. You will find that it is easier and more profitable to breed white worms, as these do not go through any metamorphosis; the worms lay eggs from which fresh worms emerge.

I have a goldfish about four years old which seems ill. It lies on its side at times and has streaks of black on its body and fins. What is the matter with it?

When a fish lies on its side there can be more than one reason for it. When fishes are in very cold water they generally lie on their sides, but usually on the bottom of the tank. When on their sides at the top of the water it may be through some form of air bladder trouble. This may, of course, have been caused by chilling but other things can cause it too. The black streaks are often the sign of previous damage. When goldfish are very young they are black in colour and this black gradually gives way to the gold. It is often found that any new tissue made by the fish to replace any damaged will be black for a time. Again some fish never seem to lose all the black, especially if they are kept very cold and come from a stock which has many similar fish. After an attack of fungus a fish may show the black markings. The fish will probably recover if it is given as much live food as possible. You mentioned in your letter about the fish swimming around in its "bowl." I hope this is not one of those awful things which we aquarists hate. Do give your fish a decent container to live in as it will be healthier and much happier.

I have a small pond in my garden and have made an elephant to pass water into the pond through the trunk. I intend to use a 15 inch length of copper tubing. Is this sufficient to harm the fish?

Yes, undoubtedly the copper can harm the fish. The smallness of the pond means that the concentration of copper can be high enough to be fatal to fish. Less than five parts of copper to a million parts of water can be fatal. I know that some people claim that they use copper with no obvious ill effects but I am still unimpressed. I have had numerous certain cases where a small amount of copper such as water running through a copper pipe has caused deaths. A lot can depend on the type of water; for instance soft water could be more dangerous than hard. The hard or limy water could soon form a deposit inside the pipe and so lessen the poisonous effects.

I have some small patches of white forming in my tank which looks like hoar frost. What is it, its cause and cure?

It appears to be a form of mildew which may have been encouraged by the decomposing of certain uneaten food-stuffs. It may not be that you have been actually over-

feeding but there may be some fine powdery substance in the food which the fish do not eat. There is nothing worse than this sort of thing to start mildew forming. Rake out and siphon off the growth, stop all fry feeding and use a little live food only.

We have obtained a rusty tank for our school and would like to know how to treat it. Also please give advice on the following subjects:—plants, fish breeds and number, essential equipment, food, especially live food produced in school, and any other matter we should know together with the names of any books suitable for beginners.

First scrape away all rust and clean the frame well. Then paint with a galvanising paint. Follow this with a coat or two of flat paint finishing with a good top glossy paint. To give you all the answers to your other questions adequately would take a whole book and as you have asked for a small book for the beginner I cannot do better than advise you to get my book *Coldwater Fishkeeping*, which answers all your needs fully. This only costs 2s. 8d. post paid from the publishers of *The Aquarist*. If after you have read this book there arise any points unanswered I shall be pleased to deal with them.

I had a well-set-up tank with plants growing apparently quite well. I bought three small fancy goldfish and they all died within about a month. They had blood clots on the fins and did not hold up their dorsal fins; before dying, they remained mostly at the surface. What was the cause of their death?

The blood clots suggest that the fish had been attacked by some pest, such as flukes or fish lice. They may have been affected when you bought them and gradually got worse. I think that you had better disinfect your tank before starting again. Put a teaspoonful of Dettol in the tank and leave for 24 hours before re-stocking. If you have plants in the tank use a less strength and empty after about half an hour. When purchasing fish do not be guided by the size of the fish. Watch those in a tank for a little while. Those which are continually mouthing at the top with their dorsals down must be passed over. Try to find fish which appear lively, are rooting about at the bottom of the tank, are bright eyed and carry their dorsal fins erect. Such fishes are more likely to be of use to you no matter how small.

I have a tank 24 ins. by 12 ins. by 12 ins. and would like to know the best time to set it up; also what powered bulb should I need as the tank only gets a little sunlight?

The best time to set up a tank is now in the warm months of the year so that the plants get the best chance of becoming established. They always grow quicker in the summer and so would make new roots far sooner than during the winter.

For a tank the size of yours I would use two 25 watt lamps, switched on at intervals according to the amount of natural light available each day. Sometimes they may be switched on only for feeding, but on a very dull day they might need to be on for several hours in the evening.

I am intending to breed from some fantails and veiltails. When separating the fish to get them into breeding condition how long should they be kept apart? They have been kept at a temperature of 66° F. all the winter. Also when the male does not show the white tubercles and the female has no distended body do you keep them separate and keep on with the special feeding?

In the first place I do not believe in keeping breeding fantails at a raised temperature all the winter. My breeders spent about a month under some inches of ice in the pond last winter, and I consider that a good rest at a low temperature is essential for the fishes if they are to breed well the following season. There is usually little need to condition feed as once the weather gets better the fish come into breeding condition naturally. Mine do get a few worms but nothing else is done and they never fail to breed well. The white tubercles on the males may not always be apparent. I have had many males in breeding form which never showed the marks. The females, however, generally become more distended in the belly when many eggs are swelling there. If fishes are separated for a week and well fed on live foods it is usually enough time to ensure that they will spawn when put together as long as the weather is right. A bright sunny morning at the commencement of a warm spell will do the trick often.

Last summer I had several fishes die in my pond. I cannot find the reason unless it was due to my using some insecticide in the garden; could this kill the fish?

Some of the modern insecticides will certainly kill goldfish. Many contain D.D.T. and some also Gammexane. These are deadly to fish and do not appear to have to be in large quantities at that. I can give you an instance. A man cleaned out a small tank which had held two goldfish for years. He re-filled the tank with tap water using a galvanised two gallon water can for the purpose. Within two days both fishes had died. He then realised that he had used the can to mix up a strong insecticide which contained the substances above quoted. There is no doubt that there was sufficient poison still adhering to the can to prove fatal to the fish. Where fine mist-like sprays of insecticide can be blown into a pond it is very dangerous indeed for the fish. Weed-killing agents which can be washed into the pond by heavy rains can also be dangerous. It is always advisable to see that no water can drain into the pond from any part of the garden.

THE PRACTICAL AQUARIST

Aquarium Cover

COVERS & LIGHTS — THE SIMPLEST FORM OF COVER/LIGHT SET-UP IS IN THE FORM OF A SHEET OF GLASS LAID OVER THE TANK WITH A LIGHT HUNG ABOVE IT. THE GLASS SHOULD BE SEATED ON RUBBER AS IN FIG. 2 SO AS TO PREVENT CONDENSATION ATTACKING THE TANK OR SUSPENDED WITHIN THE TANK AS FIG. 3. BY MEANS OF METAL CLIPS WHICH CAN BE HAD AT ANY DEALERS.

FIG. 1
FIG. 2
FIG. 3

A BETTER TYPE OF COVER CAN BE MADE FROM ALUMINIUM SHEET USING THE PATTERN IN FIG. 4, CUTTING OUT & FOLDING AS FIG. 5. THE 2 HOLES X ARE FOR LAMP HOLDERS — CARE FOR LEADS TO THERMOSTAT & HEATER & C° IS FOR

FIG. 4
FIG. 5

FEEDING & CAN BE COVERED WITH A METAL DISC OR SIMILAR — THIS SAVES REMOVING THE MAIN COVER EXCEPT FOR PERIODICAL CLEANING ETC.

ANOTHER METHOD IS TO USE THE STRIP TYPE OF LAMPHOLDER USING EITHER A SINGLE STRIP-LIGHT OR TWO STANDARD BULBS —

METHOD A
METHOD B
LAMP HOLDER
GLASS
GLASS

NEXT MONTH: HEATING

our readers

Readers are invited to express their views and opinions on subjects of interest to aquarists. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.



Address letters to The Editor, *The Aquarist*,
The Butts, Half Acre, Brentford, Middlesex

Metal Accessories

I AM enclosing a clip from an aquarium thermostat for your examination. When new this clip was brightly plated, and in fact after only a visual examination I thought it was steel. I have had two of the clips in use constantly for about two years without trouble, but two months ago I spawned a pair of *Apistogranma ramirezi*, and lost a lot of fry.

The eggs from the fish were removed on a large stone and allowed to hatch in a small glass tank floated inside the three-foot aquarium. When the fry, approximately 200, were free-swimming I transferred them to the large tank and within two hours all were dead. Ten days later the parents spawned again, but exactly the same happened, with a loss of 387 fry this time. On looking for the cause I noticed that the thermostat clip showed exposed copper upon it.

I removed by dip-tube 20 zebra danio fry about 12 days old and placed them in the tank whereupon they died after two to three hours. The fishes in the affected water have the appearance of being drunk, tumbling around in the water and swimming completely upside down at times. It seems to me that the copper from this plated clip is the cause and other aquarists may like to know of this danger. Why makers use copper and brass for accessories in this age of plastics is beyond me; a plastic clip instead of the metal one would do the job just as well with no risk.

J. R. SPERRY,
Whitwick, Leics.

The clip sent with the above letter was certainly made from copper, and the plating over this metal had worn from the surface in several places, making patches of green salts of copper in evidence. It seems from our reader's letter that the concentration of copper occurring in the aquarium, if responsible for the deaths of the fry, was not enough to harm the adult fish. We agree that plastics are to be preferred for this type of aquarium equipment.—EDITOR.

Aquarium Background

I HAVE found that a large piece of flat, uneven sandstone placed at the back of an aquarium makes an ideal background for the plants. Besides giving a natural effect the sandy colour "brings out" the green.

C. BURGESS,
London, S.W.6.

Simplified Pond-making

I HAVE just built my first pond, a fairly large one (900 galls.) of irregular shape. It has taken me a long time, with a lot of hard labour to which I am not accustomed. The "books" warned me that digging the pond was back-aching, so I expected it and was prepared for it. But no one warned me just how hard was the task of mixing and laying concrete! It must have required about six times the labour of digging. And now the task of "maturing" by soaking (I spurned sealing the lime in) is proving a long job.

How simple it would be if after the pond has been dug one could spray some kind of plastic (while in a liquefied state) on to the bare earth (mine was clay), and then fill up with water and stock immediately. The plastic would be sufficiently pliable to stretch when the surrounding earth shrank in dry weather. Would such an idea be a possibility? Have any of your readers had any experience of such an experiment? Would the plastic be sufficiently strong to withstand the pressure of the water if cracks appeared in the earth behind? And would it be durable? And I wonder what would be the cost in comparison to cement. I should be interested to know if any readers have ideas about this.

The Rev. A. B. DE T. ANDREWS,
London, W.1.

A Self-indicating Aquarium

AT one time I kept a small tank containing the Western mosquito fish, *Gambusia affinis affinis*, on my desk. These fish were fed with cladocerans, copepods and phylo-pods from a nearby freshwater lake, and it soon became noticeable that a healthy culture of green algae, probably *Chlorella*, bloomed in the tank, which was exposed to the direct rays of the sun for several hours a day. Before long an interesting relationship developed in which the intensity of the green colour in the water served as a guide to the amount of food in the tank. If a large amount of plankton was present, it utilised the algae as food at a greater rate than the algae could reproduce itself, and the water in the tank became relatively clear. When, however, the fish had eaten most of the plankton, the *Chlorella* increased at a great rate, and the water in the tank became very green, thus indicating that it was time to feed the fish once again.

DANIEL M. COHEN,
Natural History Museum, Stanford,
California, U.S.A.

Unusual Battle

IN one of my aquaria in West Africa I had a water garden 24 in. long and 15 in. wide, with 9 in. of water in the 12 in. deep tank. One day I moved a plant with my finger and saw a praying mantis move. The insect was about two-and-a-half inches long in the body and the same green as the plant; as it moved the *Panchax* in the water saw it and came in to attack. Although the fish were quick the mantis was quicker—it struck with the saw-toothed fore-limb and the fish retreated. Again and again they attacked and were met by outward thrusts of the insect's deadly weapon. It looked as if neither side would give in and then, one of the fish left the attack and swam round behind the insect, which was still resisting the frontal attack of three other *Panchax*. All four fish struck at once and the tired mantis was pulled into the water, where it was helpless, and in a few seconds it was torn to shreds by the *Panchax* and devoured even to the last traces of the wings.

J. PATERSON,
Bonnyrigg, Scotland.

Fish "Bloodstock"

SINCE I decided to make a hobby of fish-keeping some twelve months ago I have been fortunate in being able to visit dealers and shows all over the country. I am very much surprised at the difference in the quality of fishes offered for sale and those on show.

If one lives in a big city it may be easy to find breeders having the quality of fish one wants, but to anyone not so fortunately situated in this respect a considerable amount of time and money may be spent visiting breeders who might have the required stock. At some shows trading by exhibitors is forbidden and at others it is impossible to contact exhibitors in the time one has available.

May I therefore suggest that an annual bloodstock show and sale be organised to which breeders could bring prize-winning stock or fishes from such stock? I am sure such an event would be well patronised and would lead to the improvement of fishes generally. Fewer people might then be tempted to try to make silk purses from sows' ears.

F. WOLFENDALE,
Malvern, Worcs.

Fin-rot Treatment

SALT treatment is frequently advised in your pages as a cure for fin-rot. Quite a number of fishes object strongly to salt and I have cured many tropical and cold-water fishes without its use.

For fin-rot, congestion or some types of fungus, paint the affected parts of the fish with turpentine, allowing up to ten seconds before returning the fish to the aquarium. In most cases one application is sufficient and in all cases I have had 100 per cent. success. Turpentine does not appear to worry fish unduly even if painted on the gills.

J. STANHOPE,
Glasgow, S.1.

Aquarist's



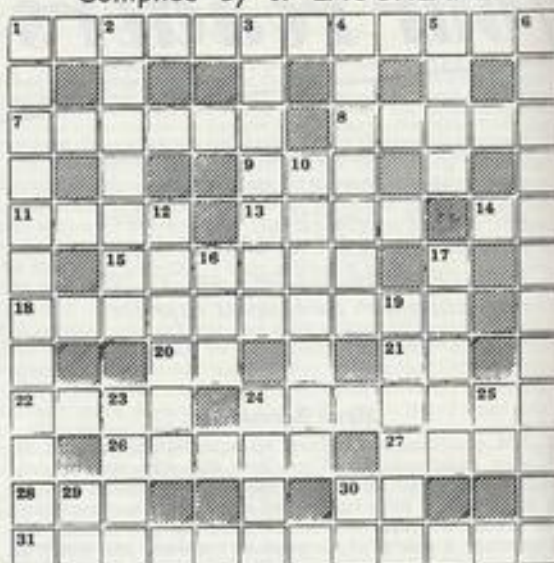
PRODUCED in response to numerous requests from readers, this attractive silver, red and blue substantial metal emblem for the aquarist can now be obtained at cost price by all readers of *The Aquarist*. The design is pictured here (actual size). Two forms of the badge, one fitting the lapel button-hole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

To obtain your badge send a postal order for 1s. 9d. together with the **Aquarist's Badge Token cut from page xii**, to **Aquarist's Badge, The Aquarist, The Butts, Half Acre, Brentford, Middlesex**, and please specify which type of fitting you require.

Badge

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- 1 *Lobelia dortmanna* (5, 7)
- 7 Rot but for this highly esteemed flatfish (6)
- 8 May be *Lenina*, Morris, or young brother (6)
- 9 Recession of the tide (3)
- 11 The part of a plant that is earthed (4)
- 13 To bring up from fry, perhaps on hind legs (4)
- 14 Indirect current, but not in the river (1, 1)
- 15 Substances formed from skeletons of zoophytes (6)
- 18 Serpent worshipper as distinct from herpetologist (10)
- 20 The French from leech head (2)
- 21 Look from the loach (2)
- 22 Another name for dace (4)
- 24 *Corogobius vandermis gracilis*, rare fish, found only in Derwentwater and Bassenthwaite (7)
- 25 Pressed or goaded (5)
- 27 Enough in an unusual form (4)
- 28 Usually tall (3)
- 30 Manuscript (2)
- 31 Bloody weapon precedes the end of this popular tropical fish (3, 9)

CLUES DOWN

- 1 *Pezomachus crispus*; aquatic warrior? (5, 7)
- 2 *Salvelinus perca*; Welsh char (7)
- 3 and 5 This runs from the gills to the tail of most fishes, and is thought to be a sensory organ (7, 4)
- 4 Stab mob for high-sounding talk (7)
- 6 Gem for the tank from the Dark Continent (7, 5)
- 10 Adorned by lace plant? (7)
- 12 To rile in a way the worker (6)
- 16 Fish eggs (3)
- 17 Moan (5)
- 19 Siam after a pound in the disturbed Dec becomes heir (6)
- 23 *Scardinus erythrophthalmus*, possibly the loveliest British fish (4)
- 24 It is nothing to vet, but upsets the vote and kills resolution (4)
- 25 Small company of cod (2)
- 29 Wind (1, 1)
- 30 Degree of the doctor fish? (1, 1)

PICK YOUR ANSWER

1. *Aequidens maroni* is popularly known as: (a) blue acara, (b) brown acara, (c) keyhole fish, (d) saddle cichlid.
2. *Barbus cononotus* is native to: (a) Ceylon, (b) Malay Peninsula, (c) Sumatra, (d) West Africa.
3. *Rivulus dormii* was named by: (a) Ahl, (b) Meek, (c) Myers, (d) Regan.
4. The oranda goldfish was first bred in Japan in: (a) 1820, (b) 1840, (c) 1860, (d) 1880.
5. The flowers of *Hydrocolea comersonii* (water poppy) are: (a) blue, (b) red, (c) white, (d) yellow.
6. Which one of the following species is indigenous to Great Britain? (a) *Myriophyllum heterophyllum*, (b) *Myriophyllum pinnatum*, (c) *Myriophyllum spicatum*, (d) *Myriophyllum terrucostum*.

(Solutions on page 82)

G.F.H.

A LARGE audience of members of the Coventry Pool and Aquarium Society heard a lecture on guppies by Mr. W. V. Jones at a recent meeting. Mr. Jones is a prominent member of the Midlands Section of the Guppy Breeders' Society. There was also a table show for pairs of fishes, there being a good number of entries of fishes of high standards.

FIRMLY established now in their new club room at the South Lodge Bungalow, The Green, Southall, members of the Southall Aquarist Society are holding meetings on alternate Thursdays at 7.30 p.m. Show materials including show tanks and electrical equipment are stored at the new headquarters so that work on this can be done on club nights in preparation for the society's summer show.

WHEN members of the London Group of the British Herpetological Society last met, 21 different species of amphibians were shown and discussed. Among the more exotic were the American bell toad, Hammond's spade-foot toad, *Hyla graciosa*, *H. evansi*, *Pelobates cultripes* and a large *Bufo marinus*. Three outings are being arranged for members.

MR. E. G. HARRIS, of the Hampstead Aquatic Society, received first prize in the Coldwater Class with his American sun fish at the National Aquarium Exhibition last month. With this sun fish he took the cup for Best Fish of the Year at the Hampstead Aquatic Society's Annual Show last year; he also gained a third prize for his tropical furnished aquarium. Although the society was not successful with its club entry in the Furnished Aquaria Class, the show secretary, Mr. C. Matthews and assistant show secretary, Mr. C. K. Walker were very



Mr. C. A. Blake of Rochdale is seen on the left being congratulated by Mr. Gerald Nes (T.V. and radio personality, F.N.A.S. secretary) on his successes at Rochester and District A.S. fourth annual show. Mr. Blake won three cups, five first prizes, four specials and one second and one third prize.

close runners in the judging. An exhibition of 20 furnished aquaria displaying tropical and coldwater fishes was organised by the society at Brentwood School, Brentwood, Essex, for the School's Annual Garden Party on 18th June. Visitors numbered nearly 600. During the exhibition an unfortunate mishap occurred when a lady visitor carelessly leant against a stand supporting two of the aquaria and sent 12 gallons of water, fishes, rock, plants, etc., all over the place, and then coolly said: "What a silly thing to do," and walked out without an apology. Apart from this incident the show was a great success, due to the efforts of Messrs. C. Matthews, K. J. A. Fye, K. C. Hind, L. G. Lawrence, C. K. Walker and Mrs. Rennick. Mr. P. Meyer set up a specially furnished

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.

A copy of *The Aquarist's Directory of Aquarium Societies* will be sent free to any reader on receipt of a stamped, self-addressed envelope.

tropical aquarium in the Brentwood School for the students of biology.

DESIGNS for the Hendon Aquarists' Society's open show this year (10th-13th August) are entirely new, and a contemporary designer, Mr. Dave Frost, is giving his services to ensure that the show will be the latest in exhibition presentation.

AT least 100 tanks are being provided by the Chelsea Aquarium Society for an exhibition of furnished aquaria and a competition for any variety of coldwater fish, entries to come from the children of Chelsea; show dates, 5th and 6th August. In May members of the society together with many aquarist guests from other societies saw the film "Under the Red Sea" at their meeting place.

STOCKING the garden pool was the subject of a talk given recently by Mr. J. Stott to the Huddersfield and District Aquarists' Society. At the meeting a table show for livebearers and other tropical varieties was held.

WHEN members of the Basingstoke Aquarists' Society were "at home" to Willesden Aquarists' Society members for a competitive display of fishes, they were the losers by five awards to three. Visiting judge was Mr. E. H. Riddle (chairman of F.B.A.S.).

MEMBERS of the Penistone Aquarists' Society now meet every third Wednesday in the month; the secretary is Mr. G. Scarfe, 60, Ward Street, Penistone, nr. Sheffield.

AT the second meeting of the newly-formed Kidderminster and District Aquarists' Society a talk was given by Mr. A. Dudley on his experiences in fish-keeping and angel fish breeding. Meetings are held on alternate Thursdays, 7.30 p.m., at the Victoria Club Room, Green Street, Kidderminster.

TWO outings for members of the Guildford and District Aquarist Club are arranged for this month—the first to the aquarium of Mr. McInerney at Ewhurst, Surrey, and the second to the Haslemere Educational Museum. Mr. J. Clegg, curator of the latter institution, is president of the Guildford society.

ACTIVITIES this year of the Bedford and District Aquarist Society have included a film show, table shows, a "bring and buy" sale and a demonstration given by Mr. J. Wadding of Wellingborough, of building an "anti-condensation" aquarium hood.

Aquarist on Holiday

INVITATIONS to aquarists on holiday in the Portsmouth and Southport vicinities have been received from the societies there for them to attend meetings. Meetings of the Portsmouth Aquarists' Club are held on the first and third Wednesday of each month, 7.30 p.m., at Northern Parade Senior Boys' School, Doyle

Avenue, London Road, Hilsae, Portsmouth-Southport and District Aquarium Society's meetings are on the first Thursday of each month, 8 p.m., at Y.M.C.A. Building, Eastbank Street, Southport, Lancs.

B.A.F. Classes

(see also page 60)

CLASSES 6 to 13 will be contained in Class 3 of entries from societies, but awards for each class will be made to the owner of the winning fish; the owner must be a member of the competing society. It is hoped that this will encourage individual society members to loan their best fishes for their own society; societies can make awards of their own within the block entry for Class 3 if desired—the show committee will supply all judging and pointing information required. Up to six of the eight classes may be entered but no more than two entries are to be made in any one class.

In Class 4 judging will assess the staging and layout generally of the society's entry and will not take into account the quality of the fishes in the seven aquaria. Floor space measuring 12 feet by 8 feet will be allotted (an island site if required) for each entering society and this is to be made as attractive as possible by any means at the disposal of the competitors.

Show schedules can be obtained from Mr. S. W. Cooke, Spring Grove, Field Hill, Batley, Yorks. Closing date for entries will be midnight 29th August.



Distinguished visitor to the National Aquarium Exhibition in London last month was the first Danish Minister in London, Dr. Jorgen D. Scheel. He is seen in the picture (centre) shaking hands with Mr. Kenneth G. Hayes at the Hykro Products stand, which was bright and colourful with posters from Denmark. Mr. L. White, secretary to the National Aquarists Society, is at the right of the picture.



Photograph taken on the occasion of the presentation of a second aquarium to the Leicester Royal Infirmary by the East Midlands Section of the Federation of Guppy Breeders' Societies. Together with the ward sister and some of her young patients are officials of the section. Left to right: Messrs. P. Casson, J. Rudkin, C. Taylor, H. Esterbrook, S. Cunliffe

Aquarist's Calendar

7th-10th July—**Chester and District Aquarist Society** annual open show at St. Peter's Parish Hall, Chester. Schedules from show secretary, Mr. C. Morrison, 22, Belgrave Place, Handbridge, Chester.

15th-16th July—**Macclesfield Aquarium Society** fourth annual exhibition at Brocklehurst Memorial Hall, Queen Victoria Street, Macclesfield, Cheshire. Particulars of open club furnished aquaria class from show secretary, Mr. S. B. Cass, 20, Duke Street, Macclesfield.

16th July—**Standard Kolster Aquarist Society** annual open show in conjunction with Standard Kolster Pete.

21st-23rd July—**Bath Aquarists' Society** third annual open show at the Concert Hall, Pump Room, Bath. Schedules available from show secretary, Miss A. Gurney, 41, Sydney Buildings, Bath.

28th-30th July—**Portsmouth Aquarists' Club** annual open show at Royal Engineers' Drill Hall, Portsmouth. Entry forms from show secretary, Mr. G. Elverson, 24, Bertie Road, Southsea.

30th July—**Bedford and District Aquarist Society** open show in conjunction with Marson Valley Brick Company's Show and Sports. Details and schedules from secretary, Mr. R. R. Pope, 51, Aylesbury Road, Bedford.

2nd-3rd August—**Leicester Aquarist Society** display of aquaria at Leicester and Abbey Park Show in horticultural marquee.

10th-13th August—**Hendon and District Aquarists' Society** annual open show. Details and schedules from Mr. Hartnup, 37, Park Mansions, Vivian Avenue, Hendon, London, N.W.4.

19th-20th August—**Kirkcaldy and District Aquarist Society** first annual show at Boys' Brigade Hall, Kirkcaldy, Fife. Schedules from show secretary, Mr. A. Blair, 14, Miller Street, Gallatown, Kirkcaldy, Fife.

20th-21st August—**Leyton Aquaria Society** annual open show (in conjunction with Borough of Leyton Show) at Coronation Gardens, Leyton. Saturday: 3.30-9 p.m.; Sunday: 12 a.m.-8 p.m. Schedules from show secretary, Mr. R. Bergdahl, 49, Overton Drive, Wanstead, London, E.11.

25th-27th August—**Midland Aquatic Show** at Bingley Hall, Birmingham.

25th-27th August—**Banbury and District Aquaria Society** show. Details from show secretary Mr. A. Simmonds, Hadsham Cottage, Hooley, nr. Banbury.

31st August-3rd September—**Leicester Aquarist Society** annual show at St. Mark's Schoolroom, Belgrave Road, Leicester. Show secretary, Mr. E. L. Matthews, 61, Alnsdale Road, Leicester.

31st August-3rd September—**Association of South London Aquarist Societies** annual exhibition at Adult School Hall, Benhill Avenue, Sutton, Surrey. Opening 3 p.m. first day, 10 a.m. others. Details from secretary Mr. S. Davies, 16, Milton Road, Wallington, Surrey.

31st August-10th September—**Nottingham and District Aquarists' Society** annual show.

8th September—**Yeovil and District Aquarist Society** furnished aquaria exhibition at Yeovil Agricultural Show.

8th-10th September—**Coventry Pool and Aquarium Society** annual show at Queen's Road Baptist Church Hall. Opening 2.30 p.m. first day, 10 a.m. others.

10th-11th September—**Willesden and District Aquarists' Club** show at the Willesden Show, Roundwood Park, Willesden.

9th-10th September—**Bethnal Green Aquatic Society** show. Details and show schedules from show secretary Mr. F. Fox, 130, Whitcross Street, Old Street, London, E.C.1.

15th-17th September—**Peterborough and District Aquarists' Society** annual open show at St. Paul's Hall, New England, Peterborough. Schedules from secretary Mrs. Y. J. Stockdale, 2, Home Place, Eastgate, Peterborough.

16th September—**British Herpetological Society** (London Group) meeting: "Young Animals," 7 p.m., at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

17th September—**Lambeth Aquarist Society** annual show at St. Luke's Church Hall, Norwood High Street, London, S.E.27.

24th September—**Federation of Guppy Breeders' Societies** show at the Pavilion Cafeteria, Zoological Gardens, Regent's Park, London, N.W.1.

£100 Guesses

EVERY visitor to the newly-opened aquarium at Southend-on-Sea is given the chance to have a free guess at the number of fishes contained in one of the aquaria. The visitor guessing the figure correctly will receive a prize of one hundred pounds. The winner will be announced at the end of the summer season after all the recorded guesses are examined.

New Societies

Londonderry and District Aquarists' Society. Secretary: Mr. J. O'Bryan, 12, Barrack Street, Londonderry. (The society extends a welcome to meetings for aquarists in north-west Ireland; the secretary will supply details of meetings.)

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:

Bath Aquarists' Society (Mr. J. F. Slater, 4, Poltney Avenue, Bath); **Bristol Aquarists Society—Keynsham and District Branch** (Mr. R. L. Vince, 8, Vandyck Avenue, Keynsham, Bristol); **Kingston and District Aquarists' Society** (Mr. W. Chiffe, 6, Wiltshire Gardens, Whitton, Middlesex); **Southport Aquarist Society** (Miss Kathryn Lessiter, 7, Carlisle Road, Birkdale, Southport); **Weybridge Natural History Society—Aquarists' Section** (Mr. W. E. Barker, 2, Thrupp Avenue, Hersham, Walton-on-Thames, Surrey).

Crossword Solution

W	A	T	E	R	L	O	B	E	L	I	A
A	O			A	O	I					F
T											
E				E	B	B	E				I
R	O	O	T	R	E	A	R	A	C		
S											
O	P	H	I	O	L	A	T	E	R		N
L											
D	A	R	E								
I											
E	N	D									
R	E	D	S	W	O	R	D	T	A	I	L

PICK YOUR ANSWER (Solution)
1(c). 2(a). 3(c). 4(b). 5(d). 6(c).